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Harald Burgsteiner &
Georg Krammer (Eds.)

Impacts of COVID-19 Pandemic's Distance Learning on Students and Teachers in Schools and in Higher Education

– International Perspectives

Pädagogische Hochschule Steiermark

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Preface

The COVID-19 pandemic caused changes in the entire social and economic life worldwide in 2020 and 2021. Nearly 1.6 billion learners (94% of the world's student population) were affected by the closure of educational institutions at the peak of the COVID-19 crisis.[1] The COVID-19 crisis also affected tertiary education, where we are likely to experience an unprecedented high in dropout rates and a projected 3.5% decline in enrolment, resulting in 7.9 million fewer students.

Due to the imposed lockdowns, schools and universities were forced to digitise conventional teaching in a very short time and to convert teaching and learning formats partially or completely to Distance Learning. The changes in everyday teaching brought by Distance Learning were felt worldwide. Presumably, these changes were received very differently in many countries. Differences may have arisen, among other things, from the different preconditions with regard to the respective:

- National social structure and existing educational inequality.
- (Previous) Training of teachers and university lecturers.
- Degree of digitalisation in the field of education.
- Speed, content and scope of the reactions of governments and competent authorities.
- Monitoring of the challenge by school and university administrations.

The editors of this book – Harald Burgsteiner and Georg Krammer – want to shed light on the effects of Distance Learning in different regions of the world. For this purpose, we invited contributions addressing specifically these changes in countries and regions across the world. This allows for a value-free comparison of how the COVID-19 pandemic has been addressed in education in different parts of the world and what impacts – positive and/or negative – it has had, is having or may have in the future. The effects of Distance Learning can be manifold. Hence, we looked for empirical and theoretical articles that discuss, analyse, critique, or otherwise address aspects of education in settings of Distance Learning brought about by the COVID-19 pandemic. Topics include but are not limited to:

1 UN Secretary-General warns of education catastrophe, pointing to UNESCO estimate of 24 million learners at risk of dropping out. URL: https://en.unesco.org/news/secretary-general-warns-education-catastrophe-pointing-unesco-estimate-24-million-learners-0 [2021-10-12].

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- technological changes (e.g., expansion of the IT infrastructure used in education);
- sustainable structural changes in the education sector;
- ongoing didactic and methodological changes in teaching and learning;
- individual and personal social, psychological and physical experiences;
- changes for individual pupils, students, teachers and university lecturers;
- differential effects of distance learning, for example for gender groups;
- risks and difficulties to an inclusive classroom;
- developing or implementing educational guidelines and policies;
- teachers' continuous professional development, training and support;
- effects of absence from school on children and young people;
- roles and experiences of parents and caregivers as at-home educators, supplementing or replacing teachers;
- preparedness, mitigation, and responses in regional education systems.

In response to the call for papers, we received more than 40 submissions from all over the world, which underwent a strict scientific peer-review process. First, all submissions were reviewed by the editorial team. Second, selected authors were invited to submit a full paper. And third, all manuscripts were subject to a double-blind peer review process by at least two experts of the respective field.

At this point we would like to thank all our authors and reviewers for their unvaluable contribution to this book and for ensuring the quality of the peer-review process. Without the cooperation of all these people we would not have been able to edit and publish this book.

The final result after the peer-review process is a book comprising 22 articles that give an insight into teaching and learning in schools and higher education during and after the imposed lockdowns due to the COVID-19 pandemic. The articles stem from 17 different countries. Thus, this book can indeed claim to have "International Perspectives" on this topic. These countries are (in alphabetical order): Austria, Brazil, Cambodia, Canada, Cyprus, Finland, France, Germany, Italy, Poland, Portugal, Russia, South African, Switzerland, Turkey, USA (California), and Vietnam.

Last but not least, we thank the rectorate of the University College of Teacher Education Styria, namely Prof. Dr. Elgrid Messner, HS-Prof. Dr. Regina Weitlaner and Ao. Univ.-Prof. Dr. Beatrix Karl, for the possibility and the comprehensive support to publish this book.

We believe that Distance Learning is not only a topic of the COVID-19 pandemic. Having said that we believe that the COVID-19 pandemic has shown a spotlight on this topic. We hope that this spotlight has fostered technological and pedagogical progress that may be used for the future development of educational systems. We also want to highlight that educational systems have dealt and probably will have to deal again with disruptive changes. Such disruptive change is not limited to pandemics. For example, media reports at the time this book was published[2,3] show that educational developments regarding Distance Learning are useful in humanitarian crisis as we are currently seeing in the terrible war in Ukraine, where teachers are still trying to teach children and adolescences with Distance Learning methods. By designing the cover of this book in the colour „Freedom Blue", we want to praise these efforts.

Yours sincerely,

Harald Burgsteiner & Georg Krammer

2 UNICEF (2020): New tech for schools in Ukraine lets children tap into education. URL: https://www.unicef.org/ukraine/en/stories/education-east-ukraine-goes-online, last visited: 2022-04-28.

3 Geneva Solutions (2022): Keeping education going for Ukraine's children. https://genevasolutions.news/peace-humanitarian/keeping-education-going-for-ukraine-s-children, last visited: 2022-04-28.

I Learners (From Young to Old Students)

The Things We (Might) Lose. Content and Context of Online Learning in Times of COVID-19

Emilia Kmiotek-Meier[1,2], Meike Bredendiek[1] & Lena Hoffmann[1]

Abstract

COVID-19 forced higher education institutions to almost instantly switch to online teaching – uncharted territory for most German universities, as academic education had mostly taken place taught on-site. This paper investigates possible gains and losses university students experience in the process of abrupt digitalization. The study focuses on experiences collected in the frame of transferable skill courses offered by the University of Cologne's ProfessionalCenter. Those courses, open to only a small number of participants, have always had a synchronous, interactive and practice-based character, which was to be implemented in their digital versions as well. Cross-sectional surveys conducted in summer term 2020 and winter term 2020/2021 enabled insights into the students' perception of online teaching and learning: They seem to be satisfied with online learning, evaluate course delivery positively and experience several advantages, such as flexibility and no duty to commute. Simultaneously, they mention disadvantages and losses. The biggest downside is the deficit in social interactions as students miss exchange with and social contact to their fellow students, their teachers and campus life. Our findings indicate a two-way development revealing fatigue and isolation among students but also the acknowledgement that online learning is here to stay. Ultimately, students do not miss the academic content in online learning, but rather the academic context: campus life and vivid exchange.

Keywords

Online Learning, Students' Perspective, Transferable Skill Courses, COVID-19, Advantages, Disadvantages

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1 Introduction

When in early 2020 the COVID-19 pandemic forced society to rethink ways of communicating and collaborating, higher education institutions had to switch almost instantly from face-to-face (F2F) to online teaching. In Germany, this meant a big shift: Omnipresent online teaching was uncharted territory, as "in conventional universities [in Germany], open, online and distance learning initiatives are offered predominantly in life-long continuing and professional education programs that are partly self-supporting" (Bernath & Stöter, 2018, p. 66). Consequently, all four purposes of higher education in Germany – the production and teaching of scientific knowledge, students' personal development, their enablement for participation in civic life, and their preparation for the labour market (Schaper, 2012) – suddenly had to be maintained in a digital environment.

Online learning does not always mean the same thing (Tang et al., 2020). As Means et al. (2014, p.10) state, there are eight variable design features of online learning, including modality (fully online, blended, web-enabled) or online communication synchrony (synchronous only, asynchronous only, both). These different kinds of online learning existed long before the pandemic breakout in the form, for example, of live sessions via a videoconferencing system or e-learning courses without any student-teacher interaction. While the majority of literature regarding online teaching and learning before and during the pandemic focuses on disciplinary courses offered by departments (i.e., teaching of scientific knowledge), little is known about university-based courses that focus on other areas such as interdisciplinary soft skill courses. These classes, as offered at the University of Cologne, teach a small number of students competences that are not discipline specific but relate to the students' behaviour in both personal and professional environments, e.g., conflict management. Our contribution will partly close this gap. We investigate possible gains and losses university students expect in the process of an abrupt shift to online learning while examining the evaluation of mostly synchronous, interactive and small transferable skill courses at one of Germany's biggest universities (see more on context of the study in section 3). Our research question is: Which disadvantages and advantages did students experience in digital classes in contrast to their previous university experience?

Not only the mode of online education can differ, the context is crucial as well – in our case that of the COVID-19 pandemic. Hodges et al. (2020) differentiate in this case between "Emergency Remote Teaching" (during a crisis) and "Online Learning" (beyond a crisis). They argue that "well-planned online learning experiences are meaningfully different from courses offered online in response to a crisis or disaster" (Hodges et al., 2020, p. 1). The emphasis on "well-planned" courses seems to be the key. Not all courses designed before the COVID-19 shutdown were well-planned. Neither were all courses during the pandemic poorly planned. We will show in our paper that even in a short amount of time, well-planed online courses are possible – at least from the students' point of view. What

we also will show is that, in the end, course content is not the most important feature of (digital) education for the students.

To answer our research question regarding possible gains and losses in online learning from the students' perspective, we will firstly discuss previous findings from relevant literature (2). In the second step, we will introduce the setting of our research (3). After having discussed the data and methods used (4), we will turn to our findings, divided in two areas: evaluation of online courses (5.1), and advantages and disadvantages of online learning (5.2). Based on these results, we will conclude with a broader picture on online education in the higher education area (6).

2 Literature Review

While discussing previous findings, the focus is on students' perspectives towards online learning. However, we will add findings regarding teachers' perspectives to the discussion, as learning-teaching aspects are tightly interwoven. We will close the literature section by discussing the advantages and disadvantages of online learning. We consider studies from before and during the COVID-19 pandemic.

We draw upon literature mostly beyond the German context, as before the pandemic, German public higher education institutions had an outspoken affinity for F2F programmes and courses (Breitenbach, 2021; Rühl, 2010). Those F2F courses were only partly enriched by digital elements. When Persike and Friedrich (2016) examined students attending F2F classes in Germany, they divided the digital media into five groups, e.g., classic media (learning platforms, emails or PDFs etc.), social (chat, forums, social networks etc.), interactive media (educational games, web conferences etc.). Around 30% of the students made use predominantly of classic digital media, and only 21% of the students used a wide range of available digital media as part of their studies. It should be noted, however, that no consideration was given to which digital media the universities provided and how good their quality was (Breitenbach, 2021, p. 6).

2.1 Student Perspective

Although the switch to omnipresent online learning and teaching occurred fast, many universities had been working for some time with e-learning platforms to facilitate course administration (Harrison et al., 2017). Similarly, e-learning platforms supplemented F2F classes long before the pandemic. A study by Ituma (2011) showed that these e-learning platforms were mainly used as repository for slides, relevant literature and notes. Given the opportunity, students were willing to engage with the course material before F2F classes as preparation.

However, online learning and teaching goes far beyond the usage of e-repositories. When the pandemic hit, students had to take online courses with no alternatives to choose from (Zapata-Cuervo et al., 2021) and had to pursue omnipresent online education. Hence, students' perceptions regarding online learning in the time of COVID-19 probably differ from those they had pre-pandemic, when they had the option to choose between different modes of instruction when taking classes. Despite being generally engaged in online learning, "[students] felt their learning from online courses was limited, lacked quality, and was less effective, compared to traditional face-to-face learning" (Zapata-Cuervo et al., 2021, p. 10). Ramlo (2021a) gives a more differentiated picture and discusses three attitudes to online education among US students during the pandemic. The biggest share of students hates online classes. The second group can be described as those students who have accommodated the shift, as it is the only alternative, but miss their F2F classes and social contacts on the campus. The third and smallest group of students prefers online teaching to the classes with physical presence.

Whereas the presented studies speak about a strict distinction between online and F2F classes, a study from Kemp and Grieve (2014) showed that students preferred some elements in online form, e.g., completing written activities online at their own pace at a convenient time, while they preferred other elements, e.g., discussions, in a F2F environment. This indicates that blended-learning models could be an optimal solution linking digital learning units that allow self-paced self-study and analogue discussion-rich classroom events in a didactically sensible manner.

Digital competencies among students are a crucial factor in their perception of online classes. For Germany, Senkbeil and colleagues (2019) showed that 20% of study beginners do not have a sufficient level of digital skills needed for successful studies. For more advanced students (6th semester), this proportion reached 53%. The acceptance of online teaching among students may be linked with skills that teaching staff possess (or not). Among the skills needed for good online teaching is the timely planning of the course and proper communication with students, e.g., answering student questions and providing feedback (Martin et al., 2019). The importance of proper communication, also understood as connection with students in the classroom by being approachable and responsive to students' needs, was discussed by Frazer et al. (2017).

Furthermore, negative occurrences, such as withdrawing from or failing online courses, may be linked with students' previous experiences with online learning: If they have had such experience, they do significantly better in subsequent online classes (Hachey et al., 2013). James (2021, p. 5) highlights that success in students' learning in online formats is "the result of a complex combination of factors" (e.g., institutional support, technical design, level of computer skills among learners, e-learning readiness, computer anxiety, learner motivation, self-efficacy, teachers' characteristics) and that higher education institutions have to consider this complexity when designing their e-learning platforms

and support services. These results show that care and support from teachers in online learning are immensely important. That is why some institutions emphasize the relevance of interaction between students and teachers in the online environment (Rühl, 2010). Research on interaction (student-content, student-student, student-teacher) shows that interaction online, when properly integrated, increases students' learning outcomes (Bernard et al., 2009; Hodges et al., 2020).

2.2 Advantages and Disadvantages of Online Learning

Findings on perceived disadvantages and advantages regarding online learning differ. Some demonstrate a negative perception, with students in general disliking online education and anticipating a return to F2F learning (Aguilera-Hermida, 2020). They complain about lack of facilities such as learning centres, libraries or interaction with academic staff. Indeed, students prefer courses with live contact to teachers due to the possibilities to directly gain information or ask questions. Similar to teachers, students view well designed and carried out communication as an important factor of successful online teaching and learning (Tang et al., 2020). Those findings underline the significance of social interaction on the campus.

Recent research has shown that the switch to university-mandated online learning due to the pandemic created physical and psychological stress, anxiety and sleeping issues among students (Birmingham et al., 2021; Jafari et al., 2021; Ulrich et al., 2021). Asked for methods to overcome these negative occurrences, students name exercising, professional support from mental health services, and social contact with others – the latter named as the most successful coping strategy (Jafari et al., 2021).

Moreover, Breitenbach (2021, p. 8) pointed out that the digitalization of teaching had a strong impact on student workload. Over 42% of all respondents to the Global Student Survey (Aristovnik et al., 2020) stated that this had increased compared to the time before the COVID-19 crisis. This particularly affected Oceania (59.8%), Europe (58%; for Germany 76%) and North America (54.7%).

Pre-pandemic, it has been shown that as far as grades are concerned, students in online classes have slightly worse grades than those attending similar F2F classes (Bettinger & Loeb, 2017). However, this may result from self-selecting mechanisms. Failing rates are also higher for online students (Gregory & Lampley, 2016), but they depend on the mode of teaching, with some modes having the same failing rates as F2F classes (Tang et al., 2020).

On contrary, other studies point at an improved engagement with class and learning material, less withdrawal from studies as well as "a stronger sense of community" in online courses (Nguyen, 2015, p. 310). Also, it has not been found that F2F learning works better than online learning (Pei & Wu, 2019). Thus, at least theoretically, online teaching can

widen access to higher education: "A large number of colleges and universities across the United States are transitioning traditional face-to-face classes into fully online, blended, or web-facilitated courses. This is partly due to the need to maintain a competitive edge and make classes more accessible to a growing and diverse student population" (Keengwe & Kidd, 2010, p. 533).

This supports other studies reporting positive aspects of online learning. One of several often-mentioned advantages in regard to online learning is flexibility (Dumford & Miller, 2018; Zapata-Cuervo et al., 2021; Zaveri et al., 2020). Online courses allow students to link different domains of their lives, e.g., family and work. Asked for reasons for choosing distance learning, students at an exclusively distance learning university in Germany reported flexibility ("flexibility of time / no classroom schedule") as well as financial situation ("more compatible with work commitments" & "financial need / must continue to earn money") most often (Stöter et al., 2014, p. 443).

3 Context of the Study

To better understand our findings, we here introduce our research context. The University of Cologne (UoC) is the biggest German university regarding on-site teaching. Along with other universities in Germany, our institution predominantly offered F2F programmes before the pandemic. UoC is attended by 50,000 students. It employs around 4,700 academics and 4,400 non-academic staff (Zahlen Daten Fakten 2018, 2020). As well as over 330 (inter)disciplinary study programmes, UoC offers both discipline-integrated and additive soft skill training. The latter is coordinated by the ProfessionalCenter (PC). PC offers courses for students from all faculties to foster professional and personal development and enhance key competencies relevant for their studies and future careers.

All courses are part of the general studies, the so-called Studium Integrale/Extracurricular Offer, that gives students the opportunity to think outside the box and acquire interdisciplinary and professional skills during their studies. In order to graduate, Bachelor students must accomplish 12 Credit Points in Studium Integrale. Students in Master programmes, teacher training programmes and the state examination programmes can voluntarily attend PC courses under the framework of Extracurricular Offer as an unaccredited supplement to their disciplinary studies.

PC offers about 70 different courses per semester, including soft skill trainings, certificate courses in cooperation with the Chamber of Commerce and Industry in Cologne, language courses and lecture series on socially relevant topics. Before the COVID-19 pandemic breakout, the programme was mainly offered as analogue classes with F2F teaching, based on the institutional belief that the acquisition of key competencies would be more successful this way than in digital form.

4 Data and Methods

This contribution focuses on gains and losses university students of transferable skill classes expect in the process of an abrupt shift to online learning. To address this topic, we use data gathered in an online-survey regarding online learning at PC during the pandemic, conducted in summer term 2020 and winter term 2020/2021. The design of the study was cross-sectional. These two periods of time were used to monitor possible changes in the evaluation of online courses, as the summer term 2020 was the first term conducted online with little time to prepare due to the COVID-19 pandemic breakout at our institution. The questionnaire was designed by the authors and tailor-made for the spectrum of PC's offer.

The study focused on different aspects of online learning, such as interaction in class, teacher support, teaching quality, overall attitude as well as disadvantages and advantages regarding online courses in online education. While the questionnaire contained mainly close-ended questions, some open-ended questions were added to get deeper insights into the respondents' perspectives on online learning. The link to the survey was sent to students who participated in one or more PC class(es)[3]. The questionnaire was open for three weeks after the respective lecture period[4] (14th September 2020 – 06th October 2020 in summer term 2020 and 01st March 2021 – 21st March 2021 in winter term 2020/2021). As incentives, twenty gift cards for a book store were offered in each term. In total, we received 684 questionnaires (see Table 1).

Table 1: Original Sample Size and Response Rate

Term	Summer 2020	Winter 2020/2021
Population	1201	1167
Sample	362	322
Response rate (%)	30	21

From all returned questionnaires, we selected a sub-sample based on the following criteria: only in-house offered courses (e.g., language courses were offered by an external service) and only formats with a sufficient number of responses (n > 10 in each term). Therefore, in the final sample, only respondents of the formats Lecture Series (LS), Soft Skills Training (SST) and Service Learning (SL) were included (see Table 2). By reducing

3 A complementary survey among teachers who taught a class within the ProfessionalCenter program was conducted.

4 At the University of Cologne, summer term starts in April and winter term in October. The lecture periods start in the second week of the respective month.

the sample, we were able to draw valid comparisons not only between the formats but also across the two terms in focus. LS offers synchronous online lectures by experts from science, economy and society on varying socially relevant topics chosen by the format coordinator. At the end of a term, a multiple-choice test assesses the students' content-related analysis of the lecture topics. SST embraces a broad variety of small classes that are geared towards the development of specific key competences. SST courses are taught by experts with many years of practical experience, e.g., time management, voice and speech training, statistical analysis etc. Classes are mostly taught in synchronous online formats, with only few teachers offering asynchronous elements. The choice of student assessment is made by the individual teacher with the respective topic in focus, e.g., presentations, written self-reflection, portfolios, etc. The third format in focus, SL, combines civic engagement with knowledge acquirement: Interdisciplinary student teams cooperate with a non-profit organisation (NPO) to work together on a project and are supported by a specialized synchronous online seminar during which they learn relevant theories and methods. In SL, students present their project results at the end of the term and reflect on their development and the process of their project work.

Table 2: Final Sample Size

Format & Short Description	Summer 2020	Winter 2020/2021	Total
Soft Skills Training (SST) skills for career and studies	191	167	358
Service Learning (SL) project work with NPOs	23	26	49
Lecture Series (LS) lectures on socially relevant topics given by interdisciplinary experts	44	27	71
Total	258	220	478

As mentioned before, we draw upon findings from both quantitative and qualitative variables in our questionnaire. As far as qualitative variables are concerned, we focus on students' answers to the open question "What will you as a student possibly lose if teaching continues to be digital?". 143 students' answers were inductively coded. If a text passage could not be subsumed, and a new category had to be formed, another material pass followed – the system was final and was added by anchor examples only when no more new categories could be formed (Kuckartz, 2018). One text passage could be assigned to several codes. The code system was finalized by the coding of three persons: one after the other, they coded the answers to verify, revise and confirm the category system. This paper's authors did the final coding and had the final say in case of conflict. The categories can be found in the coding guide (Table 4 in the results section). All answers could be coded and

were eventually quantified to get a first decent understanding about possible perspectives of online learning. Next to answers to this question, we also used students' responses to the open-ended question "Please feel free to let us, the ProfessionalCenter, know about any further ideas, wishes, comments, praise or criticism". However, we only used these answers when we needed to underpin the quantitative findings as the majority of the answers focussed on organisational aspects, e.g., the size or variety of the course offer.

To analyze the quantitative data, we used mainly descriptive statistics. To track significant differences, we used significance level of 5% ($\alpha = 0.05$). For nominal variables, we conducted the Chi^2 Test or Fisher Exact Test – depending on the number and distribution of categories. For ordinal variables, the Wilcox Test was conducted (with Bonferroni correction for variables with more than two categories). All analyses were conducted in the software R. Section 5.2, regarding advantages and disadvantages of online courses, uses original variables from the data set. To describe the areas of online teaching (5.1), we created three indices (see Table 3) and report findings of three items. To calculate the indices values, we summed up the values from single original items and divided the result by the number of variables in the respective index. This led to values in the indices between the original categories from "1: positive" to "7: negative" (e.g., 6.33). For the sake of reader friendliness, our figures round values that are integers and mirror the original scale.

Table 3: Areas of Digital Courses: Indices

Index Areas	Original Items ("1: positive" to "7: negative")	Cronbach's α * entire sample (paper sample)
Interaction	# The opportunity to exchange with other participants was given. # The opportunity for exchange with the lecturer was given. # Compared to the face-to-face courses, I was equally involved with my own contributions (oral or written).	0.68 (0.60)
Teaching (only SL & SST)	# The digital competences of the lecturer are... # The lecturer has made use of diversified digital teaching methods. # The teaching and learning materials were adapted to digital teaching.	0.68 (0.68)
Support	# Overall, I felt well supported by the lecturer. # The lecturer was easy to contact. # The lecturer has given instructions on how to use the relevant tools.	0.77 (0.79)

Note: * Generally, a cut-off value of 0.7 for Cronbach's α is accepted. However, as Cronbach's α "punishes" indices with a lower number of items (Landmann et al., 2015), we decided to maintain the indices created. This also satisfied theoretical considerations. Additionally, we use descriptive indices with the primary aim of data presentation in a reduced and reader friendly manner.

5 Results

Our findings will be discussed in two parts. First, we turn to the overall evaluation of different areas of online courses (5.1). Second, we present concrete positive and negative aspects of online courses (5.2).

5. 1 Overall Evaluation of Online Courses

To investigate different aspects of online courses, we subsumed some items from the survey to higher-ordered areas: *Interaction*, *Teaching* and *Support* (for this calculation see chapter 4, especially Table 3). Additionally, we will present three original items from the survey aiming at assessment of both the courses and learning outcomes.

In regard to three aforementioned areas, there were barely any significant differences[5] between the two terms in focus. Hence, we will focus on comparison between the formats. From Figures 1–3 we can conclude that most students were content with the online courses. However, there are some (significant) differences between the formats. In regard to the dimension *Interaction,* Lecture Series does not do as well as the other formats. Indeed, this format is set up with less participatory elements in comparison to the others, as the focus lies on the lectures' content and less on the active acquisition of soft skills. This was also the case during F2F terms. Students seem to have this in mind, as their overall assessment of Lecture Series is mainly positive.

In the area *Teaching,* we observe that more than 90% of answers are positive. This is to be highlighted, as it shows that lecturers made an effort to adapt their courses to the digital environment. The positive evaluation of this area, consisting also of the item "The lecturer has made use of diversified digital teaching methods" is somewhat contradictory with the findings regarding advantages of online learning, where under one third of the students recognize online courses as a good way to use innovative methods.

As far as the area *Support* is concerned, we see slight differences in the evaluation between the formats. Those students taking part in Soft Skills Training evaluate their courses better than students taking part in the Lecture Series. This may result from the size of the groups, which are much smaller in Soft Skills Trainings. There are no significant differences between Service Learning and the other formats. In this area, positive evaluation dominates the picture, too.

5 No significant differences between the indices. Significant differences ($\alpha = 0.05$) in regard to items "The opportunity to exchange with other participants was given" and "The digital competences of the lecturer are ..." between summer term 2020 and winter term 2020/2021.

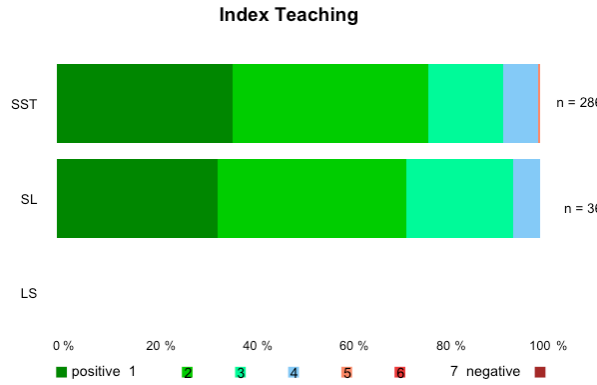

Figure 1: Index Teaching by format

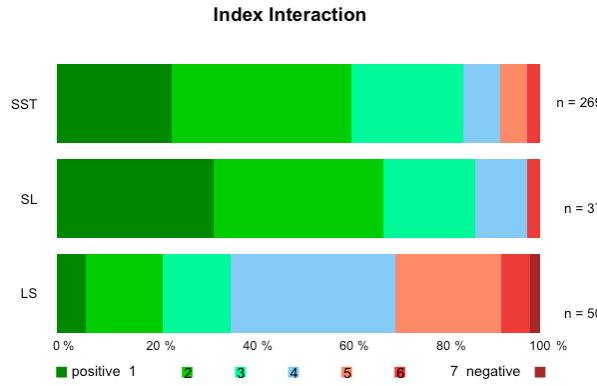

Figure 2: Index Interaction by format
Note: Significant differences ($\alpha = 0.05$) between Lecture Series & Service Learning and Lecture Series & Soft Skills Training

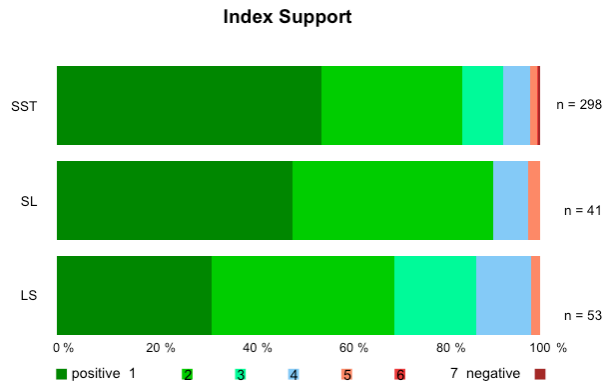

Figure 3: Index Support by format
Note: Significant differences ($\alpha = 0.05$) between Lecture Series & Soft Skills Training

Against the backdrop of positive evaluation of the areas *Interaction*, *Teaching* and *Support*, the o*verall assessment* captured in three single items (Figures 4–6) is less satisfying, with more evaluation in the middle range and in some cases at the bottom of the scale. The digital implementation (Figure 4) seems to have been successful for all formats in focus. However, most participants (79%) in Service Learning wish for a F2F variant (Figure 5). This is due to the specifics of this format: In Service Learning, students from interdisciplinary teams collaborate with non-profit organizations of their choice for one term. Therefore, before the pandemic, the widespread opinion was that the format would only be successful and efficient in the analogue space – an opinion that the student majority shares after participating in a digital Service Learning. The core of Service Learning consists of communication and collaboration paired with direct insights into the non-profit organizations' structure, vision and mission. Hence, as a format that relies on a lot of interaction, the overall evaluation is slightly less positive. On the contrary, students would rather prefer to keep the digital variant of – the less interactive – Lecture Series. There is no clear picture whether they prefer a F2F or digital mode to acquire the learning content, with some students preferring the one or the other format, and others seeing no difference between them (Figure 6).

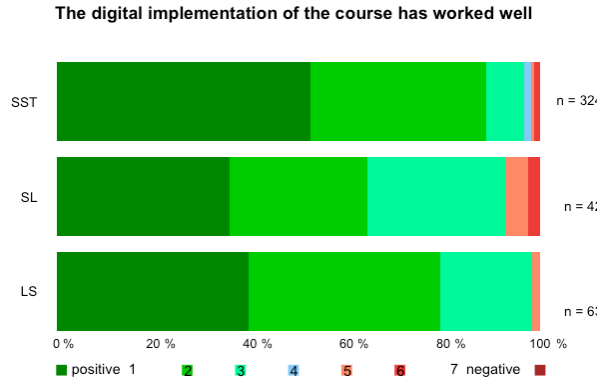

Figure 4: Overall assessment: digital implementation by format
Note: Significant differences ($\alpha = 0.05$) between Service Learning & Soft Skills Training

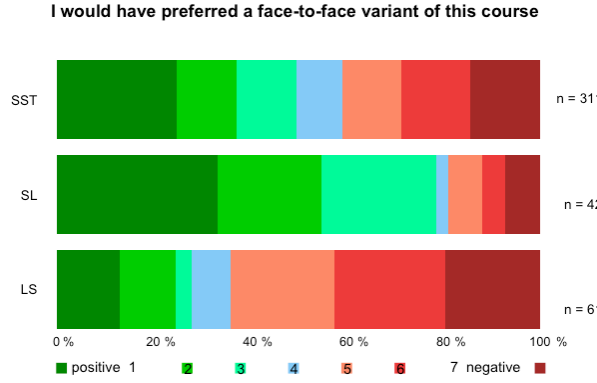

Figure 5: Overall assessment: preference for face-to-face variant by format
Note: Significant differences ($\alpha = 0.05$) between Service Learning & Soft Skills Training and Service Learning & Lecture Series

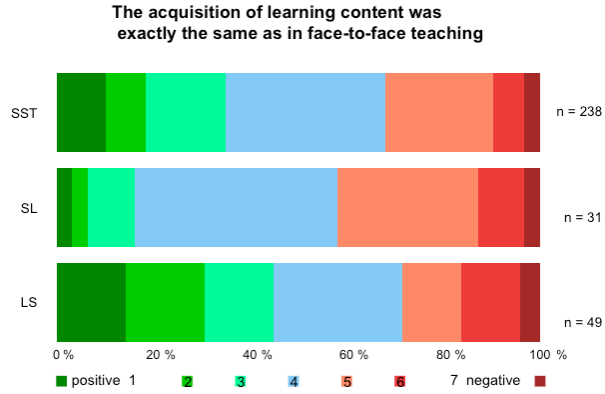

Figure 6: Overall assessment: acquisition of learning content by format

5.2 *What Students Might Gain and Lose in the Online Learning Environment?*

The previous section delivered the overall evaluation of online courses and their different aspects. Here, we turn to concrete aspects that were positive or negative for students. Before describing specific aspects students miss and disadvantages they experience in the digital classroom (5.2.2), concrete advantages of students' online learning experiences (5.2.1) will be discussed. Whereas the analysis of gains of online learning is based on quantitative findings, the section regarding the possible losses draws upon both quantitative and qualitative data. The quantitative data was drawn from the questions "As a student, which benefits have you experienced in the online learning environment?", as well as "As a student, which disadvantages have you experienced in the online learning environment?". Both items provided several answers to choose from, such as "no commuting" and "flexibility" respectively, "no direct contact with lecturers" and "insufficient technical equipment", as well as the option to add further answers.

5.2.1 What is Gained in the Online Learning Environment?

While this research emphasizes the potential disadvantages of online learning (see next section) for best possible prevention and future support, it also inquires into the concrete benefits that online learning can bring. As seen in the previous section, the overall perspective of the online courses was positive. In this section, we will pay particular attention to the development of students' perceptions regarding the advantages of online learning across two terms, as there were almost no significant differences between the formats.

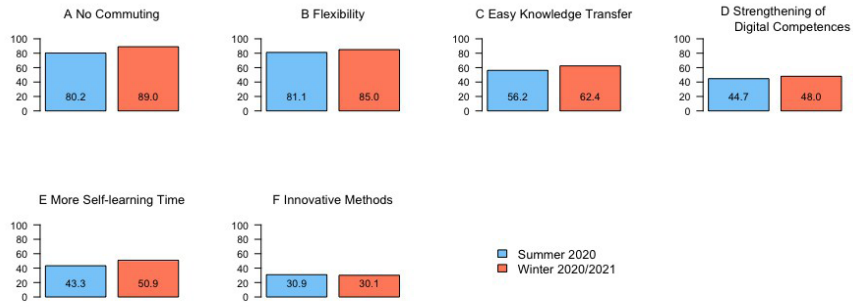

Figure 7: Advantages of Digital Courses, % of Students Naming the Respective Advantage
Note: Significant differences ($\alpha = 0.05$) regarding item A No commuting.

As far as advantages of online courses are concerned (see Figure 7), ***A** No commuting* and ***B** Flexibility* are ranked the highest. In winter term 2020/2021, ***A** No commuting* was seen as advantage by almost 90% of the students. Both items indicate that students favour less rigid timetables. Presumably, asynchronous offers at the university allowed more flexibility in comparison to tight schedules during off-line teaching and learning before the pandemic. Indeed, students mention in the open comments: "Evening courses in online format are super; I'd like to do the rest in F2F-mode again as soon as possible" and "Digital teaching saves a lot of time (commuting, etc.), which is why it is easier to take courses." Additionally, many students save a lot of time as they do not commute. This assumption can also be underlined by open answers to the question that actually aimed at detecting disadvantages: "What will you as a student possibly lose if teaching continues to be digital?":

> Nothing. Since the digital switch, I've made massive progress in my studies and no longer spend time on hour-long commutes on the train. Especially in the winter, where the trains then also tend to be cancelled. The latter has also often resulted in me not getting active participation due to being absent from the event. You unfortunately cannot do much when the unreliable Deutsche Bahn [German Railway Company] always puts obstacles in your way. Since the digital teaching I have not missed a session. And learned a lot.

The University of Cologne is a regional university: Half of the students come from suburbs in the nearer Cologne area (Borbély, 2020), only around 15% come from another federal state (Zahlen Daten Fakten 2018, 2020). We can assume that some live with their parents to save on living costs, as Cologne is among the most expensive cities in Germany (Jauernig, 2021).

Around 60% of the students see online courses as an easy way to gain new knowledge (**C**). Between 40–50% of the students stated that online courses enable them to strengthen their digital competences (**D**) as well as grant them more self-learning time (**E**). Under one third of the students recognize online courses as a good way to use innovative methods (**F**).

5.2.2 *What is Possibly Lost in Online Learning Environment?*

Having presented the positive aspects of online courses (5.2.1), we now turn to possible losses in the process of abrupt digitalization, starting with responses from the quantitative analysis. We can see that in an online teaching and learning environment students experience many downsides across the two terms in focus (Figure 8): Over three quarters (in the winter term 2020/2021, over 90%) of students miss contact with their student-peers (**A**). Lecturers are missed as well (**C**) by around 60% of the students. In this case we observe a higher percentage of students naming this aspect in the winter than in the summer term. As will be shown in following paragraphs, missing social interactions are indeed the aspect students suffer mostly from.

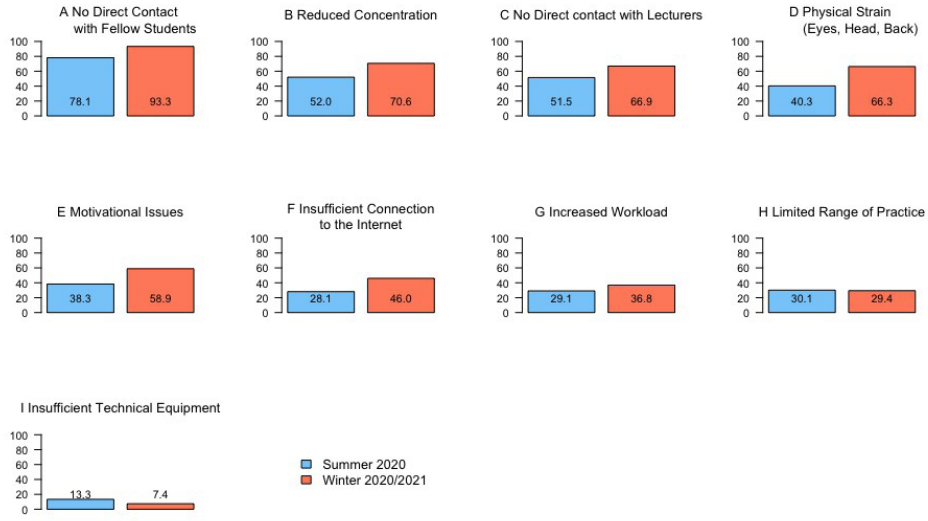

Figure 8: Disadvantages of Online Courses, % of Students Naming the Respective Disadvantage
Note: Significant differences ($\alpha = 0.05$) regarding items A No direct contact with fellow students, B Reduced concentration, C No direct contact with lecturers, D Physical strain (eyes, head, back), E Motivational issues, F Insufficient connection to the internet.

The second highest rank disadvantage is ***B*** *Reduced concentration* – in the winter term 18% higher than in the summer term – a rise of almost 40%. Next to that, students complain about ***D*** *Physical strain* and ***E*** *Motivational issues* linked to online courses; online fatigue has risen between the two terms in focus.

Similarly, although to a lesser extent, approximately one third of students complain about ***G*** *Increased workload* caused by online courses. A similar percentage suffers from ***H*** *Limited range of practice* offered by online courses.

The next area – technical disadvantages – shows a disappointing picture as technical infrastructure is a prerequisite for digital participation (Breitenbach, 2021). In the winter term almost half of the students claimed not to have sufficient internet connection (**F**). This result is almost 20% higher than the result from the summer term. It may be assumed that in the winter term 2020/2021 – the second online term – more courses were held synchronously where a better internet connection is needed to fully participate in the course. ***I*** *Insufficient technical equipment*, on the other hand, was less of an issue in the winter than in the summer term, which hints at positive development. However, considering the technical issues overall, we can conclude that an alarmingly high percentage of students is not adequately equipped to fully participate in digital education.

The quantitative data regarding the disadvantages of online courses have been complemented by qualitative findings. Based on the respondents' answers to the question "What will you as a student possibly lose if teaching continues to be digital?" we were able to detect students' biggest fears and losses. As Table 4 shows, students miss social contact with fellow students the most (n=85), including the feeling of togetherness and the everyday exchange: "Above all, the shared experiences and the normal everyday life with chatting, drinking coffee and so on are missing." Following this, the students describe that they also lack and are afraid to lose the exchange with their fellow students about everyday university life, university-related information and recommendations (n=50). They miss "exchange with fellow students also on topics related to studies" or experience an increased sense of insecurity:

> [I miss] the otherwise possible time to make contacts; in general, I have become very insecure and shy again since the online lessons, because I am no longer used to talking in front of crowds, so that it is now difficult for me even in small groups.[6]

Less but still missed is exchange with and contact to the university teachers (n=23), including generally "getting to know them." Responses show that the absent opportunities of direct exchange result in a less personal learning environment with an increased focus on duties and exams.

Moreover, Cologne, being one of the biggest cities in Germany with a dense student population, usually promises an exciting student life. Therefore, it does not seem surprising that the respondents criticize the lack of university life with all its trimmings (n=23), claiming the experience to be short of "actual student life" and "impressions that you have during a university day":

> I enrolled in order to learn and study at a university, with everything that goes with it: lecture hall, lecturers, students, cafeteria, breaks, packed lectures and also smaller seminars with a completely different dynamic, browsing in the library and reading books, experiencing the diversity of my fellow human beings and thus receiving other impressions. In a nutshell, the university life is lost on me.

6 The used quotes were translated from German to English by the authors.

Table 4: Code System and Frequencies "What Will You as a Student Possibly Lose if Teaching Continues to be Digital?", Top 5 in Bold
Note: students' answers in total: 143; coding in total: 315

Category	Sub-category	Description	Frequency
Social aspects	Social contact with fellow students	Statement directed at fellow students; relating to contact, togetherness; everyday exchange	85
	Exchange with fellow students (information, suggestions)	Exchange with fellow students, which concerns everyday life at the university, learning materials, organizational matters, uni topics	50
	Exchange with / contact to teachers	Statement directed to lecturers	23
	Interpersonal interaction	Statement not directed at a specific group of people; lack of togetherness in the context of the university	20
	Student friendships	Explicit mention of making friends	9
	Networks	Explicit mention of benefits and development of networks	6
Facilitation of studies through ...	Student life / Uni life	Description & missing of typical or imagined everyday life at university	23
	Motivation	Motivation, drive	19
	Change of time and place / separation of learning and leisure time	**Demarcation of free time and studies; possibility of change of location**	11
	Pleasure in studying		8
	Quality of what has been learned / learning success	Evaluation of one's own learning success in digital classrooms	6
	Uni flair / atmosphere		4
	Relation to the university	Relation & sense of belonging to the university	4
	Library		4
	Concentration		4
	Easy access to research literature	Aggravated access to literature research	2
	Joint learning	Mention of joint learning, the establishment of learning groups or group work	2
	Student Associations / committees		1
Competences & learning situations	Social competence / soft skills	Loss of own competencies	11
	Discussion	Less dealing with learning material due to less discussions	11
	Practical application		8
	Language skills		1
	Creativity		1
Health	Eyesight	Worsened eyesight	1
	Mental stability		1

Another often named category related to the facilitation of their studies is the students' motivation (n=19) – they fear to lose their drive to study in an ongoing digital university:

> My motivation to study has decreased significantly in the last two terms. Although I am very interested in my studies, my own performance has become less important to me and I have noticed that I am making much less effort in seminars and also in examinations such as homework.

The top five named categories resulting from the analysis of the students' answers to the question "What will you as a student possibly lose if teaching continues to be digital?" relate to social aspects. Hence, when given the chance, students predominantly name interaction, spontaneous talks, dissemination of information and exchange, be it with teachers or other students, as aspects they miss the most.

6 Discussion and Outlook

This paper gives some insights into students' mindsets after several months in a pandemic and consequently in a digital university environment. We have presented a first impression of how students at the University of Cologne evaluate both the spontaneous introduction of digital formats and the introduction planned somewhat longer in advance. These impressions can help higher education institutions and teachers to respond to concerns in a preventive manner and also to meet the needs of students in the digital space. Our findings indicate a two-way development: While a feeling of fatigue and isolation during online learning is revealed, positive aspects of online learning, such as the dispense with a commute, are also increasingly being perceived.

Since the most frequently mentioned answers to the question "What will you as a student possibly lose if teaching continues to be digital?" relate to social aspects, it is clear that students miss the social exchange and interaction the most. This result coincides with previous findings (Aguilera-Hermida, 2020). This is particularly striking, given that students in PC courses simultaneously emphasize how interactive the formats they attended were: 80% of the respondents state that they have attended a highly interactive class. Hence, even classes rich in interaction cannot replace the fact that students see, meet and talk to each other in person – there is close to no small talk or spontaneous exchange about non-university topics. Online classes should therefore emphasize sufficient and technically functioning possibilities that encourage interaction on the seminar content, but also other – daily-life – communication among the participants (Hodges et al., 2020; Tang et al., 2020).

The lack of sufficient interaction and communication consequently leads to slightly less positively assessed formats, e.g., Service Learning, that have always relied on interaction and direct collaboration – this specific type seems to be less compatible with the digital

environment than classes where less vivid exchange is needed. Therefore, there is no one-size-fits-all model.

On the other side, what students appreciate most is that they no longer have to commute, which supports other research findings naming flexibility as an asset of online courses (Dumford & Miller, 2018; Zapata-Cuervo et al., 2021; Zaveri et al., 2020). As this is an advantage that teachers also identify as the greatest (87%) in our parallel survey (Hoffmann et al., 2021), this assumption should be further investigated with an appropriate instrument. This result might point to issues students and teachers may be faced with, e.g., the rise in living costs in big cities and the coordination of study and work with other (family) commitments. Thus, online learning may be an inclusive alternative for some groups, as already stated in the literature (Keengwe & Kidd, 2010).

However, it should be noted at this point that in the PC formats, only those students who had the technical equipment participated successfully in class and accordingly in our study. Thus, we could not consider views from those who were completely disconnected from their studies during the online terms, whether for technical or other reasons. As shown in this paper, even among those students participating in our courses, a high percentage were not adequately equipped to fully participate in online classes (Figure 8). Additionally, this contribution primarily focused on small courses enhancing key competencies relevant for studies and students' future careers (as opposed to courses delivering disciplinary knowledge). Even though we believe that it is not the content but the mode – small and interactive units – that is key, it may be disputed how our findings could be expanded to other contexts, e.g., beyond the pandemic, as this study was conducted during the COVID-19 breakout.

As it is improbable that higher education institutions will fully return to the face-to-face mode in the next terms, and post-pandemic, it is important to draw upon the latest findings to enable sufficient online as well as hybrid learning environments combining the assets of both modes (Kemp & Grieve, 2014). As shown before, the more online class experience teachers and students have, the more positive their attitudes become towards them, and the more their mastery of the format increases (Hachey et al., 2013; Ramlo, 2021b). This is especially crucial as higher education institutions serve heterogeneous audiences – from freshmen to PhD students, from very young to advanced learners, from technophilic to technophobic students.

Thus, teachers and faculties must consider all these aspects and consequently also the disadvantages of online teaching and learning. Interactive formats in particular require digital equipment and the corresponding skills – instructors must therefore take the time to introduce students to the tools and, if necessary, to make inquiries in advance. In case of PC, teachers did offer the support needed (Figure 3) – an aspect that is of immense relevance for students' performance in an online learning environment (James, 2021). Further research could investigate significant differences of support needs between spe-

cific student groups. Because PC's program is open to students of all faculties and all semesters, as well as to both Bachelor and Master students, this study did not differentiate between these individual groups. By reaching out to all students, we could present a general, though representative sample of the UoC's student body.

The days of universities resting on quickly implemented "emergency remote teaching" (Hodges et al., 2020) should now be over. The focus should be on improving digital classes with suitable modalities and communication varieties as well as constant evaluations and exchange between different stakeholders at higher education institutions (Zapata-Cuervo et al., 2021).

Our study showed that PC managed to quickly get on a good track (see Martin et al., 2019): PC teachers implemented their objective-oriented learning concepts in mainly synchronous live workshops with several interactive elements instead of leaving learners alone with learning material. Even if PC enabled social interaction and communication among participants, apparently it was not enough, as social contact was still missed. This stresses the context this study was implemented in: a worldwide pandemic that reduced social contact to a minimum in all aspects of life. Our results consequently emphasize that university life is also an area in which students benefit from a lot of interaction and personal encounters. The amount of social interaction in a classroom might therefore influence the students' evaluation and perception of a course. Teachers should keep this in mind when designing online courses. In the end, students do not miss the academic *content* in online learning, but the academic *context*: campus life and vivid exchange.

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Describing and Understanding Changes in Learning Practices During a COVID-19 Lockdown

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Abstract

This chapter presents the results of exploratory qualitative research (n = 19) exploring the transformations of learning practices as experienced by learners at each level of education, from primary to university, during the first lockdown due to COVID-19 in canton Fribourg in Switzerland. The concept of a personal learning environment underpins the theoretical approach used to describe learning practices. These practices are depicted with theoretically based categories describing the learning practice and representing it visually as a system. This method makes it possible to compare the practices of different learners or those of the same learner over time. The transformations described in this way are related to teachers' changes in the design of the learning environment and learners' perceptions of these changes. Beyond the diversity of learning practices, research results highlight how a rapid transition from one learning environment to another may be either a risk leading to the deterioration of learning practices or an opportunity to develop new learning practices and projects, depending on students' self-regulation. In conclusion, the contributions of this research in terms of methodology will be presented, making visible and understanding the transformations of learning practices and avenues to support the management of transitions in learning environments.

Keywords

Transitions, Personal learning Environment (PLE), Distance learning, COVID-19, Learning practice

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1 Introduction

This book examines the effects of the abrupt shift to distance learning around the world with the emergence of the COVID-19 pandemic. This involved having each learner continue to learn and participate in courses from home with learning resources that were, if not limited, at least transformed. In this context, describing and understanding the changes in learners' learning practices seems essential. What were the changes experienced by primary, secondary and university students and how can these changes be understood? What are the needs that emerge from these analyses? What are the avenues of research?

During the urgency of the crisis, the need to describe and understand what was happening motivated our research team to explore this phenomenon in the context of their particular region. Beyond the interest in this event, understanding the effects of transitions to new learning environments is a particularly relevant research topic in a world of constant change. Every learner will, in the course of his or her life, have the opportunity to experience such transitions by moving from one school level to another, by being confronted with innovative learning environments, or by developing lifelong learning activities.

Adopting the point of view of the learners, each level of education, from primary to university, was taken into account, with 4 to 5 students per level, in canton Fribourg in Switzerland during the first lockdown from March 2020 to June 2020. In that region, schools were suddenly closed, forcing teachers to reinvent their teaching environment in a hurry to ensure a certain school continuity. At that time, schools, teachers, and learners had generally no experience with distance education, except some practice with hybrid teaching at the university. The major part of the educational environment and resources was physical and rarely mediatised (supported by the uses of media), except to some extent at the university level. Furthermore, on the digital level, the policy was to equip schools rather than learners (no Bring Your Own Device) and school use of social networks was prohibited.

The theoretical framework provides the background needed to highlight the originality of this research in relation to recent work undertaken during the pandemic, to adopt a relevant approach to describe learning practices, to categorize the changes and to understand them in relation to the transformations observed with the move to home-based learning. It also defines the central concepts involved in this research: transition, learning practices, personal learning environment (PLE) and learning design.

The modelling of personal learning environments with the MEPA method, previously presented in an article (Felder, Molteni, Baran & Charlier, 2021) illustrating its use with a single case, shows that this method make it possible to achieve the main research objec-

tives – describe the learning practices and understand the transformations that occurred during the first lockdown.

This chapter presents all of the research results, beginning with analysis of two cases. The results observed at the four levels of education – primary, secondary I, secondary II and higher education – are then presented, compared and discussed. Finally, the conclusions come back to our research questions and open up perspectives for research and supportive practices for learners and teacher training.

2 Theoretical Framework

2.1 Effects on Learning of the Unanticipated Transition to Distance Learning

The concept of transition, which has been recognised to be vague and diversely defined (De Clercq, 2017), has been applied in the field of education in particular to understand the effects of moving from one school level to another, such as from secondary school to university (Coertjens et al., 2017). Based on the literature review by Kovač (2015), De Clercq proposed the following definition of transition: "A period of instability and rupture determined in time which will lead to a qualitative evolution of the person in his or her knowledge, skills, identity, roles and daily functioning" (p. 83). It is therefore a sensitive timeframe, during which changes in the individual can occur at different levels: cognitive, affective, epistemic, relational. We should add, with Nancy Schlossberg (1981), the need to distinguish between anticipated transitions (such as entering university), non-anticipated transitions (such as the abrupt transition to distance education during the COVID-19 pandemic) and non-events (such as expecting a change and not experiencing it). However, studies on the effects of the transition to a new learning environment are rare. Recently, De Clercq et al. (2021) considered the impact of the perception of the new learning environment for students entering the university before the COVID-19 crisis on the student's success in higher education. They highlighted the significant impact of the perception of the learning environment as focused on mastery learning goals as well as the validity of the systemic perspective considering the complex relationship between psychological factors, contextual factors and the student's perception (Bronfenbrenner, 1992).

Regarding recent research conducted during the COVID-19 crisis and thus the effects of an unanticipated transition, peer-reviewed articles have mainly reported quantitative research reporting on higher education students' satisfaction (Beltekin et al., 2020), or more complex analysis of the determinants of their satisfaction and perceived learning outcomes (Baber, 2020). In this perspective, the quantitative study by Besser et al. (2020), which was interested in characterising the adaptability of college students in Israel to their new online environment, investigated the students' perception of changes in their learning practices in terms of stress, loneliness, positive or negative mood, learning, moti-

vation, performance and reliability experiences, mattering and belongingness. The results clearly showed negative impacts, with emphasis on the predictive effect of adaptability associated with personality factors. However, transformations in students' learning practices have not been precisely characterised or explored in relation to a more detailed analysis of the learning environments offered and their perception by students.

Moreover, the little work that has been done on this issue has mainly focused on students in higher education. The mixed-method study by Zuo et al. (2021) represented a significant exception, as it analysed the learning experience of Chinese primary to secondary school students during the school at-home period beginning in mid-February 2020. The authors used the concept of online learning pattern to describe the practice of online learning at the classroom level (taking into account the average length of on-line classes, the devices used, the frequency of the type of on-line interactions and the frequency of the type of learning activities). This approach allowed them to differentiate between the practices experienced according to the school level and the rural or urban context. This comprehensive research did not, however, address in detail the transformations in individual students' learning practices. The recent review of the literature on home-based learning for K-12 learners by Wen et al. (2021) showed that there is a need for research on this topic at this level of education, including the role of parents and the design of digital learning resources.

2.2 Describing Changes in Learning Practices

Goodyear (2020), citing Kemmis et al. (2014), defined a practice as a form of human activity for which the individuals and the objects employed are distributed in characteristic arrangements in a particular project (p. 4). The project of the activity (what one wants to do), its pattern (how one does it and with which tools), its performance (the doing of it at a given moment and the evolution of this practice) and its architecture (the arrangement of the project, pattern and performance discourse) characterise a practice (p. 5). Moreover, this approach is consistent with a representation of the learning activity as not totally determined by the individual or by the environment, but constructed in the interaction between the individual and the environment. As Goodyear demonstrated the theoretical and empirical validity of this approach for describing and capturing continuity and changes in students' activity of designing learning spaces, it seems well suited to describe the components of learner learning activity and its changes at the time of lockdown, during which learners had to reconfigure their own learning spaces. This approach can be operationalised by making use of research on personal learning environments (PLE) and their design by learners.

From a subjective perspective (Henri, 2014), a PLE is conceptualised as the learner's individual representation of a learning project and of the set of learning instruments employed to achieve it (Väljataga & Laanpere, 2010). In line with this conception of a PLE,

adoption of Rabardel's (1995) instrumental perspective (Fluckiger, 2014; Roland & Talbot, 2014) enabled the analysis of patterns of use of digital or non-digital tools and resources (technical artefacts) constituting students' learning instruments, as well as their organisation into a system of instruments. In order to grasp the learning activity beyond this technological vision, Felder (2019a, 2019b) integrated the epistemic (didactical artefact: knowledge and skills), cognitive (pedagogical artefact: cognitive and metacognitive strategies) and social (social artefact: individuals, rules and values) dimensions into the concept of a PLE. A PLE thus illustrates learning practices according to the approach proposed by Goodyear (2020). Using the MEPA method to describe learning practices enables the highlighting of their structures as well as their changes in relation to the changes of teaching and learning environments. In the field of educational technology, modelling techniques have been used in pedagogical engineering (Paquette, 2005), to study and design PLEs (Trestini, 2016), and more recently to analyse PLEs as an indicator of learning practices (Felder et al., 2021). As the method of modelling PLEs (Felder, 2019b) is central to our study, we present it and define the notions on which it is based in the section dedicated to the method used in this research.

In addition, a state-of-the-art paper (Vermunt & Donche, 2017) focusing on research carried out between 2004 and 2016 made it possible to characterise the transformations of learning practices when the learner is confronted with a new environment, for example, in the passage to a new level of study or the progressive or brutal confrontation with an innovative learning environment. The authors spoke of congruence or friction. The occurrence of congruence or friction was associated by Vermunt and Verloop (1999) with the compatibility of the extent of the teacher's external regulation of learning with the learner's self-regulation. The authors distinguished between constructive and destructive friction. Constructive friction represents a challenge for the learner, who develops new skills, strategies and tools for learning. In contrast, destructive friction leads to a reduction in learning skills or a failure to use strategies or tools. Abrupt transitions to a new learning environment have been associated with destructive friction (Baeten et al., 2014, quoted by Vermunt & Donche, 2017).

2.3 Situating Changes in Learning Practices in Relation to the Transformation of the Learning Environment and its Students' Representations

Entwistle (2018) provided a good overview of the research findings demonstrating the relationship between students' learning experiences and characteristics of the learning environments designed by their teachers. However, we still lack an evidence-based framework for the conception of teaching and learning environments, learning designs (Boud & Prosser, 2002) or pedagogical patterns (Laurillard, 2013) or systems of methods (Reigeluth & Carr-Chellman, 2009) that could lead to a better learning experience, that is, be congruent or lead to constructive friction, according to the learners' characteristics.

The recent literature review by Bower and Vlachopoulos (2018) on "technology-enhanced learning design showed that only one of the 21 models analysed was developed on the basis of empirical research" (p. 991).

For this research, we rely on the HY-SUP typology developed by the European project HY-SUP, which is one of the few typologies based on empirical results, and which has been used to study the relationship between types of environments and their effects on learning as perceived by students and teachers. This typology describes 6 types of hybrid teaching and learning environments. Within the theoretical framework for HY-SUP research (Deschryver & Charlier, 2014), hybrid teaching–learning environments are defined as follows:

> A hybrid teaching and learning environment is characterised by the presence in the environment of innovative dimensions linked to distance learning. The hybrid teaching and learning environment, because it involves the use of a techno-pedagogical environment, relies on complex forms of mediatisation and mediation. (Charlier et al., 2006, p. 37)

The 5 innovative dimensions representing the pedagogical pattern or learning design of a hybrid teaching and learning environment in this definition are: 1. presence-distance articulation, 2. human accompaniment, 3. openness, 4. forms of mediatisation, and 5. forms of mediation. Using these dimensions, mixed-method research studying about 200 higher education hybrid teaching and learning environments distinguished 6 types or learning designs of hybrid environments:

- The scene (type 1) – focused on teaching and characterised by the mediatisation of textual resources;
- The screen (type 2) – focused on teaching and content-oriented, characterised by the mediatisation of learning resources;
- The lodge (type 3) – focused on teaching, characterised by the integration of resources and experts from outside the academic world;
- The crew (type 4) – focused on learning, characterised by the support of the knowledge-building process and interpersonal interaction;
- The metro (type 5) – learning-centred, characterised by openness, freedom of choice and support for learning;
- The ecosystem (type 6) – learning-centred, characterised by the exploitation of a large number of technological and pedagogical possibilities offered by hybrid learning environments.

Research has shown that the learning-centred types were perceived by students as having greater effect on learning. The HY-SUP research showed that 70% of students did not recognise the type of environment as described by their teachers, their different representations being associated with their approaches to learning. When students recognised a learning-centred type of environment, they perceived greater effects on their learning. This mediating effect of students' representations of the learning design of the learning environments being offered has been demonstrated in subsequent research (Charlier et al., 2021).

In this research, the typology developed for the HY-SUP research is used to describe and characterise the teaching and learning environments and their changes due to the distance learning situation. When the information was available, the teacher's representation was compared with that of the student.

3 Research Questions

In order to understand the changes in learners' learning practices at the time of the abrupt transition to distance learning, a detailed description of their learning practice before the lockdown and during the lockdown appears necessary, in order to support a comparison and to go beyond satisfaction questionnaires. The concept of PLE allows us to approach a practice as Goodyear proposed, that is, as a human activity in which the individual and objects are distributed in characteristic arrangements. It is changes in these arrangements that can be firstly identified. Secondly, in order to understand the conditions of these changes, research has shown the importance of students' representations of the learning design of the learning and teaching environments, on the one hand, and, on the other hand, the role played by the compatibility between the degree of regulation imposed by the teacher and the students' self-regulatory competence. These theoretical frameworks lead us to envision the following research questions for the study:

1. What transformations in learning practice can be observed? Do we observe congruence or friction? Is it constructive or destructive?

2. How can we understand these transformations?

The analysis of 19 cases of learners from different levels of education – from primary to higher education – will open avenues for further research and initial recommendations for future teaching.

4 Method

As a consequence of the research questions mentioned above, the objectives of this qualitative research are

1. To characterise transformations in learning practices.
2. To understand these transformations in relation to:

    2.1 Learners' characteristics.

    2.2 Learning designs of teaching and learning environments designed by teachers.

    2.3 Learners' representations of their teacher's teaching and learning environment.

We used the MEPA's modelling method to represent the personal learning environment of learners as an indicator of their learning practices first before in their normal condition and then after the change to distance education. In order to characterise the learning designs of teaching and learning environment designed by teachers, we used the HY-SUP self-positioning tool. Finally, qualitative interviews with learners were done to identify both their characteristics and their representations of their teacher's teaching and learning environment.

4.1 Sample

A sample of five primary, four lower secondary and five post-secondary students, all in the final year of their respective educational level, as well as five university students (two bachelor's students, three master's students) was selected in April 2020 at the heart of the first semi-lockdown in Switzerland. With the permission of the educational authorities in the canton, learners in primary and secondary education were contacted directly by the researchers through their networks. Permission was also sought from parents. At these levels, the researchers were not allowed to contact the teachers of these students, in order not to disturb them during this period of crisis. For university students, the sample was drawn from the network of teachers involved in a faculty development program, who gave access to their students.

4.2 Data Collection

An explanatory interview (Vermersch, 2019) was conducted with each of the learners by video conference. During this interview, the researcher led the student to discuss his or her learning practice before and then during the period of distance learning due to the COVID-19 crisis. To help them describe their learning practices in a precise and detailed

way, students chose a course that they liked. They also had the opportunity to describe the learning environment offered by the teacher. The interviews were recorded.

To characterise teachers' changes in the learning design of the learning environments, the research planned to contact the teachers of each learner, asking them to describe their teaching before and during the forced distance teaching due to COVID-19. However, permission to do so was only obtained for teachers at the upper secondary and university levels.

An interview was conducted with those teachers, during which the HY-SUP questionnaire was used (14 items, French-language version). Each before and after learning environment was described and situated in relation to the typology.

4.3 Data Analysis

The PLE modelling method (Felder, 2019b) was then applied in three procedures: 1) reformulating the data to integrate it into the model, 2) representing the model, 3) validating the model. This approach is based on a generic model of a PLE (an ontology) and on a system of graphic and textual symbols, presented in Figure 1 below.

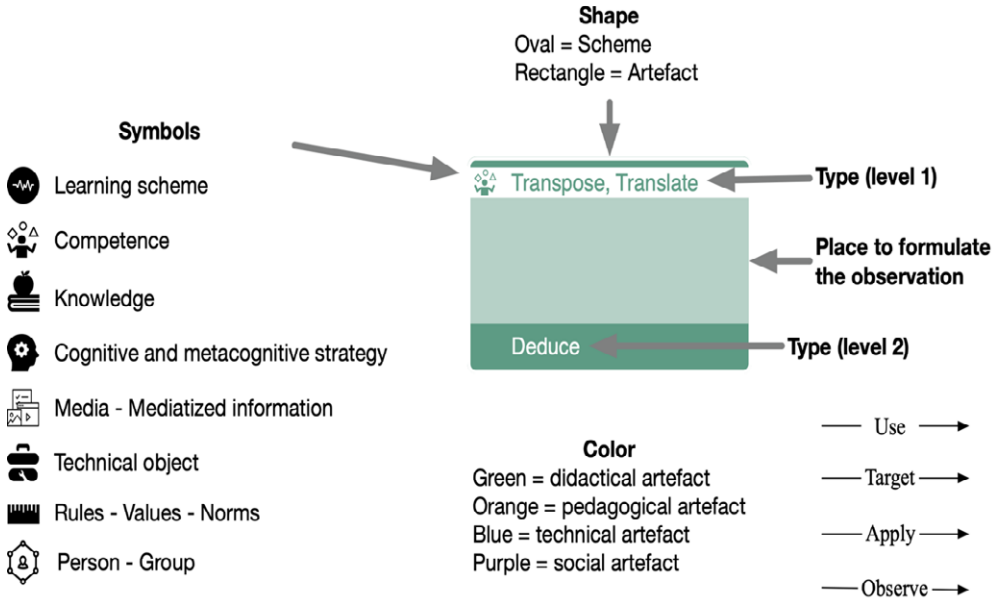

Figure 1: Summary of the modelling elements of MEPA's method (Felder, 2019b, p. 14, design according to Yepa®)

This modelling language makes it possible to express a learning practice in an intelligible, plausible and fruitful way (Felder, 2019c) by associating the discourse of the participant (the learner) with the elements of the ontological model of the PLE. The architecture of practice is expressed by means of four kinds of links connecting a learning scheme to a technical artefact (link: uses), a didactical artefact (link: aims), a pedagogical artefact (link: applies), and a social artefact (link: observes). The following table summarizes the conceptual elements, in which artefact refers to products transformed by human activity, whether material, digital or symbolic.

Table 1: Summary of the definitions in the PLE ontological model

Notion	Definition
Instrument	An instrument is composed of a scheme and an artefact. "The same pattern of use can be applied to a multiplicity of artefacts [...] conversely, an artefact is likely to fit into a multiplicity of patterns of use which will attribute different meanings and functions to it" (Rabardel, 1995, p. 4, our translation).
Learning scheme	A learning scheme is the general outline of an activity and its intention, "which can be reproduced in different circumstances and gives rise to various achievements" (Rabardel, 1995, p. 74, our translation).
Technical artefact	Technical artefact refers to digital and non-digital tools, functionalities or devices used to learn.
Didactical artefact	Didactical artefact refers to "the disciplinary objects taught" (Marquet & Leroy, 2004, p. 2, our translation) and "structured knowledge" (Vázquez-Cano et al., 2016, pp. 67–68, our translation). MEPA's method uses Paquette's (2005) taxonomy of knowledge and competence.
Pedagogical artefact	Pedagogical artefact refers to two types of objects: The cognitive and metacognitive strategies employed to learn described with the typology of Bégin (2008). Specific uses of mediated resources in learning activities.
Social artefact	Social artefact refers to "the set of interactions or relationships between individuals and persistent social objects such as institutions, roles, laws or unique interactions such as decisions" (Vartiainen & Tuunanen, 2016, p. 1268, our translation).

In this way, MEPA's method made it possible to use a longitudinal approach to compare the models produced about learning practices before and during the lockdown, thus rendering visible the changes that occurred at different levels of the model (instrument, scheme, artefacts).

Each model was then studied and revised by the research team, returning to the raw data where necessary. In a second step, the research team identified and described transforma-

tions in learning practices by comparing the PLE models at two levels: intra-case (between the same participant before and during the lockdown) and inter-case (between participants at the same level of study). In a third stage, these transformations were analysed on the basis of the descriptions produced according to the categories of the PLE ontological model (cf. Table 1; objective 1).

Then, when possible, an analysis relating each of the learning designs of the learning environment offered by the teachers and their transformations to changes in student learning practices was carried out (objectives 2.2 and 2.3.). Finally, adopting an inductive approach, the observed transformations were related to the qualitative data obtained during the interviews about students' individual characteristics (degree of self-regulation, self-representation, and so forth; objective 2.1.). These approaches led to the 19 case analyses presented in the full report, available on-line.

5 Results

In this section, two cases are briefly presented, the case of Denise, an 11-year-old learner at the primary level, and the case of Barbara, a 20-year-old student at the college level. The two cases were chosen for their illustrative power and to give access to two contrasting situations. The results first provide a brief presentation of the case, then the changes in practice are analysed according to the main dimensions of PLE and are concluded with an analysis of the congruences or frictions observed. The inter-case analysis then makes it possible to answer the two research questions by characterising the changes in learning practices and interpreting them with regard to the learners' self-regulation, their level of study and teaching environment characteristics.

5.1 Case Analysis

5.1.1 Denise

Links to the PLE models: BEFORE / DURING

Presentation

Denise presents herself as a curious student with a great desire to learn. She is able to express the learning objectives prescribed in the course she has chosen to discuss, her geography course and also to define her own cross-curricular objectives, such as speaking in front of an audience during an oral presentation or working with other children to prepare it. She enjoys learning at school and interacting with other people, as well as receiving explanations from teachers who, in her opinion, explain things well. During the lockdown, she said that she did not learn many new things in geography and that she regretted the lack of the teacher's presence. The teacher had only assigned one exercise so far (at the

time of the interview). She keeps herself busy with activities prepared by her parents, especially her father, who has studied geography. According to her, these activities allow her to review the subject and to maintain a certain level of motivation. However, Denise says that her parents do not explain as well as the teacher does, and in the absence of guidance from the teacher in all classes, she devotes much of her time to a personal learning project related to gymnastics.

Learning Schemes and Instruments

During the lockdown, there is a certain amount of responsibility on the part of the student and her parents. Denise has to go to school to find documents or corrections of homework. At the time of the interview, the only learning tool built in the learning environment is the one for searching for information online about the lakes and rivers of Switzerland.

Denise says that she feels that she is not learning anything new, but rather reviewing what she already knows. With regard to instruments that are not related to the teacher's prescribed tasks, Denise watches explanatory videos that she finds on YouTube or other videos on various topics and disciplines recommended by the teacher. With the help of her parents, Denise uses other activities to learn geography. In the absence of other stimuli, Denise develops a personal learning project to improve her gymnastics skills by practising in her garden.

Technical Artefacts

Denise's technical environment has become digital. To communicate with the teacher, she uses SMS. This transformation results from the teacher's choice. Denise chooses to use YouTube to find explanatory videos and thus gain new knowledge. However, some videos are recommended by the teacher. To view the videos, Denise uses a tablet. The use of Google to search for information was already present before the lockdown. The teacher's documents and corrections remain in paper form, because the teacher chose to distribute the materials to the children and their parents directly at school.

Didactical Artefacts

Knowledge representations in written form have a greater place in the student's practice. The teacher's decision to provide written answers and to limit interactions to the transmission of the material is a major factor in this decision. Denise deplores a lack of explanation from her teachers in general. To remedy this, she looks for explanatory videos on YouTube, which constitutes a self-regulated transformation.

Pedagogical Artefacts

No specific comments can be made for this category.

Social Artefacts

Denise's parents take on a more important role in her PLE by acting as a pivotal social artefact. This seems to be explained by a certain empowerment of the student and her parents.

Social interactions with other children are reduced to the other children in the family.

Didactical Artefacts – Skills and Knowledge

Both didactical artefacts related to geography and didactical artefacts related to cross-curricular competences are disappearing. The only didactical artefact related to geography concerns the theme of the exercise given by the teacher. This seems to be attributable to the transformation of the learning environment, which presents only one activity. The other skills that Denise targets are related to gymnastics (self-direction).

Congruence – Friction

This seems like a case of friction linked to the transition between the two learning environments. There is a destructive effect with regard to the school environment (reduction of the didactical and social artefacts). Constructive effects appear for learning activities outside the school sphere (development of a new learning scheme).

5.1.2 Barbara

Model references: hyperlinks : BEFORE / DURING

Presentation

Barbara says she is competent in mathematics the course she chose to talk about and has no difficulties in learning and achieving the objectives. She presents herself as an organised learner who participates in class and likes to do the exercises individually. She likes her mathematics teacher and her lessons, while during the lockdown she deplores the use of the chat system to communicate, as she would have preferred to interact with her teacher via video conference to ask questions directly and spontaneously. She said that she enjoys learning at a distance, as she is able to maintain her usual work pace.

Transformation of the Learning Environment from the Mathematic Teacher's Viewpoint

In his own view, the mathematics teacher initially designed a type 5 learning environment (the metro). The teacher adopted a pedagogical approach to getting students active by offering them exercises to be carried out in class individually or in groups. In the transition to distance learning, the training system became mainly a type 4 learning environment

(the crew). Indeed, the teacher now uses a chat system to communicate with the students and provides the correct answers for the exercises through videos.

Learning Schemes and Instruments

An important transformation in Barbara's practice is related to the introduction of a learning instrument to organise the tasks to be performed, a function that the student must now control. This change is regulated by her desire to maintain motivation and avoid procrastination. Another transformation is related to reviewing the subject matter: no longer having to prepare for class tests or written exams, Barbara is self-testing, rereading old summaries and practicing with mock exams. This change is regulated by her desire to do well in the final exam. Finally, in the absence of corrections of exercises by her teacher in class, she completes her practice by watching YouTube videos made by her teacher to do self-correction. This change is co-regulated by the teacher's choice to provide the solutions on his YouTube channel.

Technical Artefacts

Barbara's technical environment has become more digital. She uses the computer and the Microsoft Teams chat system to interact with her teacher. This transformation is induced by the teacher's choices. In addition, Barbara uses the "teacher's platform" more frequently than she did before the lockdown, because it is on this digital space that the teacher now gives the instructions for the tasks to be carried out. In addition, in the absence of synchronous video conferencing sessions, Barbara incorporates her teacher's YouTube channel into her practice in order to have more complete explanatory videos. Finally, course materials are being converted from paper to a digital format. However, it is Barbara who decides not to print the documents (downloaded from the online platform) and thus keep them in digital format.

Pedagogical Artefacts – (Meta)Cognitive Strategies

An important transformation in Barbara's practice is her use of the metacognitive strategies of self-regulation and anticipation. The first relates to planning and managing of tasks. The second involves trying to imagine the questions that might be asked in the oral maturity exam (exit exam for secondary school). The implementation of these two strategies is probably due to a constraint in the learning environment, insofar as it does not support these functions. It is also made possible by Barbara's self-directedness, insofar as she aims to avoid procrastination and to come well prepared for the final exam.

Pedagogical Artefacts – Forms of Knowledge Representation (Mediatisation)

The form of knowledge representation has shifted from oral explanations by the teacher to a variety of types of knowledge, in the form of video recordings (YouTube channel) or written information (via MS Teams chat and the teacher's website).

Social Artefacts

During the lockdown, Barbara's social environment has become more restricted. She now only interacts remotely with her close peers. This seems to be justified by the fact that Barbara claims to be competent in mathematics and does not need the help of others. Instead, she sees it as her responsibility to support her friends. The teacher's presence is maintained, but Barbara deplores the lack of spontaneous interaction with her.

Didactical Artefacts – Skills and Knowledge

Through this transition, Barbara perceives that she is developing her ability to adapt to a new teaching–learning modality: that of distance learning.

Congruence – Friction

There seems to be a case of friction related to the transition between the two learning environments. This effect appears to be constructive: development of new learning schemes and new pedagogical and didactical artefacts.

5.2 Cross-case Analysis

The inter-case analysis enables the two research questions to be answered by combining characterisation of transformations in learning practice with their understanding according to learners' characteristics and transformations in the teaching environment.

Out of 19 cases across all levels of education, 13 cases of constructive friction were observed. This phenomenon is particularly interesting. Based on the definition by Vermunt and Verloop (1999) cited above, we identified as cases of friction those where the transition from one learning environment to another created a rupture, an incompatibility that challenged learners to develop components of their learning practices (schemes, cognitive and metacognitive strategies) and their self-regulation. This progress seems to be associated, on the one hand, with good control of self-regulatory skills on the part of learners, and on the other hand, with accurate perception of changes made by teachers to the learning environments, for those teachers for whom we have data. This seems to confirm the work by Vermunt and Verloop. The cases of destructive friction appeared mainly at the primary level. This also confirms previous research findings highlighting the importance of pupils' initial self-regulation. Congruence only occurred at the university level, where students are more often confronted with learning-centred learning environments and highly mediatised training systems. These facilitated the abrupt transition to distance learning.

Regarding hetero-regulation and self-regulation, we observed a shift from teacher regulation to regulation by the media (e.g. written instructions, questions, and videos), by the student (e.g. getting organized, and asking questions if necessary), by the technical artefact (e.g. taking handwritten notes because the screen is occupied by the videoconfer-

ence, changing types of interactions with peers via the videoconference), and by peers (e.g. feedback, cognitive support).

In the case of primary school learners, the increase in regulation by parents (hetero-regulation) was prevalent, while self-regulation was higher at all other levels. It should be noted that the predominance of parental regulation at primary level underscores the need to consider problems due to a potential digital divide.

It is interesting to note that, during the lockdown, 11 out of the 19 learners engaged in learning activities (self-regulation) in response to a need to learn new things or to improve themselves, either in relation to the subject concerned or in relation to personal interests. This can be understood by the degree of openness suddenly offered by the teaching environment, leaving more freedom for the learner to choose learning objectives that are specific to him in his or her PLE.

In all cases, we observed a digitalisation of the learners' technical environments. This transformation was due to changes in teaching environments, with the introduction of tools such as video conferencing (Jitsi, Zoom, TEAMS), communication tools (WhatsApp, Gmail, SMS), and online learning and sharing platforms (Moodle, Fribox, Educanet2). It should be remembered that through the introduction of online platforms, students' practices underwent a form of instrumental hybridisation (e.g. the use of the internet; Roland & Talbot, 2014), where documents provided by the teachers went from paper to a digital format.

We observed varying development of digital skills in primary school pupils, with parents often taking charge of the use of new tools. But more generally, although we observed a large increase in the use of technology and the addition of new digital artefacts to the learners' PLE, we have little data on the development of digital skills. While it was not an object of this research, we note that we did not observe any cases in which a learner say on his or her own, that she or he had developed new digital knowledge or skills. It seems that such learning is not recognized by the learners.

The social dimension of learners' PLEs during the lockdown ended up becoming impoverished, despite an increase in digital communication artefacts. Learners deplored a lack of contact with their teachers. In all likelihood, it is not enough to have the means of communication for the learner to make it a social instrument of his PLE.

6 Conclusions

The inter-case analysis highlights a trend common to the different school levels considered in the specific context of one Swiss canton. Despite the digitalisation of the learning environments offered and the efforts made by some teachers to maintain a social relation, all learners deplored the impoverishment of their relationship with their teachers.

The majority of the cases showed constructive friction (13/19). This confirms the work by Vermunt and Verloop (1999), insofar as these cases were observed when the learner had a high level of self-regulation before the transition. However, this may have been the case at primary level insofar as part of the regulation of learning was taken over by the parents. Finally, the question of the development of digital skills can be raised, insofar as these were not mentioned in any of the learning schemes described.

Before proposing some avenues for research and practice, it is necessary to recall the limits of this exploratory research. Conceived during the crisis, it did not benefit from research funding that would have allowed more data to be collected. Nor was it possible to obtain permission to interview all of the teachers involved. Finally, a more robust theoretical framework at the outset would have allowed us to use a mixed-method research design that combined the use of validated research instruments with qualitative data collection.

6.1 Avenues for Research

Future avenues of research were identified in terms of methodology, research topics and unresolved questions.

First of all, at the methodological level, as mentioned in our article (Felder et al., 2021), the method used has strong heuristic power to describe in detail the components of a learning practice and its transformations, when applied to data collected at different moments in a learner's journey. Changes in practice can thus be described in a precise and systematic way by considering changes in artefacts and their relations. In addition, the analytical perspective (modelling PLE) combined with a perspective linking the described transformations with individual characteristics and the characteristics of environments ("learning design") enables highlighting configurations associating these sets of variables. It opens the way to a better understanding of the diversity of teaching and learning practices and their effects.

Our theoretical and methodological framework leads us to question the use of the notions of hetero-regulation, self-regulation and co-regulation. From the perspective of a personal learning environment, distinguishing between self- and hetero-regulation appears inappropriate. Instead, one could speak of a distribution of regulation between the person and others and between the person and the symbolic, tangible or digital artefacts. This reveals the need for a study of the conscious evolution of distribution of regulation.

The concepts of friction and congruence, taken from Vermunt and Verloop (1999), seemed heuristically very interesting. However, it would be necessary to specify the indicators of the effects of the corresponding transitions particularly with regard to constructive or destructive frictions, so that the analyses can be reproduced by other researchers.

The framework for describing hybrid learning environments was produced for higher education by Deschryver & Charlier (2014) more than ten years ago. In addition to an update to this framework, similar frameworks should be produced for other levels of education.

Thus, the study of transitions between learning environments should be continued in order to understand under what conditions institutional environments can enable learners to meet the challenges at hand. In this respect, there are many implications for practice.

Finally, other research avenues are open, in particular:

- to describe and analyse the conditions for the development of self-regulation or distributed regulatory skills in relation to institutional learning environments throughout the learners' lives;
- among these conditions, for primary school pupils, to better understand the role of parents;
- to describe and understand under what conditions the new learning practices constructed during the abrupt transition to distance education will be maintained and for whom;
- to describe and understand under what conditions the uses of digital artefacts might correspond to the development of skills in that area;
- to understand the conditions for the emergence of new non-formal learning patterns.

6.2 Avenues for Practice

In several cases, especially in higher education, the learning environments designed by teachers were learning-centred and adaptable to distance learning. Efforts to train teachers at all levels in this direction should be continued.

However, beyond this need, the social deficit was extremely marked at all levels. Of course, we can hope that a lockdown as experienced in March 2020 does not happen again. However, there are questions about the ability of teachers to provide a cognitive, educational and social presence for their learners at a distance (Jézégou, 2010). This skill should also be developed for the future, regardless of the learning design chosen.

The cases studied were relatively privileged because of the opportunistic sample, the role of parents, especially at the primary level, and the learners' initial digital skills. Particular attention should be paid in the future to addressing these potential sources of inequality through concrete actions.

This exploratory research, prompted by the abrupt and forced transition for all pupils, students and teachers to distance learning, highlights the need to prepare teachers and learners for the many transitions they will have to face as they learn throughout life.

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Electronic Supplementary Material

Hy-Sup questionnaire
Full research report (available in French) (Felder, Molteni, Baran, Charlier, 2021)

The Role of Team Psychological Safety and Self-regulated Learning Behaviours of Students in a Largely Remote Onboarding

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Abstract

Some studies are beginning to explore the possible effects of remote onboarding on the organizational socialization of newcomers to professional institutions (Saks & Gruman, 2021; Rodeghero et al., 2021), but not yet to academic institutions. This study aims to better identify the effects of remote onboarding on students of a hotel management school in Switzerland, and the resources available to students to help them cope. By comparing two cohorts each of 200 new entrants, one enrolled before the Covid-19 pandemic and the second starting in a largely distance learning environment, the present study highlights the negative impact of remote onboarding on students' intention to stay in school and emotional exhaustion but not on affective commitment. The relationships between individual resources, such as self-regulated learning behaviours, and situational resources, such as team psychological safety, on students' adjustments are analysed (Kaplan, 2019). The study provides some answers for institutions that wish to improve the distance socialization process of their new learners.

Keywords

Remote onboarding, self-regulated learning behaviours, team psychological safety, student adjustment

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1 Introduction

Students face many challenges when they join a university or another kind of higher education institution. The university environment indeed entails not only an increase in the volume and difficulty of academic work, but also less structure for how the work is organised and a greater level of personal responsibility required to meet academic challenges (Vanthournout et al., 2012). The students' ability to self-regulate learning and the need to find a safe place seem essential for the adjustment process of students (Trautwein & Bosse, 2017; Heublein, 2014; Chemers et al., 2001; Wilcox et al., 2005; Tao et al., 2000). In this transitional phase, students also seek a sense of belonging, and a safe place to express themselves (Wilcox et al., 2005). For this reason, several studies have looked at the socialization process of students in higher-education institutions and its impact on their affective commitment, intention to stay in the institution, and emotional exhaustion (Pennaforte et al., 2016; Wilkins et al., 2016; Weidman, 2006; Rosch & Reich, 1996; Tierney, 1997; Baker & Siryk, 1999).

The Covid-19 pandemic has forced higher education institutions to switch from in-person to remote functioning, raising new challenges in terms of adjustment and socialization of students entering the first year of higher education. Distance, and the consequent reduction in informal social interactions, can indeed greatly impair the newcomers' onboarding, which is defined as the process of helping new entrants regarding their social and performance adjustment to their new role (Bauer, 2010). In the world of work, a very small number of studies are beginning to explore the possible effects of remote onboarding on the organizational socialization of newcomers (Saks & Gruman, 2021; Rodeghero et al., 2021). But to the best of our knowledge, no study has attempted to investigate students' experience of remote onboarding. The goal of this article is therefore to explore how remote onboarding has affected student's affective commitment to the institution, their intention to stay in the institution and their level of emotional exhaustion, and to understand whether self-regulated learning behaviours and team psychological safety contribute to a better experience of remote onboarding.

These questions will be analysed within the framework of a study conducted on two cohorts of students beginning their first year at a hotel management school in Switzerland. The first cohort were questioned in May 2019 in normal onboarding conditions, while the second were questioned in December 2020, when teaching and extra-curricular activities had largely shifted to remote functioning. We first present the results of analyses comparing the 2019 and 2020 cohorts to assess the effects of remote onboarding on students on their affective commitment, intention to stay in school and emotional exhaustion. We then focus on the 2020 cohort to examine whether self-regulated learning behaviours and team psychological safety moderate the potentially harmful consequences of remote onboarding. This study provides some answers for institutions that wish to improve the distance socialization process of their new learners.

2 Conceptual Framework

2.1 Organizational Socialization and Student Adjustment to Institution

Socialization is classically defined as "the process by which persons acquire the knowledge, skills, and dispositions that make them more or less effective members of their society" (Brim, 1966, p. 3), while organizational socialization refers specifically to the process by which newcomers acquire the ropes to function in a new social and organizational environment (Allen et al., 2017), such as an institution of higher education. Socialization in higher education has been conceptualized as a complex and non-unitary process, in which individual and organizational dimensions intertwine to explain students' adaptation to their environment (Weidman, 2006). Baker and Siryk (1999) distinguish four facets of adjustment to university: Academic Adjustment, Social Adjustment, Personal-Emotional Adjustment, and Institutional Attachment. Academic Adjustment reflects the degree to which students meet academic requirements, and manifests in motivation, application, academic performance and satisfaction with the institutional environment. Social Adjustment reflects to the extent to which students are integrated in the social structures of university halls of residence and the university in general, participate in campus activities, and meet new people. Personal-Emotional Adjustment refers to the degree of stress, anxiety, and/or somatic symptoms that students experience faced with the demands of the university environment. Students may experience academic burnout because of a learning environment that demands an excessively high level of effort and does not provide support mechanisms to help students adjust effectively (Neumann et al., 1990). Finally, Institutional Attachment refers to the extent to which students identify with and are emotional attached to the university community such as affective commitment.

These four university adjustment indicators are thought to be positively linked to the continuation of studies (Credé & Niehorster, 2012) and interact with each other. Students who become more emotionally attached and identify with their institution are also more engaged in their studies and more successful (Wilkins et al., 2016). As socialization to the organizational norms takes place primarily in informal social interactions with peers and members of the school, this process can be expected to be impaired when onboarding has to take place at distance (i. e. remote onboarding), resulting in a reduced affective commitment with the institution.

To the best of our knowledge, no study has attempted to investigate students' experience of remote onboarding, although the mixed effects of distance learning on students have been widely investigated. Authors highlight some advantages of distance learning and conclude that e-learning increase problem-solving ability, transfer of learning or self-learning competence and teamwork skills (Getto & Kerres, 2018). However, other studies tend to show that the drop-out rate for e-learning is higher than that of face-to-face learning (Dussarps, 2015; Murphy & Stewart, 2017) and that distance learning courses are a source

of stress, depression and exhaustion (Pavlakis & Kaitelidou, 2012). Students questioned in the first available studies on distance learning implemented during the Covid-19 pandemic mention similar risks (Yaprak, 2021; Mheidly et al., 2020). The increase in exposure to screens has been reported to increase emotional exhaustion (Mheidly et al., 2020), one of the three dimensions of burnout (Maslach et al., 1997), which refers to feelings of being depleted of one's emotional and physical resources (Aronsson et al., 2017). It therefore also seems relevant to explore the adverse effects of remote onboarding on student affective commitment, intention to stay in school and emotional exhaustion.

H1: Remote onboarding is associated with a) less affective commitment; b) less intention to stay in school; c) more emotional exhaustion

2.2 The Role of Team Psychological Safety

Most students are likely to experience some difficulty in adapting to the new varied demands of higher education, but the presence of social support structures can facilitate this adjustment (Wilcox et al., 2005; Tao et al., 2000). The perceived level of social support may indeed be positively and significantly linked to students' commitment to the institution (Tao et al., 2000; Sanders & Higham, 2012) and retention (Brooman & Darwent, 2014; Zepke & Leach, 2010), and may mitigate the effects of emotional exhaustion (Halbesleben, 2006; Teoh & Kee, 2020).

Wilcox and her colleagues (2005) suggest that the establishment and maintenance of social support among peers is essential to the socialization process of students. In this transitional phase of students' life, classmates have a key role to play in providing academic support networks and, in some cases, helping other students when they encounter problems in their work. These positive effects of social support among peers seem to be enhanced by physical distance. Relationships with peers may limit dropout because of the socio-emotional support provided (Dussarps, 2015). Feeling of isolation is one of the most common reasons given by students for dropping out of distance programmes (Rovai, 2000a).

Belonging to a team, in particular, is thought to be a factor that can limit the risks of distance learning (Liu et al., 2007). The feeling of belonging to an online classroom community will create a feeling of mutual trust, support and consideration for each member of the group (Rovai, 2001, 2002a, 2002b) and is positively and significantly related to students' behavioural engagement, perceived learning level, and retention and success rates in online courses (Hu & Hui, 2012; Liu et al., 2007; Rovai & Barnum, 2007; Rovai, 2001, 2002a, 2002b). In a similar vein, the community of inquiry (CoI) framework highlighted the key role of social presence, i. e. the ability of participants to communicate purposefully in a trusting environment, in online and blended learning contexts (Garrison et al., 2010). We can thus assume that establishing as early as possible a climate of team psychological safety, the belief that the team is safe to take interpersonal risks (Edmond-

son, 1999), helps students to adjust to an institution when being onboarded remotely. We more precisely can make the following hypothesis:

> **H2:** In remote onboarding team psychological safety is associated with a) more affective commitment; b) more intention to stay in school; c) less emotional exhaustion

2.3 The Role of Self-regulated Learning Behaviours

The ability to self-regulate one's learning, i. e. the ability to set goals for oneself and to regulate one's behaviours, emotions and cognitions to achieve these goals, seems essential for trying to ensure a successful transition (Cosnefroy, 2010; de Bilde et al., 2011; Schneider & Preckel, 2017). Self-regulated learning behaviours have been shown to be crucial for academic perseverance in the first year of study (Vanthournout et al., 2012; Mäkinen et al., 2004; Robbins et al., 2006) and for commitment to remain in school (Chemers et al., 2001). Another study shows that students who apply a shallow approach to learning in their studies, which involves less self-regulated learning behaviours, are more likely to suffer from burnout than those who apply a deep approach to learning, which involves more self-regulated learning behaviours (Asikainen et al., 2020).

The ability to self-regulate one's studies seems to be an even more decisive factor in distance learning, since there is less external control over learners, and they have greater freedom to structure their time and activities (Cho & Shen, 2013; Cosnefroy, 2019; Poellhuber et al., 2019; Santhanam et al., 2008). Significant links have been demonstrated between the ability to self-regulate and dropout (Murphy & Stewart, 2017). Self-regulation also had a buffering effect on the increase in student stress after the COVID-19 outbreak (von Keyserlingk et al., 2022). It is therefore reasonable to assume that:

> **H3:** In remote onboarding self-regulated learning behaviours are associated with a) more affective commitment; b) more intention to stay in school; c) less emotional exhaustion

According to the community of inquiry (CoI) framework, authors particularly found out that social presence is a condition for creating cognitive presence, i. e. the ability of participants to reflect the learning and inquiry process, in online and blended learning programs. Through social presence participants are able to engage in reflection and dialogue that provides opportunities to extend current understandings (Shea & Bidjerano, 2009; Swan et al., 2008). In the same vein, psychological safety seems to facilitate individual learning behaviours (Li & Tan, 2013; Mornata & Cassar, 2018). Kaplan (2019) confirmed these different studies and noted that the development of trusting relationships encourages strategies for self-regulating learning. Self-regulated learning behaviours would therefore constitute one of the mechanisms by which team psychological safety would influence the indicators of adjustment.

H4: In remote onboarding team psychological safety is positively correlated with self-regulated learning behaviours and, through this, indirectly with a) affective commitment, b) intention to stay in school and c) emotional exhaustion

3 Methodology

3.1 Research Context and Design

Two cross-sectional questionnaire surveys were conducted with students enrolled in the first preparatory year at a hotel management school in Switzerland, 4 months after they had begun the programme. It should be noted that first year students are divided into teams of approximately 25 students that remain the same for the whole semester. The first cohort were questioned in May 2019 in normal onboarding conditions, while the second were questioned in December 2020, when teaching and extra-curricular activities had largely shifted to remote functioning. Following a face-to-face start to the academic year in September 2020, distance-teaching of theory classes was made compulsory at the beginning of November 2020. The usual extra-curricular activities organised by the student committees that create the student experience (sports committees, events committees, cultural committees, sustainable development committees, etc.) were halted. The presence of staff members on campus was also greatly reduced, thus diminishing opportunities for social interaction.

For the first survey, printed questionnaires were distributed and collected in class by the researchers. For the second survey, the questionnaires were sent in the form of a LimeSurvey online survey managed by the university. In both cases, students were given approximately 15 minutes to complete the questionnaire. The data collected guarantee respondent anonymity, and no raw data was released or passed onto school employees or officials.

3.2 Participants

During the first survey, 198 questionnaires were collected out of 199 distributed in class. For the second survey, 195 questionnaires were collected out of 558 sent out. In total, 393 valid questionnaires were used to answer the first question to understand how remote onboarding has affected student's feeling of their affective commitment, intention to stay at school and level of emotional exhaustion, and 195 valid questionnaires were used to answer the second question to understand whether self-regulated learning behaviours and team psychological safety contribute to a better experience of remote onboarding.

For the first survey (N=198), the average age of respondents was 20 years. Over 80% of them were under 22 years old. Forty-two percent of respondents were male and 58% female. Forty-six percent of them were Swiss, 25% French, 86% European, and 14% non-European. Eighty-nine percent of them had professional experience, and 39% worked along-

side their studies. For the second survey, the average age of the respondents was 19 years. More than 95% of them were under 22 years old. Thirty-five percent of respondents were male and 65% female. Twenty-eight percent of them were Swiss, 23% French, 79% European, and 21% non-European. Seventy-seven percent of them had professional experience and 23% worked alongside their studies.

3.3 Measurement of Variables

All variables were measured using scales validated in the scientific literature. Respondents were asked to indicate their level of agreement on a 5-point Likert scale. The source, the number of items, the degree of reliability (Cronbach's alpha) and examples of items from each measurement scale are presented in Table 1.

Table 1: Measurement of variables

Variables	Source	# items	Cronbach's alpha	Example of items
Affective commitment	Meyer et al. (1993)	4	.72	"I am proud to belong to this school"
Intent to stay in school	Gruman et al. (2006)	2	.55	"If I have the opportunity, I will continue to study at EHL next year"
Emotional exhaustion	Maslach & Jackson (1981)	3	.76	"I feel emotionally drained from my studies"
Self-regulated learning behaviours[4]	Berger & Karabenick (2016)	13	.86	"Before I begin studying I think about what and how I am going to learn"
Team psychological safety	Harvey et al. (2019)	4	.68	"In my team, it is easy to speak up about what is on your mind"

Affective commitment, intent to stay in school and emotional exhaustion were measured in both cohorts, in English and French in the 2019 cohort and in English in the 2020 cohort. Self-regulated learning behaviours and team psychological safety were measured in English in the 2020 cohort. The reliability coefficients are satisfactory for all variables, apart from the intent to stay in school scale which has low reliability ($\alpha = .55$), so caution should be exercised when interpreting the results.

4 We didn't find the three dimensions of Berger and Karabenicks' scale, therefore we considered this construct as a one-dimensional variable.

Two control variables were taken into account: age and nationality. Age was measured using five categories: 18–19 years, 20–21 years, 22–23 years, 24–25 years, and 26 years and above. Nationality was divided into two categories: European and non-European.

3.4 Analyses

Multivariate analysis of variance (MANOVA) was used to compare the averages of each of the two cohorts for the three dependent variables considered to answer our first hypothesis (H1). Statistical analyses were conducted using SPSS Statistics 27 for the correlations between the variables, and structural equation modeling were conducted using AMOS 26 to test the direct and indirect effects (H2, H3, H4).

4 Results

4.1 Preliminary Analysis

The discriminant and convergent validity of the measurement model was tested through confirmatory factor analysis using AMOS (version 26), using the fit thresholds proposed by Hu and Bentler (1999) and Marsh et al. (2004) (CFI ≥ .90; TLI ≥ .90; RMSEA ≤ .08; SRMR ≤ .08).

The linguistic equivalence of the English and French versions of the questionnaire was first tested for affective commitment, intention to stay in school and emotional exhaustion, variables measured in French and English in the cohort 2019. The CFA of the configural invariance model was first conducted allowing the same structure to be assessed simultaneously in the two distinct language groups. The results show that this configural invariance model fits the data well ($\chi 2/dl=1.90$; CFI=0.91; TLI=0.88; RMSEA=0.07; SRMR=0.09). The CFA of the metric invariance model was then conducted to test the relationships between our variables. The results show that this metric invariance model fits the data well ($\chi 2/dl=1.92$; CFI=0.90; TLI=0.87; RMSEA=0.07; SRMR=0.09). Compared to the configurational invariance model, there is no significant change. The results indicate that the difference between the comparative fit index (CFI) of the metric invariance model and the comparative fit index of the configurational invariance model is less than .01 that should not be exceeded to consider that the measurement models are invariant between the two groups (Cheung & Rensvold, 2002).

Due to the large number of parameters to be taken into account, we reduced the number of indicators for the variable of self-regulated learning behaviours following the procedure recommended by Landis et al. (2000). We grouped items measuring the same variable in pairs to create indicators (parcels) showing the average of two items. The CFA results of the hypothetical model show a good fit to the data ($\chi 2/df=2.78$; CFI=0.91; TLI=0.90; RMSEA=0.06; SRMR=0.08).

This model was then compared with other, more parsimonious models. The results of these analyses (Table 2) show that our measurement model comprising 5 factors, namely team psychological safety, self-regulated learning behaviours, affective commitment, intent to stay in school, and emotional exhaustion, best fits the data. The existence of common method bias causing artificial inflation of the results was also tested using the unmeasured latent variable technique recommended by Podsakoff and his colleagues (2012). This technique involves adding to the measurement model an additional latent variable capturing the common variance linked to the method, and shared by all the indicators measuring the other 5 latent variables of the model. The fit indices of this model ($\chi 2$/df=1.66; CFI=0.93; TLI=0.91; RMSEA=0.06; SRMR=0.08) and the variance extracted from the common method-related factor (0.23) suggest that common method bias remains sufficiently limited and cannot by itself explain the results.

Table 2: Fit indices of alternative models

Model	Number of factors	$\chi 2$/df	CFI	TLI	RMSEA	SRMR
1	5 (TEAM/SELFREG/COMMIT/ STAY/EXHAUST)	2.78	0.91	0.90	0.06	0.08
2	4 (TEAM/SELFREG/COMMITEX-HAUST/STAY)	2.68	0.81	0.78	0.09	0.10
3	4 (TEAM/SELFREG/COMIITSTAY/ EXHAUST)	1.95	0.89	0.87	0.07	0.08
4	4 (TEAM/SELFREG/COMMIT/ STAYEXHAUST)	2.20	0.86	0.84	0.08	0.10
3	3 (TEAM/SELFREG/COMMIT-STAYEXHAUST)	2.75	0.80	0.77	0.10	0.10
5	5 (TEAM/SELFREG/COMMIT/ STAY/EXHAUST) + common method bias	1.66	0.93	0.91	0.06	0.08

Note: $\chi 2$ = chi squared; df = degrees of freedom; CFI = comparative fit index; TLI = Tucker-Lewis index; RMSEA = root mean square error of approximation. TEAM = Team psychological safety. SELFREG = Self-regulated learning behaviours. COMMIT= Affective commitment. STAY = Intention to stay in school. EXHAUST = Emotional exhaustion.

4.2 Comparison of face-to-face and remotely onboarded students

In the next two sections, we first present the results of analyses comparing the 2019 and 2020 cohorts to assess the effects of remote onboarding on students. We then focus on the 2020 cohort to examine whether self-regulated behaviours and team psychological safety moderate the potentially harmful consequences of remote onboarding.

The results (Table 3) show that the 2020 cohort, who were mainly remotely onboarded, had significantly lower scores for intent to stay in school, and higher scores for emotional exhaustion. Contrary to our expectations, no significant differences were found between the two cohorts in terms of affective commitment.

Table 3: Analysis of differences between the averages of the two groups

	Face-to-face onboarding N=198		Remote onboarding N=195			
Variable	*M*	*SD*	*M*	*SD*	F	η^2_p
Affective commitment	4.23	0.72	4.13	0.74	1.087	0.003
Intent to stay in school	4.78	0.49	4.56	0.75	9.568**	0.025
Emotional exhaustion	2.55	0.93	2.91	1.03	17.085***	0.044

Note: p > .05*, p > .01**, p > .001***. Control variables included: age and nationality. η2p = partial eta squared.

4.3 *The Role of Self-regulated Learning Behaviours and Team Psychological Safety in Remote Onboarding*

Table 4 presents the correlations between the variables studied. The results give us a first indication of the links between the variables.

Table 4: Correlations between variables

	M	SD	1	2	3	4	5	6	7
1. Age	2.09	1.13	-						
2. Nationality	1.21	0.41	-.066	-					
3. Team psychological safety	3.91	0.82	.049	-.161*	.682				
4. Self-regulated behaviours	3.95	0.65	-.172*	-.015	.194**	.857			
5. Affective commitment	4.13	0.75	.027	-.184*	.481**	.298**	.719		
6. Intent to stay in school	4.56	0.75	.095	-.213**	.303**	.096	.555**	.553	
7. Emotional exhaustion	2.91	1.03	-.183*	-.178*	-.204**	.038	-.186**	-.326**	.757

Note: N=195; p > .05*, p > .01**, p > .001***, correlations are from the "remote onboarding" sample

Structural equation modeling (SEM), with a bootstrap approach (5000 resamples) and a 95% confidence interval, was used to test the direct and indirect effects. The CFA results of the hypothetical model show a good fit to the data ($\chi 2/df=2.78$; CFI=0.91; TLI=0.90; RMSEA=0.06; SRMR=0.08). The results of the outcomes of the path analysis are presented below (Figure 1). Self-regulated learning behaviours has a positive direct effect on affective commitment, but do not on intent to stay in school and emotional exhaustion. Team psychological safety has a positive direct effect on self-regulated learning behaviours, affective commitment and intent to stay in school, but do not on emotional exhaustion. Team psychological safety also has an indirect effect on affective commitment through self-regulated learning behaviours (Table 5).

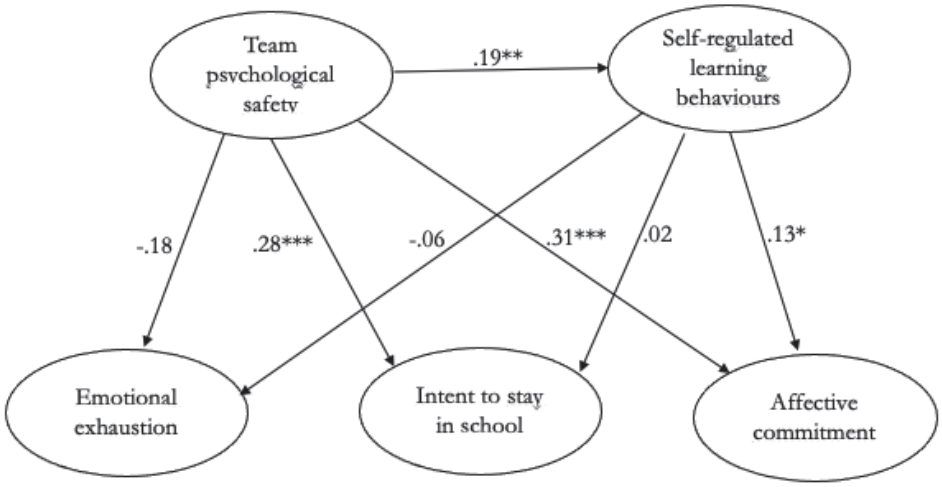

Figure 1: Model of Structural Relationships Between Study Variables
Note: N=195; p > .05*, p > .01**, p > .001***; Unstandardized Estimates (Amos 7.0 Graphics)

Table 5: Analysis of indirect effects

	Coefficient	Confidence interval (95%)	
Indirect effects	Effect	Lower	Upper
Team psychological safety -> Self-regulated behaviours -> Affective commitment	**0.026**	**0.004**	**0.075**
Team psychological safety -> Self-regulated behaviours -> Intent to stay in school	0.003	-0.031	0.035
Team psychological safety -> Self-regulated behaviours -> Emotional exhaustion	-0.012	-0.076	0.032

Note: N=195; Significant indirect effect when the confidence interval does not encompass zero

5 Discussion

5.1 Theoretical Contributions

Our first hypothesis suggests that remote onboarding is associated with less affective commitment, less intention to stay in school and more emotional exhaustion. The results show that students who began their studies under largely distance learning conditions were more likely to intent to drop out and were more emotionally exhausted than students who began their studies in a face-to-face setting. These findings are consistent with studies that have highlighted the difficulties of students' emotional adjustment to university (Neumann, 1990) and the adverse effects of distance learning on intent to stay in the institution (Dussarps, 2015; Murphy & Stewart, 2017) and burnout (Pavlakis & Kaitelidou, 2012; Yaprak, 2021; Mheidly et al., 2020). Remote onboarding however, does not seem to affect first-year students' affective commitment to the school, hypothesis 1 is therefore partially confirmed. Since social interactions with peers and members of staff are a key factor in the socialization process of new students (Wilcox et al., 2005; Tao et al., 2000), one would assume that remote onboarding would decrease students' attachment to the school. With reference to Berger and Braxton (1998), this counter-intuitive result could be explained by the fact that the student selection process of this hotel management school places a strong emphasis on matching their personal values with those of the school. It is possible that this early, anticipatory socialization was particularly beneficial in maintaining students' commitment to the school. Another explanation could be related with the fact that the onboarding in the 2020 cohort was not online from the beginning, but only after about two months. This face-to-face start at school in September 2020 probably had a positive impact on students' affective commitment to the institution too.

Our results also provide insight into the personal resources that can be mobilised to counteract the detrimental effects of remote onboarding. It first complements research high-

lighting the major role of team psychological safety when students are learning remotely (Hu & Hui, 2012; Liu et al., 2007; Rovai & Barnum, 2007; Rovai, 2001, 2002a, 2002b). We assume that in remote onboarding team psychological safety is associated with more affective commitment, more intention to stay in school and less emotional exhaustion. The results indicate that when team psychological safety is strong students are more committed to their school, and more likely to intent to continue studying, which confirms partially hypothesis 2. Concerning the role of self-regulated learning behaviours, hypothesis 3 proposes that in remote onboarding self-regulated learning behaviours are associated with more affective commitment, more intention to stay in school and less emotional exhaustion. The results indicate that in remote socialization students who implement self-regulated learning strategies to achieve their personal goals are also more committed to their school. Their experience thus supports the findings of studies that highlight the beneficial effects of self-regulated behaviours on institutional commitment in the higher education socialization process (Chemers et al., 2001). However, contrary to expectations (Vanthournout et al., 2012; Mäkinen et al., 2004; Robbins et al., 2006; Asikainen et al., 2020; Murphy & Stewart, 2017), in this research the intention to drop out of school and emotional exhaustion do not correlate with self-regulated learning behaviours, which invalids partially hypothesis 3. Since this hotel management school in Switzerland is an elite hotel management school, studying there comes at a price. Students may therefore be under financial and family pressure, which suggests that they feel compelled to continue their studies, regardless of their motivation and ability to use self-regulated learning behaviours. Regarding the link between self-regulation and emotional exhaustion, it may be that some dimensions of self-regulated learning behaviours are more correlated with emotional exhaustion than others, as suggested by Inan et al. (2017). If we had analysed self-regulated learning behaviours in sub-dimensions, the results might have been different.

Our final hypothesis indicates that in remote onboarding team psychological safety is positively correlated with self-regulated learning behaviours and, through this, indirectly with affective commitment, intention to stay in school and emotional exhaustion. The results of this research first reveal that a high level of team psychological safety is associated with the adoption of self-regulated learning behaviours, thus contributing to the relatively scarce literature on the relationship between social interactions and self-regulatory learning strategies (Garrison et al., 2010; Shea & Bidjerano, 2009; Swan et al, 2008; Kaplan, 2019). When students are part of a team in which they feel comfortable expressing their ideas, they use more self-regulatory strategies to conduct and manage their learning. Similarly, Wilcox et al. (2005) suggest that being part of a social network can lead to students having higher self-esteem and feeling more in control of their environment. This study also sheds light on the process by which team psychological safety affects the adjustment of new distance learners, and highlights the mediating role of self-regulated learning behaviours. New students who feel comfortable expressing their ideas within their team

adopt more self-regulated behaviours and therefore become more engaged with their institution. These results therefore support partially hypothesis 4.

5.2 Limitations and Directions for Future Research

This study has some limitations that need to be taken into account when interpreting the results. These limitations also provide possible directions for future research.

A first limitation refers to the relatively low response rate in the 2020 survey reflecting the existence of a non-response bias in the 2020 cohort. We can hypothesise that the least remotely engaged students did not respond to the survey creating a potentially selective sample. Another limitation concerns the cross-sectional nature of the data collected, which reduces the possibility of establishing causal links between the variables studied. The use of a longitudinal design with several measurement times would undoubtedly make it possible to support with greater certainty the direction of the links between the variables. In the context of this study, the longitudinal follow-up of new students, during the different teaching and work placement phases of their course for example, would allow for a better understanding of the socialization within the school influences their ability to adapt to the various placement contexts. The difference in the time of the two samples' generation possibly also play a role. The students in the 2020 cohort are living in a pandemic context. This special context will influence the indicators, independently of what happens at the institutions. The pandemic context could have wider effects for example on stress and mental health. The degree of reliability of the scale of intention to stay in school is quite poor and has also to be discussed. The fact that this scale has only two items with little variance between them could explain this low reliability.

Moreover, self-regulated learning behaviours represent a general concept consisting of three dimensions (planning, monitoring and regulation) that need further study to explore the dynamic relationships of these three specific dimensions with the other variables of the study. Questions such as the following could be the focus of future studies: "Is planning associated with team psychological safety and, "Is planning associated with affective commitment, intention to stay in school and emotional exhaustion?".

Two control variables were taken into account, age and nationality. However some additional control variables like the feeling of isolation and family obligations could have some impact on our variables (Wilcox et al., 2005; Lawson Jones et al., 2021; Okado et al., 2021). It is possible that students living alone are even more affected of loneliness caused by the pandemic situation than students living with their family, in couples or shared accommodation. Moreover, it has been shown, for example, that teleworkers with significant family and domestic responsibilities would perceive more conflict between the work and private spheres than non-teleworkers (Solís, 2017). It may be the same for students who face a process of distance socialization. Teaching presence, defined as the design, facilitation and direction of cognitive and social processes seems also to be essen-

tial in establishing a sense of social presence by engendering an atmosphere of trust, open communication and group cohesion and to reach resolution and achieve student perceptions of a successful learning experience (Garrison et al., 2010). Other additional control variables such as the domestic situation and the teaching presence should be included in future research.

5.3 Practical Implications

The results of this research provide some answers for institutions that wish to improve the distance socialization process for their new learners.

As stated above, students who started their study programme under remote onboarding conditions are more likely to intend to drop out and are more emotionally exhausted than students who start their study programme in a classroom setting. These results are concerning, and call for an investigation into how these negative effects could be counteracted. One piece of advice we could give to institutions would be to ensure students' value congruence when entering the institution and to use practical tools to prevent students from dropping out and burning out. A way to improve retention in higher education would be to provide prospective students with accurate information about the curriculum to improve decision-making prior to entry into the institution (Thomas, 2011). Creating spaces for new and old students to meet would allow the latter to provide new students with information about the institution and the learning experience before they begin their studies.

According to Thomas (2011), students beginning their first year of study are not sufficiently prepared to become autonomous learners. This leads us to another recommendation: to help develop an environment in which self-regulated learning behaviours can emerge, for example by organising training sessions for new students that facilitate the implementation of those behaviours. Teachers could recognise the beneficial effects of these self-regulatory strategies, and gain knowledge and tools that improve their teaching by enabling them to promote such learning. A recent study by Molinari and Schneider (2020) proposes a 'toolbox' to help distance learners develop self-regulatory strategies for getting and staying on task when studying alone at home. The toolkit contains five tangible objects: a Reward Tube, a Victory Album, an Emotional Thermometer, a Learning Cap and a Time Guard. The first three pertain to internal strategies and aim to promote the regulation of motivation and emotions, while the last two relate to external strategies and aim to promote the structuring of time and the workspace.

Another course of action is to leverage the benefits of group work by dividing students into small teams. Structuring a course to include work in small groups can encourage students to feel comfortable expressing their ideas, asking for feedback, providing honest feedback, collaborating, taking risks and experimenting. Providing a social and pedagogical online presence also promotes a sense of a learning community. Concretely, this can

be achieved through participation in discussion forums, setting guidelines for social interactions, acknowledging students' contributions to the online learning community, and monitoring students' social interaction processes (Artino & Stephens, 2009; Cho & Kim, 2013; Shea et al., 2006). Kaplan (2019) argues that it is desirable to increase the frequency of interactions between peers through the use of communication processes and tools. The author also advocates combining the team dynamic and self-regulated learning behaviours by using teams to enhance self-regulated learning in distance education. To this end, he suggests, for example, the provision of a logbook to be kept collectively by students working together in small groups, as well as co-assessment tools to foster metacognitive awareness and the use of individual and collective regulation strategies.

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Students' Experiences About Entering Higher Education During Pandemic

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Abstract

Autumn 2020 was an unexpected situation for many new university students in Finland as they suffered lack of orientation activities as well as both formal and informal learning experiences on campus. Instead of social events, peer group mentoring and study guidance, they entered university online.

Theoretical background. The conceptual framework of the study consists of the engagement and belongingness during studies. In addition, the first-year experience as footing for the academic educational path creates the framework of the empirical study.

Method. The study features a student survey carried out in the autumn of 2020 at a mid-sized university in Finland. A total of 803 first-year students (35% response rate) answered questions about their experience of the first months at the university, the online learning experience of the first courses and the support for learning, and they shared their feelings about belonging to the university and groups as well as concerning loneliness at the beginning of the studies.

Results. The main results show that there were contradictory experiences among the students during the pandemic. 30% said that the COVID-19 pandemic did not hamper the beginning of their studies but 60% suffered from the pandemic's circumstances. There were no differences between faculties or disciplines. Some of the students responded that the distance learning went smoothly for them. In contrast, some students felt it was disappointing. Because of the COVID-19 pandemic, the beginning of their studies was hampered for several reasons. The critical issues of starting university studies online without campus experience and the consequences for the development of a supporting transition are discussed.

Keywords

COVID-19 pandemic, first-year experience, engagement, transition, higher education

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1 Introduction

This study reports students' first-year experience (FYE) of higher education in Finland, starting a new educational path during the COVID-19 pandemic at a Finnish mid-sized university. The autumn of 2020 was an unexpected situation for many new university students in Finland as they suffered lack of orientation activities as well as both formal and informal learning experiences on campus. Instead of in-person study guidance, social events and peer group mentoring, they entered university online.

At the end of January 2020, Finland confirmed its first case of the contagious coronavirus disease (COVID-19). In March, all schools, including higher education, switched to distance education. As a result, the new academic year 2020–2021 began with distance learning in the autumn. All over the world, the pandemic affected the practices of teaching and learning. Most classroom teaching was replaced by distance teaching and learning (Marinoni et al., 2020). The UNESCO report (2020) highlights the consequences of the worldwide restrictions to young people's lives as increased pressure, stress and anxiety are underlined when routines are disrupted and social interaction decreased in addition to the lack of traditional learning methods.

The switch to distance teaching and learning has intensified the discussion about pandemic inferences and implications for higher education pedagogy as well as students' abilities to cope with the new situation. Some findings show that at the beginning of pandemic, many students enjoyed the new way of online education and that only a small minority had trouble (Karalis & Raikou, 2020). At the same time, distance learning at home required greater self-discipline and motivation to follow through with online lessons (Aristovnik et al., 2020).

Research has looked at the readiness for the situation of both individual students and the institutions. Oliveira and colleagues (2018) note that not all students are prepared to study online and enter a distance learning course, although principally the flexibility is the main advantage for students. In addition, the comparison of Austrian and Finnish higher education students during the pandemic has shown that individual competence as well as self-regulated learning are crucial factors to predict outcomes like motivation and emotions in education (Holzer et al., 2021). Institutionally, there have been discussions about universities' preparedness for new online teaching environments. Kamarianos and colleagues (2020) point out that the existing well developed and maintained digital technology could support the successful transfer to online teaching and administration.

As the pandemic situation has been challenging for both staff and students, we asked what kinds of experiences the newcomers had in the transition to higher education during the pandemic. In this study, our focus is on first-year students and their experience of starting a new study programme at a time when the pandemic forced the closure of the campus.

2 First-year Experience as Footing for the Academic Study Path

The first few weeks at the university campus are crucial for the whole study path as such. Biggs and colleagues (2012) describe the transition as a complex process involving students' previous knowledge and expectations, before coming to the campus, as well as the first campus experience and the supportive practices organised by the university. Our study utilises the conceptual framework of the studies of engagement and belongingness during higher education. The engagement developed during the first months is crucial for the later study path. Krause and Coates (2008, p. 494) define it as: 'the quality of effort students themselves devote to educationally purposeful activities that contribute directly to desired outcomes and their definition highlights the student's own activity in the process of becoming a member of the new community'. In their model, Annala and colleagues (2012) emphasise the way a student's own activity interacts with an academic community that is seen as a supportive environment for significant learning experiences by collaborative teaching and learning. Some studies have also paid attention, not only to the amount of time, but also to the quality of time spent on diverse kinds of activities. Fosnacht, McGormick and Lerma (2018) found that students often spend their free time relaxing and socialising as well as volunteering.

Trautwein and Bosse (2017) found four dimensions of critical requirements to be considered as crucial for early engagement. Difficulties with these requirements can harm a successful transition to university. First, they summarised a dimension of personal requirements as potential difficulties in terms of the students' self-management and their personal adjustment to university, for example, involving a wide variety of challenges in general study skills and the ability to schedule learning activities. This can also include a new life situation and balancing studying with other areas of life. Secondly, the organisational dimension refers to the more social issues in a new environment. These can be difficulties with coping with the university system, its rules and regulations or other institutional conditions. A new student might not gain an overall orientation within the university system or the ways in which learning and teaching are organised. Students might struggle with their exam schedule or lack of supervision. Thirdly, the content-related dimension concerns challenges regarding the content of students' study programme and the complexity of the subject matter of the courses. These challenges might be related to the choice between the actual study programme and their interest or expectations regarding the study content. The last category is the social dimension. The social dimension is about building up peer relations as well as integrating and getting involved in social groups on the campus.

The interaction with staff and peers plays a significant role in the integration and engagement process. The interaction between students and teachers influences the quality of the first-year engagement (Cotten & Wilson, 2006; Hagenauer & Volet, 2014; Prahalad & Ramaswamy, 2004). Teachers' support enhances adjustment also as regards identity for-

mation in the transition phase and early experiences on campus (Harvey, Drew & Smith, 2006; Scanlon, Rowling & Weber, 2007). Teachers play a key role in aiding students' identity formation, and it is important that students have experiences of teachers being accessible since many studies report students' feelings of anonymity as problematic (Scanlon, Rowling, & Weber, 2007; Wilcox, Winn & Fyvie-Gauld, 2005).

For first-year students, it is important that they receive support during their early experiences in a new community. Teaching staff play a vital role in that. Leese (2010) points out that new students look for an opportunity to speak with teaching staff as well as for the ability to talk to personal tutors. The possibility to speak with teachers outside the classroom can foster academic achievements and study paths in the long term (Schudde, 2019). Fuentes, Alvarado, Brendan, and De Angelo (2014) suggest that the early interaction with academic staff leads to a more meaningful interaction with teachers also later on along the study path. Supportive teachers can improve integration and engagement as well as support identity formation at the beginning of studies (Harvey, Drew & Smith, 2006; Scanlon, Rowling, & Weber, 2007). In addition to the quality of the teacher–student relationship, the interaction with peers and older students is important in the transition to the new study community (Krause & Coates, 2008; Wilcox, Winn & Fyvie-Gauld, 2005).

3 Supporting the Transition to University

The early weeks on campus are crucial for building up social relationships (Wilcox, Winn & Fyvie-Gauld, 2005). Previous research has called for developing various kinds of interventions and particular introductory courses for the early phase of studies to support successful transitioning and integration (Brinkworth et al., 2009; Brooman & Darwent, 2013; Gale & Parker, 2014; Greene, 2011; Kantanen et al., 2020; Tinto, 2000; Willcoxson, Cotter & Joy, 2011). There is the need for a well-planned and supported transition period during the first weeks and months at university. Leese (2010) noticed that students were prepared for the increased workload, higher expectations, and emphasis on independent learning, but, at the same time, some students were surprised about these. This might also be related to a lack of cultural capital in the heterogeneous student population. Leese (2010) emphasises that this also has to do with the growing awareness of teaching staff about teaching and learning processes.

University student services aim to support new students during their transition as well as their long-term engagement in studies. In Finland, the transition to university is supported by several kinds of practices regarding guidance and counselling. Lairio and Penttinen (2006) present the holistic student-centred model of guidance applied at many Finnish universities. Peer tutoring plays a vital role in the socialisation and integration of new students in the study community (Skaniakos, Penttinen & Lairio, 2014). In addition, the role of academic staff is recognised on the horizon of pedagogical practices, and teachers'

role is seen as important in the development of academic identity and future prospects during studies (Penttinen, Skaniakos & Lairio, 2013). Thus, most Finnish universities have a long tradition of developing practices to support new students' transition to academic studies.

However, in the exceptional situation of the pandemic, the support during the transition lacked social events and face-to-face peer mentoring. In addition, the introductory courses were carried out online without the students experiencing learning in lecture halls where feelings can be shared with other new students in one's field. At many universities, there were some small group events for new students, like at this university. In addition, teaching was implemented mostly as distance learning online, but although intensified study guidance and counselling were offered partly on the campus, many students lacked the motivation to come to an empty campus.

4 Research Question

The aim of our research was to understand the effects of the pandemic on the process of transition to university. Based on previous research on first-year students' experiences, our research questions were designed to identify the effects of the pandemic on first-year students during this unique period. The aim was to gain an understanding of the variations among the student experiences. Our research questions were the following:

1. Did first-year students have trouble starting their studies during the pandemic situation?
2. How was the experience of the pandemic connected to social aspects of the students' early engagement, that is, to their:
    a. sense of belonging to the groups at the university,
    b. feeling of loneliness at the beginning of the studies,
    c. experience of student–staff engagement,
    d. experience of support from staff, peer students, the student union as well as friends and family?
3. How did students themselves describe the effects of the pandemic on the early phase of their studies?

The first two questions were quantitative and aimed to describe the aspects of the situation in general. The last research question focused more on the aim to give space to the

voice of the students themselves in order to capture their own interpretation of their first-year experience during such an exceptional situation.

5 Methodology

5.1 Data Collection

Data were gathered with a survey of first-year students of a medium-sized university in Finland. The questionnaire consisted of structured questions about background information (age, gender, previous experience of university studies, the degree programme, and faculty). Students' own evaluations of COVID-19 effects were also asked about with a structured question, "Has the pandemic situation made it difficult to start your studies?", with options "Yes", "No", and "Cannot say". After answering the multiple-choice question they could describe their experience of the situation further in their own words.

Because of COVID-19 pandemic effects, there were questions about belonging to the university and groups as well as aspects of loneliness at the beginning of their studies in line with questions used in the Finnish Students Health and Well-Being Survey (KOTT, 2021, see also Kunttu, Pesonen & Saari, 2016). Students' sense of belonging to a group was asked about with a multi-selectable multiple choice question, "In which groups do you feel that you belong?", with choices "University", "Field of study", "Academic year class", "Student union", "Peer student group", and "Peer group outside university". Social support at the beginning of the studies was measured with a multiple-choice question, "How much support and help have you received from peer students / peer mentors / teachers / personal study tutor / friends outside the university / family?", with a Likert-type scale of answers from 1 ("Not at all") to 4 ("A lot").

The questionnaire also included questions about the first courses and interaction with staff. The scale for measuring these factors was modified from the Student–Staff Engagement scale for first-year students developed by Krause and Coates (2008). The scale highlights the important role of staff in higher education students' first-year experience. Some items were added to deal with online teaching. The respondents were asked to evaluate statements (e. g., "The first courses were interesting", "The quality of online teaching has been good", "Teaching methods have supported my learning", "I have received support for learning online", "Teachers have been easy to contact online or on campus", "Most of the staff have been easy to approach", "I know who to ask for help if needed", and "Study guidance is readily available") with a Likert-type scale from 1 ("Strongly disagree") to 5 ("Strongly agree").

A total number of 803 first-year students (response rate 35%) answered the questionnaire at the end of the autumn 2020 semester. At completion, the data consisted of 798 respondents, after we deducted five respondents from the distance affiliation of the uni-

versity. Most of the respondents had started a Bachelor's degree (80.6%). Although fewer respondents started a Master's degree (19.4%), more than half of the respondents (51.3%) reported having previous experience of university studies in Finland; it is quite common for students to have studied at open university before applying for a degree. Thus, the data consist of a heterogeneous student body of Finnish university students starting a new study programme. The first-year students in Finland tend to be older compared to those in most other OECD countries (OECD, 2021). The youngest respondents were 18 years of age and the eldest was 70 years old. The average age was 24.8 years (SD 7.61). The national average age of entrance in higher education in Finland was 22.8 years in 2020 (Karhunen et al., 2021). The respondents were categorised into three groups according to age. The *youngest group* (21 years or younger) of respondents represented those who had only one or two gap years before university. The *young adult group* (22 to 29 years) was based on an age category used in Finnish youth policy. Finally, the others were classed as the *older group* (30 years and older).

All of the questions in the questionnaire were optional to answer. Because there were no compulsory questions, we were satisfied with the manner of how respondents had filled in the questionnaire. Only some answers were missing throughout the data. Gender distribution was 74.6% *female*, 22,0 % *male* and 0.5% *other*, while 2.9% selected *I do not want to state my gender*. These numbers characterise the average student population in Finland, where most students at the research universities without technical or medical education are female. The respondents represented the average distribution of students across different faculties: 27.4% humanities and social sciences, 15.2% information technology, 24.4% education and psychology, 10.7% business and economics, 11.9% sports and health sciences, and 10.4% mathematics and science.

5.2 Analysis

Data were analysed both quantitatively and qualitatively to aim at a descriptive outlook on the overall situation. For the quantitative analysis, the IBM SPSS Statistics (Version 26) programme was utilised and consisted of descriptive statistics. The items of the Student–Staff Engagement scale were used to create a new sum variable of Student–Staff Engagement Group differences ($\alpha = 0.83$, $n = 8$) that were tested with the Chi-square test and one-way analysis of variance (ANOVA) (Larson, 2008). The aim of the analysis was to get a descriptive picture of the general factors influencing students' first-year experience at the start of a new study programme from the perspective of an exceptional situation, the COVID-19 pandemic.

The qualitative content analysis featured open-ended questions about the students' own descriptions of the effects of the pandemic on the beginning of their studies. The data consisted of 604 unique answers from individual respondents. Quite brief answers were typically – one or two sentences about whether or not a respondent felt that the pandemic

had harmed the early phase of their recent studies. The qualitative data were divided into two main categories: 1) those descriptions that highlight the difficulties that the pandemic caused, and 2) those answers which included argumentation about the good qualities of how studying was handled during the pandemic. Two researchers checked the data and applied thematic categories that were compared and discussed. The content analysis utilised the original ideas of Patton (2002) and Bengtsson (2016). We treated the two categories as separate units of analysis representing the variance in students' opinions. The overall strategy was more like manifest analysis (see Bengtsson, 2016). All the thematic categories were organised according to the broader surface structure, and the aim was to complement the understanding of the descriptive results of the quantitative data analysis.

6 Results

6.1 The Influence of the Pandemic Experience

The effects of the pandemic were experienced in diverse ways among the student population. The main results show that there were contradictory experiences among the first-year higher education students during the pandemic. Two-thirds of respondents (59.9%) reported that the pandemic had hampered the beginning of their studies. However, almost one-third (30.4%) felt that the pandemic had not caused much trouble at the beginning of their studies. Less than ten percent (9.7%) of the respondents could not say whether or not the pandemic had any consequences for the early phase of their studies. A chi-square test of independence was performed to examine the relation between pandemic situation and background information. When comparing respondents' pandemic experience according to their background information, only age made any difference with respect to the variety of experiences (Table 1). More than two-thirds of the youngest respondents (age 21 years or younger) reported difficulties with the pandemic. It was quite the opposite among the older student group (30 years or older), where only one-third reported that the pandemic had harmed the beginning of their studies. Gender and the field of study made no difference.

Table 1: The experience of the pandemic situation according to age

Has the pandemic made it difficult to start your studies?	Yes		No		Cannot say				
Age	f	%	f	%	f	%	X^2	p	df
21 years or younger	287	71.0	74	18.3	43	10.6	99.349	.000	4
22–29 years	132	56.9	75	32.3	25	10.8			
30 years or older	51	34.2	90	60.4	8	5.4			
Total	476	59.9	242	30.4	77	9.7			

6.2 The Social Aspects of Early Engagement and the Pandemic Situation

When exploring students' sense of belonging to groups, some differences were found. The majority of respondents (85.3%) reported feeling a sense of belonging to the university where they had been accepted to study. Likewise, 77.5% of all respondents felt they belong to the study field they had chosen. Only a small minority (8.2%) of respondents did not have feelings of belonging to any group at all.

The sense of belonging to the university and field of discipline can be interpreted as representing the overall belongingness to the academic study community as a shared experience without connection to the pandemic situation, and there were no significant differences between groups. However, there were significant differences in the feelings of belonging to smaller and more concrete social groups; these differences are reported in Figure 1. These respondents, who felt difficulties caused by the pandemic, also reported less belonging to their academic year class ($X^2 = 10.852$, $df = 2$, $p = .004$). In addition, they reported a lesser feeling of belonging to a smaller peer student group ($X^2 = 13.683$, $df = 2$, $p = .001$) and to the student union ($X^2 = 22.044$, $df = 2$, $p = .000$). However, when it comes to friends outside university, those who suffered from the pandemic reported belonging to this kind of peer group outside university in more cases than those whose studies had not been hampered ($X^2 = 26.623$, $df = 2$, $p = .000$).

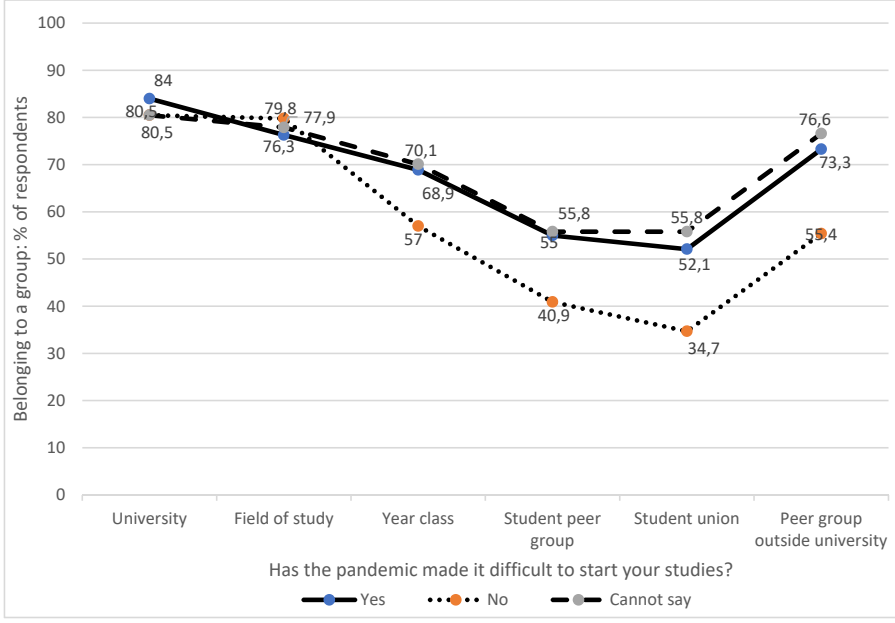

Figure 1: Significant differences between sense of belonging to a group and the pandemic experience

Table 2: The pandemic experience and the feelings of loneliness at the beginning of the studies

Has the pandemic made it difficult to start your studies?	Yes		No		Cannot say		Total				
	f	%	*f*	%	*f*	%	%	%	X^2	*df*	*p*
Do you feel lonely?											
No	148	31.1	147	60.7	36	46.8	331	41.6	60.441	4	.000
Yes, sometimes	265	55.7	80	33.1	36	46.8	381	47.9			
Yes, often	63	13.2	15	6.2	5	6.5	83	10.4			
Total	476	100	242	100	77	100	795	100			
Has starting to study increased your loneliness?											
Not decreased, nor increased	144	30.3	152	62.8	30	39.0	326	41.1	81.408	6	.000
Not able to say	32	6.7	15	6.2	6	7.8	53	6.7			
Increased loneliness	214	45.1	40	16.5	24	31.2	278	35.0			
Decreased loneliness	85	17.9	35	14.5	17	22.1	137	17.3			
Total	475	100	247	100	77	100	794	100			
What kinds of effects have loneliness had on your studies?											
Not negative or positive	184	39.3	150	63.6	36	47.4	370	47.4	65.174	6	.000
Not able to say	111	23.7	54	22.9	26	34.2	191	24.5			
Negative	164	35.0	24	10.2	12	15.8	200	25.6			
Positive	9	1.9	8	3.4	2	2.6	19	2.4			
Total	468	100	241	100	76	100	780	100			

In addition to belonging to groups, respondents were asked about feelings of loneliness. The experience of the pandemic and loneliness is compared in Table 2. Almost half of the respondents (47.9%) had felt loneliness at least sometimes during that period, while a minority (10.4%) had felt lonely often. Loneliness and the pandemic were related in a way: respondents who felt the pandemic harmed them in their first year of higher education also reported loneliness. These respondents reported increased feelings of loneliness at the beginning of their studies in more cases. In addition, overall, every fourth respondent felt that loneliness had had a negative effect on their studies. Those respondents who did not consider the pandemic to have caused them much trouble thought more often that starting their studies did not increase or decrease their loneliness. In addition, almost two-thirds of all students were quite neutral in regard to any effect of loneliness on their studies. Those respondents who suffered from the pandemic felt in more cases that loneliness had negative effects on their studies.

Family and friends outside the university was the most often mentioned source of social support at the beginning of the studies (Table 3). Here, the neutral group of respondents "cannot say", who were not able to determine whether or not they had difficulties because of the pandemic, reported the highest amount of social support from both formal and informal sources. A post hoc Tukey's test showed that in the cases of different kind of peer support (peer students, peer mentors, and friends outside university) the "cannot say" group differed from the other groups significantly at $p < .05$. In the case of support received from teachers, based on Tukey's test the group "yes" differed from the other groups "cannot say" and "no" significantly at the $p < .05$. The group "yes" differed from the group "no" significantly at $p < .05$ in the case of support from personal study advisor. In addition, a post hoc Tuckey's test showed that the group "yes" differed from the group "cannot say" significantly at $p < .05$.

Table 3: The pandemic experience and support from staff, peer students, family, and friends

Has the pandemic made it difficult to start your studies?												
	Yes		No		Cannot say		All					
	Mean	SD	Mean		Mean	SD	Mean	SD	F	p	df1	df2
Peer students	3.16	.91	3.05	.92	3.47	.75	3.16	.90	5.752	.003	2	749
Peer mentor	2.88	.85	2.88	.90	3.23	.80	2.91	.87	5.297	.005	2	715
Teachers	2.57	.75	2.90	.83	2.91	.77	2.70	.79	15.087	.000	2	719
Personal study tutor	2.78	.89	3.15	.79	2.93	.96	2.90	.88	12.548	.000	2	677
Friends outside university	3.24	.81	3.09	.87	3.49	.61	3.22	.82	6.289	.002	2	688
Family	3.31	.83	3.41	.78	3.58	.74	3.36	.81	4.275	.014	2	752

Both the experience of the pandemic situation and the student–staff interaction according to the Student–Staff Engagement scale are presented in Table 4. Those students who did not think that the pandemic disrupted the beginning of their first year of university had higher scores on the Student–Staff Engagement scale than those who considered the pandemic situation as difficult for the start of their studies. A post hoc Tuckey's test showed that all the groups differed from each other significantly at $p < .05$.

Table 4: The pandemic experience and student–staff interaction

Student–staff engagement						
Has the pandemic situation made it difficult to start your studies?						
	n	Mean	SD	F	df	p
Yes	466	3.46	.73	66.531	2	.000
No	249	4.09	.66			
Cannot say	77	3.87	.58			

6.3 Students' Own Descriptions of the Effects of the COVID-19 Pandemic in the Early Phase of their Studies

6.3.1 The COVID-19 Pandemic as a Challenging Situation

Students' own descriptions about the pandemic situation contained both the things that made it difficult to start their university studies and the factors that related to the experience of the pandemic not having interfered with their studies. The challenges of the situation were categorised into three themes: 1) Challenges of lack of social life and friends; 2) Challenges of unbalanced workload of distance learning; and 3) Challenges of lack of academic study skills, self-directedness, and time management.

Challenges of lack of social life and friends highlighted the social aspects and typical student life missing in studying during the pandemic as indicated by these students:

> I have gotten to know one new person only. (Female, 28, Humanities and Social Sciences)
>
> It is quite tricky to make friends with anyone. (Female, 24, Humanities and Social Sciences)
>
> There is no grouping or familiarising at all. (Female, 24, Information Technology)
>
> Making new friends in a new town is incredibly challenging. (Male, 23, Information Technology)

Challenges of unbalanced workload of distance learning were also seen as problematic Lack of learning experience from contact teaching at the university and the strain of distance learning increased the workload:

> Distance studying requires more effort than traditional learning. (Female, 20, Information Technology)
>
> Continuous distance studying increases the workload. (Female, 20, Business and Economics)
>
> Courses blend together, online everything seems the same and mashed. (Female, 39, Education and Psychology)
>
> Distance lectures are harder to follow than lectures on campus. (Male, 21, Humanities and Social Sciences)

Online learning was reported as being quite a lonely experience and students also felt challenged to get support from teachers:

> Studying is watching old lecture videos alone at home. (Female, 19, Education and Psychology)
>
> Distance courses without live lectures are very oppressive to do alone. (Female, 36, Information Technology)
>
> On the internet, it is more troublesome to contact teachers and to get help. (Female, 32, Information Technology)

The third aspect of the negative experience of starting studies during the pandemic was the *Challenges of self-directedness, studying skills, and time management*. The pressure to manage things alone by themselves was described as demanding self-regulation and time management. This was a question of taking responsibility or generating motivation but also required the ability to focus more on the learning tasks:

> It is difficult to concentrate on distance teaching. (Female, 21, Humanities and Social Sciences)
>
> Difficulties of keeping up a regular study rhythm. (Female, 27, Humanities and Social Sciences)
>
> I must have had more independence and self-control. (Female, 19, Humanities and Social Sciences)
>
> *It is difficult to shape up and get motivated to study. (Male, 19, Business and Economics)*
>
> *I had the responsibility of progressing my studies completely by myself. (Female, 34, Humanities and Social Sciences*)

6.3.2 The Pandemic as Enabling Increased Flexibility

Despite the majority having difficulties during the exceptional situation, there were also students who thought that the pandemic had not caused any disruption to their early steps in the new degree programme. These experiences were characterised by the theme of increased flexibility. Flexibility included short stories about individual life situations, combining work, family life and studies, as well as overall notions about the fit of the online learning environment to one's own style of studying. Four categories of chances and benefits were identified: 1) Chance of the possibility to combine work, family and studies; 2) Chance for individual learning styles and habits; 3) Benefits of lack of personal need for social events and groups on campus; and 4) Benefits of satisfaction with teaching arrangements projected increased flexibility as a positive experience.

The advantages of *chances of combining work, family and studies* are presented in the following quotes:

> It is easier to combine work and studies. I have been grateful that teachers have lessons on Zoom, record lectures, and have made comprehensive content available at Moodle. (Female, 32, Business and Economics)

> I work full-time, so Corona [the COVID-19 pandemic] has improved my possibilities to study independently outside my work time. (Female, 27, Business and Economics)

> Distance learning makes it possible to combine work, family and studies. It is a modern way of studying. I hope hybrid studying is one way to learn in the future. (Female, 43, Business and Economics)

For many respondents, flexibility regarding time and place brought more freedom to make their studies as *a chance for individual learning styles and habits*. This flexibility supported their individual learning styles. This experience shared by students of different ages, as seen here:

> That you can study anywhere, for example, brings more freedom. (Female, 19, Business and Economics)

> It is easy to study alone; watching lectures at home is easy and convenient. (Female, 19, Mathematics and Science)

> Distance learning suits me better than contact teaching. (Male, 38, Information Technology)

> Contrarily, distance learning has made more efficient, more independent, and more flexible studies possible as I do not need to run around campus. (Male, 30, Humanities and Social Sciences)

> Distance learning has been an effective way to study for me. I can watch the videos in my own rhythm and it is possible to pause if I want to reflect on something or find out more information before continuing to watch the lecture. (Female, 30, Education and Psychology)

The students who felt they benefitted from the Pandemic situation also expressed that they did not feel bad about missing social events or student life on campus. They reported *the benefits of lack of personal need for social events and groups on campus*. They also felt that they had a sufficient social network around them:

> I see that I can study much more effectively as I can find my own rhythm for doing the distance studies and social events do not take away time from my studies. (Female, 26, Business and Economics)

> I do not feel a need for social events. For me, the most important thing is to learn new knowledge and to graduate into a new career. I am undertaking a Master's degree and am not participating freetime activities, so the Coronavirus [COVID-19 pandemic] has not really had an impact on me. (Female, 26, Humanities and Social Sciences)

> I have a good, supportive social network around me. (Female, 20, Education and Psychology)

These respondents were satisfied with the way the teaching was organised by the university. They also thought that the quality of teaching was good. These experiences were categorised as *the benefits of satisfaction with teaching arrangements projected increased flexibility as a positive experience*.

> Distance learning has been well arranged. (Male, 47, Business and Economics)

> Online lectures are excellent. (Male, age not stated, Mathematics and Science)

> Things are well organised online, and my own digital skills are sufficient. (Female, 33, Education and Psychology)

7 Discussion

The results show that, at the university examined here, the majority of new students felt they suffered from the pandemic situation. However, this is not the only truth about the first-year experience as there were also around one-third of the respondents who did not think that the pandemic had disrupted the beginning of their studies. Based on the statistics, these student groups differed from each other by age. Those who had trouble starting their studies were often younger students. The older group, students over 30 years of age, reported less negative effects having been experienced due to the pandemic. Hence, the critical issues of starting university studies online without campus experience seem to be related to the age and overall life situation of individual students. The variation can partly be explained and understood as a part of the overall student body's heterogeneity, but the differences should not be seen only as individual factors as there were also institutional and pedagogical issues. Next, these aspects are discussed further.

The quantitative results draw a picture of how the COVID-19 pandemic has been connected to the experience of social factors at the beginning of first-year university students'

studies. The results concerning feelings of belonging to groups are in line with previous literature emphasising the importance of students' interactions with school staff and peers (Cotten & Wilson, 2006; Hagenauer & Volet, 2014; Prahalad & Ramaswamy, 2004). Our findings also indicate that belonging to peer student groups and social support from fellow students have been important factors during the exceptional situation of starting university studies during the pandemic. The reported experience of loneliness of many students intertwines with the lack of interaction and support with peer students, although there is no causal connection. It is also of interest that friends and family outside the university were the most common source of support reported. It appears that the pandemic situation has caused students to seek support even more than before from familiar sources. The lack of social relationships inside the university community might have had consequences for the dynamics of the smaller group engagement and feelings of belonging to the university.

The interaction with staff and the early experience of learning in the first courses had a clear connection to the pandemic situation. Our results confirm the important role of teachers and staff in early engagement, which has been highlighted in previous studies (e. g., Kantanen et al., 2020). It is evident that, for many new university students, the pandemic situation and the online interaction have not made it possible to create the usual relationships with teachers. Wilcox and colleagues (2005) have pointed the importance of being able to negotiate a new identity as a university student and the need to belong to a group for a successful study path. Our study shows that the pandemic situation has not been the most appropriate starting point for these kinds of processes that are particularly important for new students. Early interaction with staff is also significant because, according to Fuentes and colleagues (2014), it leads to a more meaningful interaction with teachers later along the study path. Thus, there is good reason to be worried about further waves of first-year students during the pandemic and their educational engagement.

Students' own descriptions about the challenges of starting their studies during the pandemic and simultaneously their personal responses expressing their satisfaction with the educational adjustments highlight the two-sided experience of the pandemic. Though our overall group of respondents had a heterogeneous background of previous studies, the online experience was contrasted to the traditional face-to-face teaching. Those who were suffering from the non-traditional online entrance to higher education were mostly young students aged 21 and younger. They can be seen as having been in a particularly sensitive phase along their educational path as many of them were entering university straight from upper secondary school. Previous research has paid a lot of attention to this particular age group and highlighted the need for these transitioning young adults' negotiation between their old and new identity as well as the importance of social support.

The experience of the youngest respondents shows that the specific requirements Trautwein and Bosse (2017) suggest for a successful transition are critical in the time of the

pandemic and online transitioning. This group lacked these requirements in many ways. They described challenges in personal requirements for study skills, time management and self-directiveness. These can be seen as critical issues in student's own activities in the engagement process (see Annala et al., 2012). In addition, the qualitative data show that organisational and social dimensions seem to be critical during the pandemic situation. The institutional conditions were different from the traditional teaching and more demanding for many respondents. Likewise, the social aspects of building up peer relations and integrating in groups were not as easy in the online learning experience.

The group with more positive feelings about the online study experience consisted mostly of older students. They might have a family and career and more life experience. Theoretically, we can assume that they have already gone through various kinds of negotiating processes regarding their identity and membership in diverse groups. However, they seemed to either feel like belonging to institutional or non-formal peer groups. Individual qualitative data portrayed a picture of adult learners with professional objectives for their studies. They might be the type of students with autonomy, competence and self-regulation described by Holzer and colleagues (2021). They might also have more capacity for flexibility and thus are able to gain more advantage in such a situation (see Oliveira et al., 2018).

Online university entrance seems to be challenging, particularly to young students who need a lot of social support and places to discuss the demands of academic studies, which Aristovnik and colleagues (2020) have also highlighted during the pandemic. There is also a need for support for academic study skills and time management, which was described in responses to specific open-ended questions. The online first-year experience raises the question of how to answer new students' heterogeneous needs for supportive practices at the very beginning of their studies, especially for the ones who are at university for the very first time. Previous studies have called for special programmes for newcomers to the academic study community (Brinkworth et al., 2009; Brooman & Darwent, 2013; Gale & Parker, 2014; Greene, 2011). The results of our study confirm the need for that. However, the early transition programmes should take into account the individual needs and the diversity of the student body.

The pandemic forced universities to roll out the extremely large-scale intervention of online teaching and learning. Oliveira and colleagues (2018) point out: "It is possible that the distance modality continues to grow steadily, but it still seems utopian to say that at some point in the history of education, face-to-face teaching will become obsolete and thus be totally replaced by EAD". In the case of first-year students in higher education, the pandemic has shown that there are still many lessons to be learned about developing practices for online transitioning. These lessons concern the importance of social relationships and community aspects as well as pedagogics.

We also acknowledge the limitations of our study. Not all (just under half) of the respondents were entirely new university students without any prior experience of university studies. However, they represent a proportion of the typical first-year student body in Finland, and the data represent the diversity of new students and their needs. It also highlights the importance of understanding the complexity of supporting individual students at the start of their higher education studies in appropriate and meaningful ways.

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Motivational Beliefs and Positive Achievement Emotions During COVID-19: A Person-Environment Fit Perspective in Higher Education

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Abstract

Guided by the person-environment fit approach, this study is focused on the fit between students' perceived feedback and their need for feedback (need-supply fit) in college courses. The need-supply fit was examined in students' most important and most difficult courses during the COVID-19 pandemic. Furthermore, we asked to what extent students' competence beliefs and subjective task value beliefs mediated the relations between instructor feedback and the need-supply fit related to feedback and students' positive achievement emotions. Using a diverse sample of 225 undergraduates (31% males), we found that more than 50 percent of students experienced a fit or a small misfit between their need for feedback and the feedback perceived from instructors in their most important and difficult courses. The overall misfit was lower in students' most important courses than in their most difficult ones. In the most difficult course, both the need-supply fit and the perceived feedback were related to students' competence beliefs and subjective task values. In the most important course, the need-supply fit was associated with students' subjective task values, whereas perceived feedback was related to students' competence beliefs and subjective task values. Also, instructor feedback was associated with higher positive achievement emotions through students' subjective task values in both courses. Finally, we discuss the study's relevance in the context of higher education, e. g., the importance of feedback as an instructional strategy for students' positive academic development.

Keywords

competence beliefs; subjective task values; person-environment-fit theory, higher education, COVID-19 pandemic

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1 Introduction

Instructional quality in classrooms is central for students' positive academic development (Helmke, 2009). That was true before and during the COVID-19 pandemic, and we assume that it will continue to matter after the COVID-19 pandemic. Theorist postulate that teachers' behaviors, e. g., their instructional quality, influence students' motivational beliefs and achievement emotions (Eccles et al., 1983; Pekrun, 2006). However, does the concept of instructional quality imply that it is equally positively meaningful to all students' motivational beliefs and achievement emotions?

Throughout the COVID-19 pandemic, some instructors and students at universities were satisfied with the instructional quality during the pandemic, whereas other reported lower satisfaction (Weidlich & Kalz, 2021). However, satisfaction with instructional quality does not always imply a high average of instructional quality. In the context of instructional quality research, person-environment fit (PEF) theorists emphasize that the fit between students' needs for instructional quality and the perceived instructional quality in class (need-supply fit) explains students' satisfaction and their positive academic development (Fraser & Fisher, 1983).

Feedback is one central element of instructional quality (Klieme, 2019; Praetorius et al., 2018). Instructors' feedback helps students become aware of their (lack of) competence and aims to improve students' competence development and motivation. Thus, feedback might help to improve students' learning success (Forsythe & Johnson, 2017). In this paper, we focus on college student and ask whether instructor feedback per se or the fit between instructor feedback and students' need for feedback matter for students' positive academic development? We are particularly interested in the mediating role of students' motivational beliefs in the association of instructor feedback, fit between instructor feedback and students' need for feedback and students' positive achievement emotions.

1.1 Feedback as Indicator of Instructional Quality

Instructors' behaviors help to explain students' academic development and success in class by creating a learning environment with multiple learning opportunities (Helmke, 2009; Klieme, 2019; Lipowsky, 2015). Teachers who adjust their instructional behavior based on the class context and create learning environments that offer classroom management, cognitive activation, and student support provide effective learning opportunities (Klieme et al., 2006, 2019; Pianta & Hamre, 2009).

Variations in the instructional quality of *student support* help explain students' competence experiences, sense of autonomy, and feelings of social relatedness (see Deci & Ryan, 2000; Praetorius et al., 2018). The nature of individualized feedback is a key component of student support. Multiple scholars have highlighted the impact of feedback on college students' positive academic development. Informal talks with instructors, instructor

learning advice, and individual feedback for students are associated with higher college students' involvement, interest, and performance (Gruber et al., 2010; Núñez-Peña et al., 2015; Plecha, 2002; Remedios & Lieberman, 2008). Similarly, general student support, and individualized feedback are positively associated with students' learning processes, academic motivational beliefs, and emotional well-being in college (Duchatelet & Donche, 2019; Sakiz, 2012; Şenel & Şenel, 2021).

Though students rated feedback from their instructors as a motivating factor for their learning success in class (Şenel & Şenel, 2021; Sogunro, 2015), feedback can also have either no or negative impacts on students' achievement emotions or motivational beliefs (Agricola et al., 2020; Forsythe & Johnson, 2017). Feedback from instructors can cause anxiety when students do not perceive feedback from instructors as useful (see Núñez-Peña et al., 2015). Forsythe and Johnson (2017) indicated that the impact of feedback depends on students' mindset, i. e., if students have the attitude that their mind is fixed or able to grow. In summary, prior research has indicated no, positive and negative effects of feedback. Different associations might be explained by students' heterogeneous needs for feedback.

1.2 Does Instructional Quality Need to Fit Heterogeneous Student Needs?

Multiple theoreticians argue that instructional behaviors and instructional quality indirectly affect student achievement emotions[5] through students' competence beliefs[6] and value beliefs[7] (e.g., expectancy-value theory, Eccles et al., 1983; control-value theory, Pekrun, 2006). Multiple scholars have investigated the direct impact of instructional quality on students' motivational beliefs, achievement emotions and performance in school and higher education (Fauth et al., 2014; Dorfner et al., 2018; Rubach et al., 2022). However, scholars also claim that teachers need to create learning environments with different learning opportunities for heterogeneous student needs within their classes. Teachers can challenge the situation to teach students with heterogeneous learning needs and preconditions by adaptive teaching (Helmke & Weinert, 1997). Adaptive teaching is a concept that involves teaching subject knowledge while taking into account the heterogeneous preconditions of students through different instructional strategies that are beneficial to the development of each student according to the situation (Hardy et al., 2019; Vogt & Rogalla, 2009). Heterogeneous preconditions and needs are defined by demographic characteristics (e. g., students' socio-economic status, ethnicity/race, gender, age), functional skills (e. g., abilities, cognitive or behavioral disorders), and academic attitudes

5 Achievement emotions refer to students' emotional experience in academic and achievement-related situations and outcomes, including tests, learning processes, or success/failure (Pekrun, 2006).

6 Competence beliefs refer to one's perceptions of their abilities and skills (Muenks et al., 2018; Pekrun, 2006).

7 Value beliefs, including subjective task values, refer to the degree of perceived importance, interest, and utility of an action, task, or outcome (Eccles & Wigfield, 2020).

(e. g., subject-related motivation, Hamre & Pianta, 2005; Vock & Gronostaj, 2017). Previous studies have focused on the association between the extent of instructional quality and students' academic development explained by demographic and functional risk factors (Rubach et al., 2022; Fauth et al., 2014; Wenger et al., 2020). However, to our knowledge, few scholars have investigated whether the extent of instructional quality is associated with students' academic development by considering the extent to which instructional strategies meet students' need for instructional quality. This research interest is grounded in person-environment fit theories.

1.3 Person-Environment Fit Theories in the Context of Instructional Quality

Person-environment fit (PEF) theorists aim to explain interindividual differences in human development, especially in individuals' motivational beliefs, satisfaction, emotions, and performance (Holland, 1997). PEF theories emphasize that the interaction between a person (P) and the environment (E) determines individuals' behavior (B = f(P, E); summarized in Holland, 1997 and Eccles et al., 1993). The theoretical approach is widely used in the context of organizational psychology (e. g., fit between employees and vocation or companies, e. g., Kristof-Brown et al., 2005), developmental psychology (e. g., stage-environment fit theory, Eccles et al., 1993) and in educational psychology (e. g., fit between instructors' value for teaching and their faculty value for teaching, e. g., Smart & Umbach, 2007; fit between students' values and their major, e. g., Schelfhout et al., 2019; or fit between students' ability and the demands of their program, e. g., Bohndick et al., 2018).

Across fields, two general types of PEF have been differentiated, namely the supplementary and complementary types. The supplementary type of fit describes whether an individual and the environment have similar or coinciding characteristics, e. g., value congruence (Kristof, 1996). The complementary types fit within the view that a "weakness or need of the environment is offset by the strength of the individual, and vice versa" (Muchinsky & Monahan, 1987, p. 271). The complementary fit can be further differentiated into the demands-abilities fit and the need-supply fit. The demand-ability fit focuses on how individuals' skills and abilities match the requirements of the environment (Cable & DeRue, 2002). The need-supply fit focuses on how individuals' needs are met by supplies offered in their environment (Cable & DeRue, 2002). In the educational context, the demand-ability fit of college students and the program they are enrolled in explains college students' satisfaction and performance (Bohndick et al., 2018; see Eccles et al., 1993 for similar findings in junior high school). The supplementary fit between all enrolled students' average interest and their chosen major explained the average academic success of students in enrolled college programs (Milsom & Coughlin, 2017; Schelfhout et al., 2019). However, studies did not find that the fit between students' interest and the programs they were enrolled in predicted their individual performance (Schelfhout et al., 2019).

During the COVID-19 pandemic, empirical research emphasized the importance of instructional quality. College students who were satisfied with the instructional quality in courses also reported higher motivational beliefs, satisfaction, emotional well-being and lower stress or depression (Aristovnik et al., 2020; Kim et al., 2020). Indeed, satisfaction with instructional quality does not always imply a high average of instructional quality. According to the PEF approach, students' positive academic development is impacted by the fit between perceived instructional quality and each student's needs for instructional quality (i. e., need-supply fit).

However, no study to our knowledge has investigated whether the instructional quality itself or the fit between students' need for instructional quality and their perceived instructional quality (i. e., need-supply fit) is positively associated with students' motivational beliefs and positive achievement emotions in higher education. We found one intervention study focusing on feedback. The authors investigated if requested written or verbal feedback impact students' achievement emotion (test anxiety) and motivational beliefs (self-efficacy) differently than feedback that students got without requesting it (see Agricola et al., 2020). However, this study focused on verbal and written feedback and not the intensity and quantity of feedback. Our study builds on this research lack.

1.4 The Present Study

In this study, we focused mainly on the instructional strategy of feedback. We investigated the associations between (a) feedback and (b) the need-supply fit regarding feedback with college students' subsequent positive achievement emotions. Guided by Eccles and colleagues (1983) and Pekrun (2006), we were, furthermore, interested in potential mediated effects through students' motivational beliefs, i. e., competence beliefs and subjective task values.

We used survey data from a longitudinal study at a large public university in Southern California. Participating students completed weekly surveys in the academic quarter of spring 2020 with course-specific questions about a broad range of behavior and experiences. It was the quarter in which instruction at this university switched to Emergency Remote Teaching (ERT), i. e., a distant, online form due to the COVID-19 pandemic.

Two types of courses were examined in our study in order to test the relevance of feedback and the need-supply fit regarding feedback for students' achievement emotions through their motivational beliefs. Students selected two different courses, i. e., one they perceived as their most difficult and one that they considered their most important course of all enrolled courses in spring 2020. Students explained why they selected the particular courses as the most difficult and most important (see Rubach et al., 2022). Using two different courses as reference allows examining intraindividual differences across courses, rather than using only one course for generalization. We chose to compare the most important and the most difficult course because we assumed that instructors' feedback and, in par-

ticular, needs-supplies fit have different implications for students in these courses. For the most difficult course, it might be even more relevant that the feedback offered by instructors meets the needs of students for most effective help in a challenging learning environment. Students reported that the course is perceived as difficult because, for example, content and assignments are perceived as overwhelming, and students have low competence beliefs in these courses. In such situations, needed feedback from instructors at the perfect intensity level could help students to overcome such challenges. In previous studies, for example, feedback helped students in these situations to identify and overcome such challenges (Kalinina et al., 2016; Paris & Oka, 1989).

All survey questions about instructional quality and motivational beliefs referred to these courses. We, therefore, investigated the associations between the course-specific need-supply fit, feedback, course-specific motivational beliefs, and general (course-unspecific) positive achievement emotions.

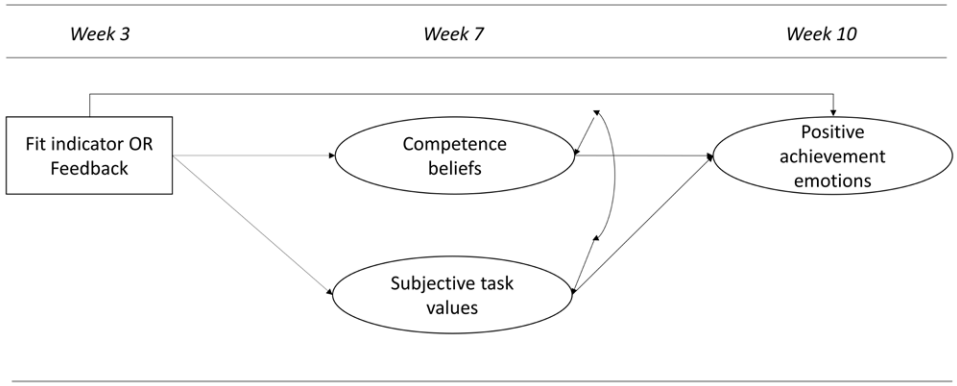

Figure 1: Theorized model for college students' most important and difficult course

Thus, we examined the following research questions (see hypothesized associations in Figure 1):

RQ1: To what extent do students report a need for feedback, and what is the fit between students' need for feedback and students' perceived feedback (need-supply fit) in their most important and most difficult course in the first quarter of the COVID-19 pandemic?

RQ2: To what extent are (a) perceived feedback and (b) the need-supply fit regarding feedback in the most important and difficult course related to students' positive achievement emotions mediated by students' competence beliefs and subjective task values?

Guided by the PEF theories, we hypothesized that college students who (a) perceived high individualized feedback in class and (b) have the need-supply fit between their need for feedback and perceived feedback would also be more likely to report being motivated, i. e., higher competence and subjective task value beliefs. We assumed that feedback, especially the fit between students' learning-related need for feedback and their experienced feedback in their enrolled courses (i. e., need-supply fit), would explain college students' motivational beliefs and achievement emotions during the COVID-19 pandemic (Eccles et al., 1993).

We also hypothesized that higher competence and subjective task value beliefs in college students' most important and difficult courses are associated with higher positive achievement emotions in college. Finally, guided by Eccles et al. (1983) and Pekrun (2006), we assumed that course-specific individualized feedback and the need-supply fit regarding feedback are associated with students' positive achievement emotions through students' course-specific competence beliefs and subjective task values.

2 Methods

2.1 Research Design

Data were used from the ongoing *Next Generation Undergraduate Success Measurement Project* (Arum et al., 2021) with a longitudinal and multi-cohort design at the public University of California, Irvine (UCI), as well as a parallel project *Improve Teaching, Motivational Beliefs, and Well-Being in Higher Education* (Rubach et al., 2019–2021; see https://www.researchgate.net/project/IMPROVE-Teaching-Motivational-Beliefs-and-Well-Being-in-Higher-Education [02.02.2022]). The *Next Generation Undergraduate Success Measurement Project* is investigating undergraduate student experiences and success in college. The parallel project *Improve Teaching, Motivational Beliefs, and Well-Being in Higher Education* was particularly focusing on student experiences in college courses and to what extent instructors' teaching behavior influences college students' positive academic growth. Both projects were approved by the Institutional Review Board (IRB) of the university.

Data collection with the first cohort started in September 2019 with 1,249 freshmen and junior students. 353 students of this full sample completed weekly surveys across the fall, winter, and spring quarters in the academic year 2019/20 (see the timeline in Figure 2). The weekly surveys assessed different experiences of students every week, i. e., their motivational beliefs, perceived instructional quality, achievement emotions, and academic behavior. Participating students received course credits every quarter they completed the weekly surveys. In this study, we used data from the spring quarter of 2020. All UCI courses had shifted to an online format due to the COVID-19 pandemic in the spring

quarter of 2020, which started on March 25th. The information that UCI moving its classes online was announced on March 10th, 2020. The stay-at-home order was issued in California started March 19th.

Week	Week 0	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11
Date	3/25-3/29	3/30-4/5	4/6-4/10	4/13-4/17	4/20-4/24	4/27-5/1	5/4-5/8	5/11-5/15	5/18-5/22	5/25-5/29	6/1-6/5	6/8-6/12
Event	Quarter starts	Begin of instructions									Instruction ends	Quarter ends & Finals
Assessment of constructs			Needs for instructional quality	Perceived Instructional quality			Competence beliefs Value beliefs *				Achievement emotions	

Figure 2: Timeline of the project in the academic quarter of spring 2020

2.2 Sample

We used data from n = 225 undergraduates who (a) participated in weekly surveys and (b) completed the surveys related to their needs for instructional quality and motivational beliefs. Eighty percent of the subsample were students in their freshman year (20% were juniors), 31% were male students, and 52% were first-generation college-going students. The sample was racially/ethnically diverse (48% Asian; 32% Hispanic; 13% White; 17% others). Students were enrolled in various majors (e. g., 29% Life Science, 17% STEM majors, 39% Social Sciences, 5% Humanities and Arts).

2.3 Instruments

An overview of all items, factor loadings, and internal consistency for each construct is provided in Table 1.

2.3.1 Perceived Feedback

Students' perceived feedback was assessed in the two courses students selected as their most important and most difficult courses in the third week of the spring quarter of 2020. The item development was guided by the three dimensions of instructional quality (classroom management, cognitive activation, students support; Klieme et al., 2006; Klieme, 2019). Students perceived feedback was assessed with one item "To what extent does the instructor provide feedback that helps you understand your strengths and weaknesses in *course name of most important/difficult course*". The response scale ranged from 1 = *not at all* to 7 = *very much*).

2.3.2 Need for Feedback

Students' needs for instructional quality were assessed with nine items in the first week of the spring quarter 2020. We asked each student to rate the importance of teaching strategies related to the three dimensions of instructional quality for their successful learning in college courses on a seven-point Likert scale with 1 = *not at all important* to 7 = *extremely important*. Students' need for feedback was assessed via one item "How important is it that you receive detailed feedback from the instructor?"

2.3.3 Need-Supply Fit

Guided by the PEF approach, we calculated the need-supply fit in students' most important and difficult courses (see Cable & DeRue, 2002). The literature describes multiple ways to assess and calculate fit: (a) subjective fit and (b) objective fit (see Greguras et al., 2014). The subjective fit captures only the person's perception in both the person (P) and the environment (E) and is further differentiated into direct and indirect fit. The direct fit captures individuals' judgment on the fit on a topic in their environment. The indirect fit can be calculated by judging a topic that occurs in the person (P) and the environment (E). The objective fit included both the person's and environment's perspectives. Indeed, the indirect and objective fit were both calculated with two indicators. In this study, the indirect fit was calculated (fit = need – supply) based on two indices reported by college students: (a) students' need for feedback and (b) students' perceived feedback in class.

The indirect fit can be calculated using three different mathematical approaches: (a) the algebraic differences (fit = need – supply), (b) the absolute difference (fit = |need – supply|), and (c) the squared difference (fit = (need – supply)^2) (see Bohndick et al., 2018). The distinction between absolute and squared difference is that the squared difference weights the misfit higher and assumes that a higher misfit has higher negative impacts on students' academic indices. In this study, all three approaches were calculated with the goal to test two underlying assumptions:

Hypotheses A: The misfit (need ≠ supply; absolute and squared difference) is negatively associated with various students' academic indicators. Hence, smaller misfits should be related to more positive student academic outcomes, i. e., higher subjective task values, competence beliefs, and positive achievement emotions.

Hypotheses B: The relationship between fit and students' academic development is linear (algebraic differences). The fit (needs = supply) or the misfit of higher feedback than needs (needs < supply) are positively associated with students' academic outcomes, i. e., higher subjective task values, and competence beliefs. However, the (mis)fit of receiving less feedback than needed (need > supply) is negatively associated with students' academic outcomes, i. e., lower subjective task values, competence beliefs, and positive achievement emotions.

In the following, we use the term misfit to indicate the numerical difference from the fit, where the fit has the value of zero.

2.3.4 Competence Beliefs

Guided by the expectancy-value approach (Eccles et al., 1983), three items were used to assess students' competence beliefs in their most important and difficult course (see Table 1). Students were asked to rate how good they were at learning new material in their most difficult/important course a) over time, b) compared to other subject areas, and c) compared to their peers. This study used students' competence beliefs measured after they received their midterm grades, i. e., after weeks five to seven of the spring 2020 quarter (see Figure 1). The response scale ranged from 1 = *not at all good* to 7 = *extremely good*. Reliabilities were strong (important course: ω = .94; difficult course: ω = .90).

2.3.5 Subjective Task Values

Five items assessed students' subjective task values (interest, utility, attainment) in their most important and difficult course after receiving their midterm grade (Eccles & Wigfield, 1995) (see Table 1). This study used students' subjective task value measured after they received their midterm grades, i. e., after weeks five to seven of the spring 2020 quarter (see Figure 1). The response scale ranged from 1 = *not at all* to 7 = *very much*. Reliabilities were strong (important course: ω = .91; difficult course: ω = .91).

2.3.6 Positive Achievement Emotions

Five self-developed items assessed students' positive emotions in academic situations in the last week of the spring quarter 2020 (Arum et al., 2021) (see Table 1). We asked students about their excitement, interest, happiness, and feelings of being welcome that they have experienced at the university and academic activities during the last weeks of the quarter. A slider from 0 = *not at all* to 100 = *very much* was used to rate these items. However, for this study, the scale was adjusted with items ranging from 1 to 7. The reliability of the scale was strong (ω = .86).

Table 1: Overview of items, factor loadings, and internal consistency for each construct

Nr.	Items	λ (important course)	λ (difficult course)
Competence beliefs			
1	Over the last few weeks, how good do you think have you been at learning the new material in your difficult/important course?	.93	.83
2	Compared to other subject areas, how good have you been at learning things in your difficult/important course?	.92	.98
3	Compared to your peers in this course, how good have you been at learning things in your difficult/important course?	.89	.75
	Internal consistency (omega)	ω = .94	ω = .90
Subjective task values			
1	Based on your experiences in this term, how much is your difficult/important course useful in everyday life?	.77	.79
2	Based on your experiences in this term, how much is your difficult/important course interesting to you?	.85	.85
3	Based on your experiences in this term, how much is your difficult/important course intellectually challenging in a positive way?	.83	.85
4	Based on your experiences in this term, how much is your difficult/important course important to you personally in terms of your values and identities?	.83	.86
5	Based on your experiences in this term, how much is your difficult/important course useful in terms of your long-term goals?	.83	.75
	Internal consistency (omega)	ω = .91	ω = .91
Positive achievement emotions			
1	In the past two weeks how often have you felt happy with academic activities?	.64	
2	In the past two weeks how often have you felt excited about learning?	.93	
3	On the past two weeks how often have you felt interested in what you are learning in courses?	.92	
4	In the past two weeks how often have you felt welcomed by your professors or Teacher Assistants?	.54	
5	In the past two weeks how often have you felt excited about being at UCI?	.62	
	Internal consistency (omega)	ω = .86	

2.4 Statistical Analysis

The analysis was undertaken using SPSS version 26 and Mplus version 8.1 (Muthén & Muthén, 1998–2016). For research question one, we calculated the algebraic, absolute, and squared fit indicators to understand the distribution of the need-supply fit and misfit for feedback across the most important and most difficult courses (see for more details, section 3.3.3). For research question two, we used structural equation modeling and specified two models for each student's most important and most difficult course. The first model specified the indirect associations between fit indicator (week 3), competence beliefs and subjective task values (week 7), and students' positive achievement emotions (week 10). The second model included perceived feedback as a predictor instead of the fit indicator (week 3), as well as students' competence beliefs, subjective task values (week 7), and positive achievement emotions (week 10). We did not include the need-supply fit regarding feedback and perceived feedback simultaneously in one model because of their strong intercorrelation (-.83 ≥ r ≥ -.72). We furthermore tested which of the three fit indicators (algebraic, absolute, squared fit) best fit the data (see Bohndick et al., 2018).

The hierarchical data structure (important/difficult courses) was taken into account within Mplus (Type = complex, cluster = important-course ID, difficult-course ID). We evaluated the goodness of model fit using cut-offs based on Brown (2015) and Kline (2010): Comparative Fit Index (CFI) ≥ 0.90, Tucker–Lewis Index (TLI) ≥ 0.90, and root mean square error of approximation (RMSEA) ≤ 0.08 for an acceptable model fit and CFI ≥ 0.95, TLI ≥ 0.95, and RMSEA ≤ 0.06 for a good model fit. Missing data were addressed using full-information maximum likelihood (FIML) estimation.

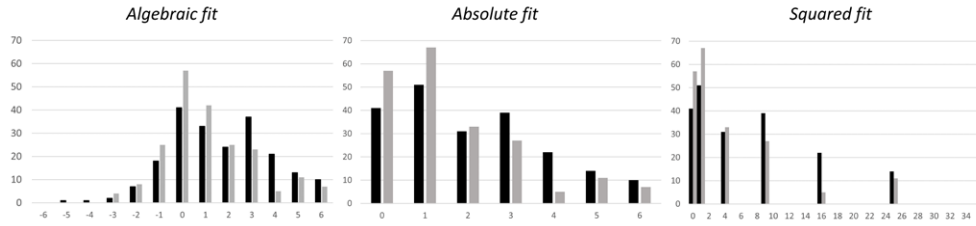

Figure 3: Distribution and path of the three fit indices for students' need for feedback and their perceived feedback for the most important and most difficult course for n = 225 college students
Note: The y-axis represents the number of cases (n), while the x-axis indicates the fit/misfit values. Black bars = difficult course, grey bars = important course

3 Results

3.1 Need-Supply Fit Regarding Feedback (RQ1)

On a scale from 1 (not at all important) to 7 (very important), students on average reported that individualized feedback from instructors is highly important for their own learning success (M = 5.85, SD = 1.20) in their courses. Furthermore, students experiencing higher feedback in their most difficult course (M = 4.18, SD = 1.95) compared to their most important course (M = 4.77, SD = 1.85, $t(213) = -3.73$, $p < .05$).

Figure 3 presents the three fit indicators in students' most difficult and important courses in the first three weeks of the spring quarter of 2020. Results show that 19.7% of the students experiencing a level of feedback that fit their needs (difference = 0) in their most difficult course and 27.5% in their most important course ($t(205) = 3.71$, $p < .05$).

In the most difficult course, the algebraic fit indicated that 13.9% of students experienced a higher level of feedback than what they needed, whereas 50.4% of the students experienced a lower level of feedback than what they needed. The absolute and quadratic fit indicated a dropping left-step trend, with most of the students (59.1%) experiencing no or a small misfit (Δneed – supply ≤ 1).

In the most important course, the algebraic fit indicated that 17.9% of students experienced a higher level of feedback than what they needed, whereas 54.6% of the students experienced a lower level of feedback than what they needed. The absolute and quadratic fit indicated a dropping left-step trend, with most of the students (59.9%) experiencing no or a small misfit (Δneed – supply ≤ 1).

Descriptively, the mean of the algebraic fit in the most important course was positive and higher than in the most difficult course (see Table 2). These results indicate that the likelihood was higher for students in the most important course to experience fit or experience more feedback than they needed.

3.2 Associations Between Perceived Feedback, Need-Supply Fit Regarding Feedback, Motivational Beliefs, and Achievement Emotions (RQ2)

Descriptive statistics are provided in Table 2. Descriptively, students' competence beliefs were lower than their subjective task values in both courses. Furthermore, competence beliefs and subjective task values were higher in the most important course than in the most difficult course.

Correlations indicated that all three fit indicators strongly correlated with the amount of feedback students perceived in both courses (-.83 ≥ r ≥ -.72). In the most difficult course, the fit indicators correlated negatively with college students' competence beliefs and subjective task values. Only the absolute fit correlated with students' subjective task values in the most important course. Perceived feedback positively correlated with competence beliefs, subjective task values, and positive achievement emotions in both courses. Furthermore, competence beliefs and subjective task values in both courses were positively associated with positive achievement emotions.

Comparing the final models with the three fit indicators suggests that the absolute fit best matches the data (see Table 3). Therefore, only the absolute fit was further examined as a predictor for students' academic outcomes. Below, results for the most difficult course are described first, followed by results for the most important course. Model fits of all models are shown in Table 3.

Difficult course. The final models are presented in Figure 4. Students' perceived feedback (week 3) was positively but weakly associated with students' competence beliefs and subjective task values in students' difficult course (week 7). Furthermore, students who reported higher subjective task values in their most difficult course (week 7) also reported higher positive achievement emotions at the end of the quarter (week 10). However, competence beliefs (week 7) were not associated with students' positive achievement emotions (week 10). The association between students' perceived feedback on students' positive academic emotions was mediated through students' subjective task values ($ß_{ind}$ = .12, *S.E.* = .04, p = .01; *95% CI* [.03; .20]) but not through competence beliefs ($ß_{ind}$ = .05, *S.E.* = .04, p = .22; *95% CI* [-.03; .13]).

The need-supply fit regarding feedback (week 3) was weakly related to students' competence beliefs in the middle of the quarter in the most difficult course (week 7). The smaller the misfit between perceived feedback and students' need for feedback, the higher students reported on their competence beliefs. The same association helds for students' subjective task values. The association between the absolute need-supply fit regarding feedback on students' positive achievement emotions was mediated through students' subjective task values ($ß_{ind}$ = -.07, S.E. = .04, p = .04; 95% CI [-.14; -.002]) but not through competence beliefs ($ß_{ind}$ = -.03, *S.E.* = .03, p = .21; *95% CI* [-.08; .02]).

The final step was to examine the R^2 (Cohen, 1988) and to answer whether the need-supply fit regarding feedback or the feedback itself is meaningfully associated with students' competence beliefs and subjective task values. Both the R^2 of the prediction of the need-supply fit ($.03 \leq R^2 \leq .04$) and students' perceived feedback ($.09 \leq R^2 \leq .12$) on students' competence beliefs and subjective task value indicated small associations.

Important Course. Students' perceived feedback (week 3) was positively but weakly associated with students' competence beliefs as well as positively and moderately associated with subjective task values in the most important course (week 7). Furthermore, students who reported higher subjective task values in their most important course (week 7) also reported higher positive achievement emotions at the end of the quarter (week 10). However, competence beliefs (week 7) were not associated with students' positive achievement emotions (week 10). The association between students' perceived feedback on students' positive academic emotions was mediated through students' subjective task values ($ß_{ind}$ = .14, S.E. = .05, p = .003; 95% CI [.05; .24]) but not through competence beliefs ($ß_{ind}$ = .02, *S.E.* = .02, p = .49; *95% CI* [-.03; .06]).

The absolute need-supply fit regarding feedback (week 3) was weakly related to students' subjective task values but not to students' competence beliefs in the middle of the quarter (week 7). A smaller misfit between perceived feedback and students' need for feedback was associated with higher subjective task values. The association between the need-supply fit regarding feedback and students' positive academic emotions was mediated through students' subjective task values ($ß_{ind}$ = -.09, S.E. = .04, p = .03; 95% CI [-.18; -.01]) but not through competence beliefs ($ß_{ind}$ = -.01, *S.E.* = .01, p = .51; *95% CI* [-.04; .02]).

Again, the final step was to examine whether the need-supply fit regarding feedback or the feedback was more strongly associated with students' competence beliefs and subjective task values. As an indicator, we used the R^2 (Cohen, 1988). The need-supply fit regarding feedback was weakly associated with competence beliefs (R^2 = .01) and weakly associated with subjective task values (R^2 = .05). In comparison, students' perceived feedback was weakly associated with competence beliefs (R^2 = .06) and moderately associated with subjective task value (R^2 = .16).

Table 2: Means, standard deviations and bivariate correlations among all included variables for the most difficult course (above the diagonal) and most important course (below the diagonal)

		Difficult course		Important course								
		M	SD	M	SD	1	2	3	4	5	6	7
1	FIT.algebraic (week 3)	-1.67	2.19	1.10	1.99	1	.78***	.77***	-.83***	-.21**	-.23**	-.11
2	FIT.absolute (week 3)	2.14	1.74	1.61	1.60	.78***	1	.95***	-.79***	-.19**	-.21**	-.02
3	FIT.squared (week 3)	7.60	9.62	5.14	8.52	.79***	.94***	1	-.73***	-.15*	-.16	.02
4	Feedback (week 3)	4.18	1.95	4.77	1.85	-.80***	-.77***	-.72***	1	.31***	.35***	.18*
5	Competence beliefs (week 7)	3.85	1.38	4.67	1.48	-.12	-.11	-.05	.22*	1	.46**	.32**
6	Subjective task values (week 7)	4.29	1.58	5.04	1.47	-.17	-.25*	-.21	.40**	.41**	1	.41***
7	Positive academic emotions (week 10)	4.01a	1.35	4.01a	1.35	-.10	-.09	-.05	.21*	.24*	.41**	1

Note: $N = 225$ college students, [a] no course-specific factor, FIT.algebraic = algebraic fit indicator; FIT.absolute = absolute fit indicator; FIT.squared = squared fit indicator, $^{*}p < .05$; $^{**}p < .01$,$^{***}p < .001$.

Table 3: Comparison of model indices for the three fit conceptions for the most difficult and important course

	Difficult course				**Important course**			
	Algebraic fita	Absolute fit	Squared fita	Feedback (no fit indicator)	Algebraic fita	Absolute fit	Squared fita	Feedback (no fit indicator)
χ^2	131.45	135.15	132.24	133.86	118.00	117.10	119.08	119.99
df	72	72	72	72	72	72	72	72
CFI	.95	.95	.95	.95	.97	.97	.97	.97
TLI	.94	.94	.94	.94	.96	.96	.96	.96
RMSEA	.06 95% CI [.04; .08]	.06 95% CI [.05; .08]	.06 95% CI [.04; .08]	.06 95% CI [.05; .08]	.055 95% CI [.04; .07]	.05 95% CI [.04; .07]	.05 95% CI [.04, .07]	.06 95 % CI [.04; .07]
SRMR	.05	.05	.05	.05	.05	.05	.05	.05
AIC	9710.46	9619.12	10313.26	9675.37	9443.87	9350.92	10027.26	9418.89
BIC	9870.81	9779.47	10473.61	9835.93	9604.01	9511.05	10187.40	9579.24

Notes: [a] The models with the algebraic and squared fit were not reported as the model with the absolute fit as predictors fits the data best.

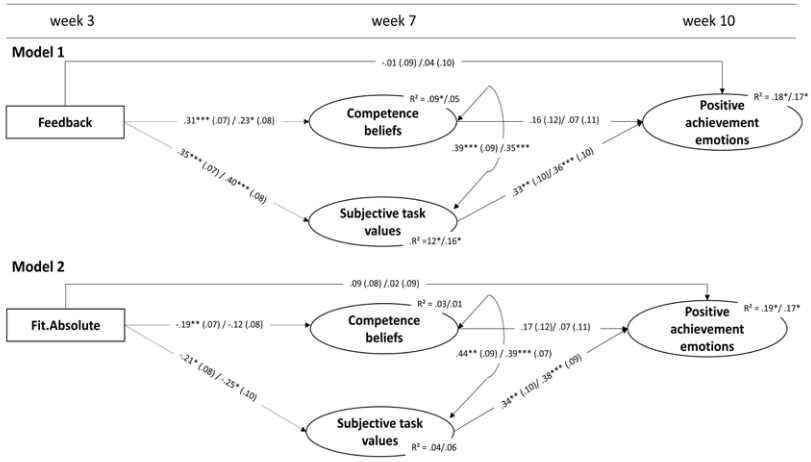

Figure 4: Final models with standardized coefficients for both fit indicators (Model 1) and feedback as predicator (Model 2) for both the most difficult course (coefficients before the slash) and most important course (coefficients after the slash)
Note: $N = 225$ college students, FIT.Absolute = absolute fit indicator; Feedback = perceived feedback during the first three weeks, reported are standardized ß effects before parentheses and standard errors in parentheses, $^{*}p < .05$; $^{**}p < .01$,$^{***}p < .001$.

4 Discussion

In this study, we investigated the extent to which feedback and the related need-supply fit were associated with students' positive achievement emotions in their most important and most difficult course. We further investigated whether these associations were mediated by students' course-specific competence beliefs and subjective task values. We addressed these research questions shortly after the transition to Emergency Remote Teaching in response to the COVID-19 pandemic. This was a particularly challenging time in which students' learning-related needs were of major interest for the discourse among researchers, practitioners, and the public. In the following, we discuss findings in detail.

First, in line with previous research, our results showed that students reported a high need for individualized feedback from instructors for their learning success in college courses (see also Şenel & Şenel, 2021; Sogunro, 2015). This result supports Klieme's assumption (2019) that feedback is an essential high-quality instructional strategy for students' learning.

We also found that more than 50 percent of students experienced a fit or only a small misfit (Δneed – supply ≤ 1) between their need for feedback and their perceived feedback from instructors in their most important and difficult course. Interestingly, a higher percentage of students experienced a fit or only a small misfit (Δneed – supply ≤ 1) in their most important course compared to their most difficult course. This result was because,

on average, feedback by instructors was perceived as higher in students' important courses in the first three weeks of the academic quarter compared to their most difficult course. Relevant to ask is whether instructors offer more feedback in courses students perceive as important or students' interpretation of feedback is related to students' course judgment (difficult versus important).

Second, this study demonstrated that the need-supply fit regarding feedback and students' perceived feedback were associated with students' motivational beliefs. However, differences occurred between the most important and difficult courses as the need-supply fit regarding feedback was not associated with students' competence beliefs in their most important courses. Guided by Cohen (1988) and the interpretation of the R^2, we see that in the most difficult course, both the need-supply fit regarding feedback and the perceived feedback were weakly related to students' motivational beliefs. In the most important courses, the need-supply fit regarding feedback was weakly associated with students' motivational beliefs, whereas perceived feedback was weakly to moderately related to students' motivational beliefs. It might be that the need-supply fit regarding feedback was particularly important for students' motivational beliefs in courses they believe are difficult and challenging. As stated above, it might be that especially in a situation in which students struggle with courses' content and tasks (that was one reason why students' defined courses as difficult, see Rubach et al., 2022), instructors' feedback and the fit with students need for feedback provides sources to cope with such challenges. In our study, however, we did not know how the teachers provided feedback, which is a question that needs to be answered to understand underlining psychological mechanisms. It should be taken into account that there were four weeks between the surveys to assess the need-supply fit and the motivational beliefs. This time difference may explain the low correlation between these constructs. It is also possible that the fit has a particularly situational effect on students' motivational beliefs in courses.

We did not confirm our hypotheses that the need-supply fit regarding feedback was more important for students' motivational beliefs than the perceived feedback itself. However, Eccles et al. (1983) and Holland (1997) described that individuals choose by default the environment that matches their values and needs. It could be that the evaluation of feedback by students in both courses already considers students' need for feedback. In detail, it would be possible that students self-select their courses and instructor regarding their own needs, and that the subjective judgment of instructional quality thus takes into account students' needs. Supporting this, we found a strong correlation between students' reported feedback and the calculated need-supply fit ($-.83 \geq r \geq -.72$). Future scholars can consider these assumptions by using objective rankings of feedback in order to calculate a fit. As described above, the need-supply fit regarding feedback can be calculated using the direct, indirect, and objective approach to calculate the fit. It might be that the indirect fit that we have used to assess the need-supply fit did not fully capture the actual fit. Important for future studies is to assess all three fit approaches (direct, indirect, and ob-

jective approach) and examine the impact of various fits on college students' academic development (see for the direct fit approach, Pelikan et al., 2021). As raised above, the time differences between students' experienced fit and students' motivational beliefs should be decreased to investigate the situated nature of investigated associations (see Eccles & Wigfield, 2020).

Interesting is the question of whether the need-supply fit regarding feedback might be associated with changes in motivational beliefs. Thus, feedback may be positively related to all students' motivational beliefs, but the fit, in particular, might contribute to an increase in students' motivational beliefs. Furthermore, it would be possible that the fit, as shown, is not only associated with competence beliefs and subjective task values but influences other aspects, such as performance, the perception of psychological costs, procrastination, persistence, or negative achievement emotions (see Bohndick et al., 2018; Pelikan et al., 2021). These hypotheses could be tested in future studies.

Third, this study highlighted the importance of instructors in various courses as we found that feedback provided by instructors was associated with students' positive achievement emotions through students' course-specific subjective task values. We found that students who perceived feedback from their instructors in the first third of the quarter reported higher interest, attainment, and utility in their course in the middle of the quarter and reported about higher positive achievement emotions at the end of the academic quarter. These results highlight the intercorrelation of students' academic and personal environment, i. e., that instructors might impact students' well-being (see also Gilbreath et al., 2011). These results might also support the theoretical assumption that instructors matter for students' achievement emotions through subjective task values (Eccles et al., 1983; Pekrun, 2006). As highlighted in the situated expectancy-value theory (SEVT, see Eccles & Wigfield, 2020), students' subjective task values might be relevant drivers of students' successful and healthy academic development. However, the bi-directional links between achievement emotions, motivational beliefs, feedback and need-supply fit regarding feedback need to be investigated as we know that the perception of instructional quality depends on students' emotional well-being (see Rubach et al., 2022).

The question that arises is how to develop a feedback culture in college courses? First of all, colleges need to provide a protected and respectful learning environment in which students get timely, accessible, dialogical, individualized, specific, and constructive feedback (Forsythe & Johnson, 2017; Nicol, 2010). Students may be introduced to the perspective that feedback is beneficial to become aware of their competence and use it as a learning opportunity to grow in their competence. We recommend to (a) offer mentoring and coaching to challenge students' maladaptive behaviors and dispositions related to learning growth and feedback, (b) provide learning opportunities with different intensity levels where students learn to regulate positive and negative achievement emotions related to feedback, (c) actively offer feedback and encourage feedback-seeking and (d) introduce

students early in their studies to feedback theories, practices, and goals (Forsythe & Johnson, 2017). Furthermore, verbal feedback was perceived as higher qualitatively and more useful feedback than written feedback (Agricola et al., 2020). Verbal feedback also provides the opportunity to have a dialogue about learning growth with instructors (Elbow & Sorcinelli, 2011).

5 Limitations and Future Steps

There are several limitations to this study that warrant discussion as a function of testing the person-environment fit approach.

First, estimating the fit between students' need for feedback and the feedback they perceived is captured by the differences on both items (see also Gilbreath et al., 2011). We asked students to rate the importance of feedback for their successful learning in courses with a scale from 1 = *not at all important* to 7 = *extremely important*. Students also reported their perceived feedback from instructors on a scale from 1 = *not at all* to 7 = *very much*. The question arises whether the calculated difference of both items provides the most accurate information on the fit. We used a ratio scaling approach and assumed that the interpretation of the used rating scale is the same for both items. It might be relevant to ask students directly about the fit between the need for instructional quality and perceived instructional quality (subjective fit) or use different scaling approaches on the need and instructional quality, e. g., assess the frequency and quality of the feedback. Furthermore, the wording of the items is not completely identical, which might impact the fit calculation. For future studies, it might be beneficial to use various approaches to calculate the fit between the need for instructional quality and perceived instructional quality, i. e., the direct, indirect, and objective fit, and investigate the associations between all types of fit calculation.

Second, the need-supply fit regarding feedback was calculated with data from the beginning of the quarter. We were interested in whether the fit would be essential after the transition into Emergency Remote Teaching and students and instructors reported uncertainty in this situation. However, it might be that students do not receive much feedback in the first weeks of the quarter and that a misfit between needs and supplies does not become salient early in an academic quarter. Therefore, we ran additional analyses with data on perceived feedback in students' most important and difficult courses measured in weeks three and eight of the academic quarter. These additional results showed no meaningful changes in students' perceived feedback over the quarter in their most important (Time 1: $M = 4.19$, $SD = 1.98$, Time 2: $M = 4.36$, $SD = 1.91$, $t(197) = 1.51$, $p > .05$) and most difficult course on the same instructor (Time 1: $M = 4.77$, $SD = 1.90$, Time 2: $M = 4.57$, $SD = 2.01$, $t(199) = -1.14$, $p > .05$).

Third, this study focused on students' positive achievement emotions as these decreased with the COVID-19 pandemic's start (Prasath et al., 2021). Our study did not investigate students' negative achievement emotions in the academic context. It is also relevant to note that achievement emotions were assessed across all enrolled courses. One goal of the *Next Generation Undergraduate Success Measurement Project* was to investigate how course-specific experiences impact students' college experiences (see Arum et al., 2021). Future studies need to investigate the association between course-specific motivational beliefs and course-specific (positive and negative) achievement emotions for a robustness check. Also, it would be promising to investigate the impact of motivational beliefs for different types of positive and negative emotions such as hope, pride, enjoyment (positive emotions) or anger, anxiety and frustration (negative emotions). The same might be true for students' subjective task values. To understand underlying psychological mechanism in detail, we suggest to investigate students' subjective task values, i. e., interest, attainment, utility and also cost value, separately. It might be that feedback or the need-supply fit are more strongly related to some value components (e. g., perceived interest or cost values) than to other value components. Future studies need to take this into account.

Furthermore, we used some new instruments that were adapted to the context of higher education. Feedback, for example, was assessed with one item in order to calculate the fit (see above). We assessed if students received feedback on strengths and weaknesses from their instructors. Related to the content validity, we did not assess various dimensions of feedback. Future studies might investigate the importance of different aspects of feedback and their fit with students' needs on students' positive academic development (see for example Agricola et al., 2020).

Lastly, our study used data from one university in the United States. We want to encourage future scholars to replicate our findings with other samples, e. g., students from different universities or across countries.

In summary, we found that the need-supply fit regarding feedback was not more strongly associated with students' competence beliefs and subjective task values than the feedback from instructors overall. However, it might be that the need-supply fit related to other strategies of instructional quality matter for students' positive academic development during the COVID-19 pandemic. Especially at the beginning of the quarter, the need-supply fit regarding classroom management might be important for college students' course-specific motivational beliefs. Furthermore, it might be important to investigate whether the course format, i. e., synchronous, asynchronous, or hybrid courses, moderates the influence of instructional quality or the related need-supply fit regarding students' motivational beliefs and emotions. For example, feedback might have a stronger association with students' academic development in courses with limited social interactions compared to courses with more interactions between students and instructions. Overall, we see it as a relevant question whether high instructional quality matters for all students

in a college course or if the fit is even more relevant? However, based on our results, it might be that the need-supply fit is only beneficial for specific groups of students, e. g., students who struggle in courses.

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Open Science practices

The project *Improve Teaching, Motivational Beliefs, and Well-Being in Higher Education* was pre-registered on osf (https://osf.io/jfzud/). Instruments are provided in Table 1.

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Students' Perceptions of Online Learning During the COVID-19 Lockdown: The Realities of Social Justice for Rural University Students

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Abstract

Social justice is a significant feature of any democratic government that aims at providing education for all. Access to an equal education is a fundamental right of every South African school-age citizen as enshrined in the 1996 Constitution. The sudden emergence of COVID-19 shut down the global world activities and thus revealed the realities of social justice in the education system in most developing nations. Before the pandemic, teaching and learning in the South African education system had been either conventional face-to-face learning, blended learning or both in most learning institutions. The outbreak of the pandemic forcefully led many higher institutions to adopt online learning as an alternative, thereby highlighting the digital divide between poor and rich, rural and urban students. This study explored lived experiences of rural students in accessing learning activities during the COVID-19 lockdown among rural-based South African students. Data collected from semi-structured telephonic interviews with twenty students from a rural-based university were thematically analysed. The students whose homes were based in Mtubamtuba, Esikhawini, Nongoma, and Port Dunford areas of KwaZulu-Natal province were purposively selected. Mezirow's (1994) Transformation theory was used as the theoretical framework to understand the study while content analysis was used to interpretively present the findings. Findings indicated that rural students encountered a lot of challenges to access online teaching and learning due to many factors. Some of the students were not able to actively interact with their lecturers on the Learning Management System known as Moodle. Poor network from service providers hindered their regular access to the learning and assessment activities. Due to the high cost of data subscriptions, most of these students could not afford data subscriptions. Provision of data subscriptions, laptops and appropriate network SIM cards to the students by the university are recommended to enhance social justice.

Keywords

Social justice, COVID-19, lockdown, realities, transformation, online learning

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1 Introduction

One of the significant characteristics of democratic government is the provision of education for all citizens who aspire to acquire learning experiences. The emergence of COVID-19 in the global world forced countries to go on lockdown to curtail the spread of this deadly virus. Thus, all activities were grounded as people were restricted to their homes. One of the sectors greatly hit was the education sector. With schools closed and students kept at home, the need to salvage the academic calendar led to the adoption of online teaching and learning as the only alternative means of curriculum delivery. Adoption of online teaching and learning approaches, therefore, was received with mixed feelings by many rural-based students. To these rural students, it amounts to their exclusion from learning activities as they may be unable to access online learning resources. Factors responsible for their exclusion include lack of learning infrastructure, lack of electricity, lack of laptops, poor communication network from service providers, lack of computer knowledge and skills for both students and some lecturers to assist students with online learning activities. Urban settlements have enabling facilities that can promote and give adequate learning experiences to urban-based students. This explains the realities of social justice between rural and urban, the poor and the rich. According to Hall (2019), most South African students in rural-based universities are from rural areas where basic amenities are challenging them. Rurality is a term that describes human settlements whose main occupations are agricultural practices and lack basic amenities or inadequate provision of basic infrastructures. Cristobal-Fransi, Montegut-Salla, Ferrer-Rosell and Daries (2020) posit that a rural area may be described as a remote part of a country located in sparsely forests and mountains. Seemingly, Avila and Gasperini (2005) assert that rural dwellers do not have access to adequate socio-economic amenities like quality education, good health facilities, good transport, and electricity. This implies that rural people have many limitations that make them nomadic (Avila & Gasperini, 2005). South African rural areas are mostly characterized by a lack of viable social and economic activities that are technologically driven (Cristobal-Fransi, Montegut-Salla, Ferrer-Rosell, & Daries, 2020). Hall (2019) posits that the population of South African rural schools stands at 11,252 schools across the whole country. These are made up of 3060 high schools and 8192 primary schools. KwaZulu-Natal is home to many rural students in the country and has the highest child population. According to Hall (2019), 2.6 million children (62%) of the KwaZulu-Natal child population are classified as rural. In another report, the World Bank (2018) reports that 33% of South Africans may be classified as rural. Despite the significant population of students in these rural areas, South African Governments at various levels have been unable to provide quality education or make available facilities that can enhance quality education (Du Plessis & Mestry, 2019). This is why Francis and Webster (2019) describe South Africa as a paradox; a country where inequalities or social injustices exist.

The Parliamentary Monitoring Group (2020) affirms that rural education is a significant fraction of the South African education system which has existed for many years. Rural schools have suffered neglect with little or no attention given to the schools or commitment to ensuring quality education like that of the urban schools (The Parliamentary Monitoring Group, 2015). Students in the urban areas are provided with enabling environments that make them access and excel in learning experiences even during the lockdown (World Bank, 2020). Urban areas provide several opportunities for urban students to be supported with learning devices, good internet networks from different service providers, a constant supply of electricity, computer training, a comfortable environment and many others (Dube, 2020). These facilities place urban students at vantage positions over rural students in the acquisition of skills, knowledge and also in various forms of assessment (Du Plessis & Mestry, 2019). Hence, students' lived experiences during the pandemic provide various indices for the realities of social justice in South African education. Dieltiens (2008) asserts that the peculiarity of rural schools is an indicator of social injustice meted out to rural students. This explains why rural students' academic performances are lower than that of their urban counterparts in the same examinations (Ajani & Gamede, 2020). The rural students are limited in knowledge production, critical thinking and academic writing. Health precautions such as social distancing and self-isolation prohibit traditional classroom teaching and learning, to curb the spread of COVID-19 in a physical gathering of large students (Krishnakumar & Rana, 2020).

Rural students are used to traditional teaching and learning approaches, which were discouraged. Rather, full online teaching and learning, using learning management systems (Moodle), which, unfortunately, complicate access to learning activities to many students in rural areas. Thus, students living in urban areas are more privileged to access learning via various resources. Ebrahim, Ahmed, Gozzer, Schlagenhauf and Memish (2020) assert that the lockdown in South Africa created economic hardships for many families, especially rural families who seem helpless to provide resources that can be used to access online learning activities. To this end, rural students are helpless on an effective approach to online learning activities during the COVID-19 lockdown. This study argues that COVID-19 has shown realities of social justice that exists in South African education by making students in the rural areas disadvantage from online learning activities, and the online learning is only the practicable alternative to traditional teaching and learning during the pandemic lockdown, so, there is need for an inclusive practical approach to promote social justice in lived realities of rural students.

Proffering measures to address issues from COVID-19 should include approaches to address factors that deprive rural students of accessing online learning. Nkoane (2010) asserts that several factors undermine successful online teaching and learning for rural students. Du Plessis and Mestry (2019) further agreed that there is a need to devise various strategies to improve access to online teaching and learning for rural students, as these would improve and ensure a better academic future for the development of South

African human capital. Shibeshi (2006) posits that solutions should be proffered to rural students' access to online learning. Hence, this study explored the lived realities of social justice in the education system, within the rural students' contexts in South Africa during the COVID-19 lockdown.

2 Theoretical Framework

This study adopts transformation theory as a lens to view lived experiences of rural students' access to online learning as the theory explains tenets of transformation in learning experiences. This implies the rationale for the theory is to understand rural students' lived experiences of online learning activities during the COVID-19 pandemic in South Africa. Transformation theory was initially propounded for adult learning (Mezirow, 1994). Accordingly,

> Transformation theory is intended to be a comprehensive, idealized, and universal model consisting of the generic structures, elements, and processes of adult learning. The theory's assumptions are constructivist, an orientation which holds that the way learners interpret and reinterpret their sense experience is, central to making meaning and hence learning. (Mezirow, 1994, p. 222).

The sudden transformation that ushered in online teaching and learning was a shift from traditional face-to-face teaching and learning, during the pandemic in the continuation of academic activities in South Africa. The students can only access learning experiences online through various learning technologies, as a transformation that influences their academic activities positively and negatively. The use of online-only for teaching and learning activities by the universities provides continuous learning experiences without borders or restrictions at students' convenience. However, learning experiences are determined, decided or controlled by students, as access to learning is determined at their own learning pace or speed, to suit their individual differences as a new transformation in the system.

According to Mezirow (1998), the application of Transformation theory to online learning activities in higher institutions provides in-depth knowledge of the impact of the transformative system in education. The theory promotes comprehensive and in-depth descriptions of students' capabilities to construct, reformulate and validate learning from online learning experiences (Cranton, 1994). Similarly, Mezirow (1998) avows that students' approach to problem-solving through learning experiences to understand, inteprete, describe or construct meanings to the problem via online engagements is transformational learning, which differs from the traditional approach of face-to-face learning. Students are made to reflect critically on learning experiences to arrive at useful transformative insights. Mezirow (1994) affirms that students can justify their new perspectives through the construction of new knowledge in their discourse.

Thus, the main focus of transformative learning is to empower the students for rational discourses (Evans & Nation, 1993). According to Evans and Nation (1993, p. 91), students' empowerment „involves three major ideas: the notion of choice, of control of one's life, and emancipation from ways of thinking which for the particular individual have limited both choice and control". Therefore, students get transformed by being empowered as mature and autonomous students. Furthermore, Mezirow (1994) describes transformative learning as the main focus of adult education that aims at making students critically think and make an autonomous contribution to discourses, rather than gullibly accepting others' views or opinions. The transformative learning process enhances students' critical reflections, validation, and actions on „beliefs, interpretations, values, feelings, and ways of thinking" (Mezirow, 1994, p. 26). With the vast emergence of the Fourth Industrial Revolution and the adoption of learning technologies into the education system, it becomes inevitable for students to embrace the new culture of learning. The acceptance of the modern approach to teaching and learning using learning technologies comes with diverse challenges in students' assumptions, beliefs, interpretations, judgments, and expectations (Coppola et al., 2002; Lee & Tsai, 2010).

Therefore, the adoption of a transformative learning framework into this study is to view students as adult learners who can understand and transform online learning structures for their critical reflection on the discourses and act on the learning experiences (Taylor, 1998). Extant literature on transformative online teaching is limited on students' reflective capacity for a deep knowledge base of online learning and „to make their discoveries public and peer-reviewed" (Kreber & Kanuka, 2006, p. 122). This study, therefore, explores the perceptions of South African rural university students of online teaching and learning during COVID-19 lockdown, and the use of transformation theory. The theory in this phenomenon is anchored on three fundamental premises, which see rural students as active adult learners, with their transformative learning based on critical reflection, and students' transformation via pedagogical inquiry with learning technologies. This explores evidence of the existence or lack of these transformative premises on the students' perceptions of online teaching and learning in the realities of social justice for rural students' competencies.

3 Online Teaching and Learning

Online learning refers to all online approaches of accessing learning experiences without traditional face-to-face contact with the facilitators, also known as distance learning (Adarkwah, 2020; Dube, 2020; Pete & Soko, 2020; UNESCO, 2020). Online learning can be hybrid or blended learning or purely online against traditional face-to-face. The purely online activities are learning activities that are accessed over the Internet, while hybrid or blended entails learning activities through traditional face-to-face classroom sessions and online activities, via the Internet or learning technologies (Kibuku, Ochieng & Wausi, 2020). The significance of online learning includes its effectiveness in students' access to learning at their conveniences and locations. It is also cost-effective for the universities and promotes a world-class education to students (Mhlanga & Moloi, 2020; Motala & Menon, 2020).

In most universities in developed countries, online learning has been in practice for many decades, as an effective approach not to only cut the rising cost of the education system but to also make learning accessible to students without borders or limitations (Dube, 2020). Thus, the adoption of online learning is an effective approach to address the rising cost of making learning experiences available to a large number of students from dispersed geographical locations as against traditional face-to-face classrooms (Pete & Soko, 2020; UNESCO, 2020; World Bank, 2020). Furthermore, the use of online learning saves the learning institutions with limited classroom sizes to reach out to their students without borders. The goal of online learning is to provide unlimited and unrestricted access to learning at the comfort zones of the students (Robinson & Rusznyak, 2020). Evidence from extant literature affirms that online learning enhances students' critical thinking and allows self-reflection on discourses, different from the face-to-face learning experiences, as it requires them to develop their diverse pedagogies (Owusu-Fordjour, Koomson & Hanson, 2020; UNESCO, 2020; Zimba, Khosa & Pillay, 2021). Online teaching allows teachers' traditional roles to be converted to the online environment, where teachers create roles for effective and meaningful learning experiences (Dube, 2020). These roles are to make online learning interactive between the students and the teachers through various approaches (Cristobal-Fransi, Monegut-Salla, Ferre-Rosella & Daries, 2020).

Teachers' role in the online teaching and learning environment is the instructors' role, which entails social, pedagogical, technical and managerial roles (Adarkwah, 2020). The teachers engage their students in an online discussion, facilitating learning experiences in the discussions, encouraging and promoting teamwork, organization of design for discussions, as well as the technological environment for the students (Mhlanga & Moloi, 2020). Similarly, due to the global adoption of learning technologies in the education system, online learning has significantly changed the teaching responsibilities of teachers, especially in the COVID-19 pandemic. UNESCO (2020) categorises teachers' role in online teaching and learning into three: designing and organizing instructional materials,

facilitating the learning discourses, and directing the instructions. Teachers' pedagogical skills are exhibited in the „design, facilitation, and direct instruction of cognitive and social processes to realize personally meaningful and educationally worthwhile learning outcomes" (Zimba et al, 2021, p. 5).

Teachers' pedagogical skills are known to be their teaching presence by some scholars, and they significantly influence students' perceptions of learning, satisfaction, and sense of community (Hedding, Greve, Breetzke, Nel & Vuuren, 2020). The teaching presence refers to how teachers can create communities of inquiry for students with social and cognitive presence, where all the students are made to participate in the online learning, with teachers assigning responsibilities to the students. Ilonga, Ashipala & Tomas (2020) affirm that teachers' pedagogical responsibilities are critical to online learning environments (cognitive, affective, and managerial). It is their cognitive roles that enable them to engage their students in learning activities that show in-depth their cognitive level concerning how they store information, critical thinking, and mental processes. Their affective role enables them to design various tools for students to express different emotions and how to develop diverse intimate relationships within themselves and between the students and the teachers. Finally, their managerial role structures and provides teachers with various tools to monitor their students for the necessary attention.

Thus, a teacher's roles in providing online learning to the students can be situational such as a researcher, process facilitator, content facilitator, advisor/counsellor, assessor, designer, technologist, manager and administrator. Teachers can adopt these roles in different situations during students' online learning.

4 Purpose of the Study

This study aims to explore rural students' perception of online learning during the COVID-19 pandemic in South Africa. The study will also proffer how rural students can be supported to effectively benefit from online learning during the pandemic.

5 Methodology

This study adopted a qualitative approach within the interpretivism paradigm. A semi-structured interview was used to generate data from the participants. The researcher requested biographic registration data for the 2020 academic registration of registered students in the Faculty of Education and purposive sampling was adopted to select 20 students from Mtubamtuba, Esikhawini, Nongoma and Port Dunford rural settlements in KwaZulu-Natal province. These students were selected to share their lived experiences in a semi-structured telephonic interview (Creswell, 2014). All the participants were briefed about the study and were made to understand their participation was voluntary and could

be withdrawn at any stage. An informed consent letter was communicated via e-mails. All other ethical considerations were strictly adhered to.

All the telephonic interviews were audio-recorded with permission from the participants. The data analysis for the study followed a systemic procedure with the transcription of audio-recorded interviews, and the transcripts were sent to the participants to validate their information. Transcribed data were coded, and themes were generated for the presentation and discussion of findings (Braun & Clarke, 2006). Pseudonyms are adopted in the presentation of excerpts from the participants for the confidentiality of the participants (Kumar, 2014). Participants from Mtubamtuba, (M1, M2, M3, M4, M5); Esikhawini, (E1, E2, E3, E4, E5); Nongoma, (N1, N2, N3, N4, N5); Port Dunford, (PD1, PD2, PD3, PD4, PD5).

6 Presentation of Findings

Based on the systemic data analysis of the collected data from the purposively selected participants for this study, the following generated findings are presented.

6.1 The Use of Online Learning as an Alternative During the COVID-19 Pandemic

The inability of the educational institutions to use face-to-face approaches for teaching and online led to the introduction of online learning during the lockdown. Participants acknowledged the shift to online learning by the education system.

> We were informed that our learning activities will now be online due to Corona. Though it is to continue our studies but it is going to be difficult (PD2).

The participants established transformation from conventional face-to-face to online learning happened suddenly and fast. A participant had this to say:

> The university indeed communicated to us that due to lockdown and Corona cases in South Africa, all face-to-face activities or gatherings have been suspended. So, our classes will now be online to continue teaching and learning (E4).

Participant N1 lamented on how he can cope with the introduction of full online:

> Eish! The adoption of online for full teaching and learning is a concern to me when I heard that we cannot continue to be on campus for learning. I stay in a rural area where it is difficult to get a network for communication most times (N3).

The shift from traditional classrooms to online platforms was adequately announced. This was asserted by this participant:

> I heard the announcement that since we cannot be on campus again for teaching and learning activities, and that online classes are to be used to continue the academic year, I knew there was nothing we can do to change this despite the challenges that some of us in rural areas may face (E2).

Most of the participants admitted that the use of online learning was a sudden paradigm shift that transformed the higher education space in South Africa, and this transformation did not provide rural students with adequate support.

6.2 The Unavailability of Network Access/Poor Network in Rural Areas

The participants highlighted poor network as one of the main challenges to their access to online teaching and learning during the pandemic. The pandemic has created an unusual lifestyle which includes online learning that disadvantaged rural students due to poor network service that does not allow the students to benefit from learning experiences. The participants expressed poor network as a front for the digital divide:

> As you are aware, our university is a rural university, and most of the students are from various KZN rural communities. Adoption of online teaching and learning as a full approach is challenging to us. We have missed so many assessments which are online because we have a poor network from the network service providers (E3).

Network connectivity is one of the rural areas' challenges in communication. A participant indicated that network problems in his community influence his communication life, using cell phones. He said:

> As a student in the deepest rural community of Kwa-Nongoma, I am really worried about my education now, because I know the network is very bad here. Sometimes I cannot receive calls for hours or even a whole day. Now, the same network affects data for internet browsing. I have been struggling with that! (N1).

Students from various rural areas experience problems with service networks in accessing learning materials online. Another participant buttressed N1, with this:

> Eish! We are facing a serious challenge, as much as we want to participate in all activities, we are sometimes left behind due to our inability to access this thing of online learning. I stay at the outskirt of Mtuba, where networks are terribly bad in our location. It is only the students who live in towns that enjoy good networks (M5).

While another participant PD4 expressed his frustration with online learning due to poor network services as he explained this:

> I am frustrated about this online teaching and learning, and I am praying that this year will not be a wasted year. Because if you can't cope with the learning and assessment that are online, you will end up failing. That will be a waste! The use of online learning during this COVID-19 as the only option is a problem. It is a challenge for us that are from rural areas where infrastructures are problems already. We have limited or poor network to even make/receive calls not to talk of using the internet. Since we started this online learning, we have not been able to enjoy or learn like others who enjoy good networks (PD4).

Another participant highlighted that poor network remained his worry because his rural area had issues:

> Online learning is not a new thing to us, we have been using it along with face-to-face teaching. At the university, we are provided with computer labs with good internet. The university provides WIFI that we use for Smartphones and laptops at any time. But now, we are struggling with poor networks in our rural locations (N3).

As illustrated from the above findings, the participants identified poor network services as what had been affecting their cellphone communication in their rural areas but the inclusion of data for online learning limited their access to the use of online learning.

6.3 Lack of Laptops or Smartphones to Access Online Learning

Findings from the participants indicated their lack of common learning technologies such as laptops and smartphones to access online learning activities. Most of these rural students are from poor economic backgrounds, which limits them from buying learning technologies like laptops or good smartphones.

> As much as we are willing to learn and accept online learning, we cannot afford to buy laptops or smartphones to access online learning. We are from poor homes that cannot afford to buy these things. And the university has not provided us with laptops. We seriously do not know what will become of this academic year because of this COVID-19 (N2).

Another participant added:

> It is the lack of laptops that is limiting us from online learning. Our phones cannot do much work like that of laptops, in the university we use computers in the computer labs to assist ourselves but now, we cannot even access the university. So, how do we access learning? The first-year students are greatly affected because we have never owned laptops before, we were expected to be supplied in the university before the pandemic. So, many of us are cut off from online learning now (PD1).

The issue of the first year rural students who were meant to be given laptops was also explained further:

> Before I got the offer from the university, I was told that the university will provide us with laptops as first-year students. But this never happened before the COVID-19 pandemic lockdown. And now, online learning is the news, how do we feature in these now? I cannot afford to buy a laptop and even my phone is a small phone that cannot access too much from the internet (E5).

While another participant also explained his expectation to be provided with a laptop :

> I got information from the university that online learning will be adopted to continue teaching and learning. I was expecting to hear that laptops and data will be made available to us. The university knows that most of us are from the interior rural parts of South Africa. Without the laptops, we cannot access online meaningfully (M2).

Similar fear was expressed by another participant, who failed to get a laptop before the pandemic:

> At home, there is no single member of my family that has a laptop. Yet the school sent a message of continuing teaching and learning online. I am seriously confused and I do not know where or whom I can ask for a laptop. The truth is that online learning will be difficult for us that are in rural areas. I know I am not the only one in this situation (E3).

The socio-economic backgrounds of rural students did not allow students to purchase laptops or good smartphones that could be used to access online learning materials.

6.4 Closure of or Absence of Internet Cafés in Rural Areas.

Findings from the participants indicated that during the lockdown, some internet cafés in the rural communities were closed, while some revealed that the absence of internet café has worsened the crisis of inability to access online learning for them.

> We have two internet cafés in my rural area, but with lockdown, they were forced to close. The hope of visiting these places to access online became dashed for me. With the network issues, we rely on these caféto do all online activities (PD2).

The same view was expressed by another participant, who admitted that the closure affected her:

> Most of us who are students and even learners in high schools rely on the internet cafés for our online needs, but with the lockdown safety regulations, the only internet café was closed. This became a nightmare to our access to online learning (M1).

Another participant revealed that the absence of an internet café in his location worsened his situation.

> There is no internet café in my immediate location. If I need one, I have to take a taxi to the closest city. This cannot be convenient for me every day or every time. I don't have a laptop, and I am thinking of deregistration to save myself from this problem (E4).

While another participant admitted that an internet café is not ideal for him because he spent a lot there:

> Using an internet café is not a good idea at all. A few times I have used it before lockdown for my assignments, I spent so much. So, it is expensive and sometimes overcrowded with high school learners (N5).

Another explanation to support the high cost of using internet cafés was given as:

> Even though it is expensive to use an internet café in my community, the poor network connectivity is also a problem for the only one internet café in my area. And for online learning, it means I will spend more. Do I have the money for that? (N1).

Due to the socio-economic backgrounds of rural students that did not allow them to own learning technologies, they always patronised local internet cafés in their communities. However, with the lockdown, the cafés were not operating and this created problems for them as they could not have access to online learning.

6.5 Lack of Computer Skills for Rural Students

Some participants revealed that most rural students are unable to access online learning materials because they lack the necessary skills. The participants agreed that several learning apps exist in online teaching and learning but they were unable to access or explore the online learning apps.

> As a first-year student, I do not know how to use a computer. Our rural high school did not have that for learners. I started learning how to use a computer when I started university, we had not even spent two weeks when the lockdown started. So, I cannot use the computer effectively for online learning at all (PD3).

Another participant agreed that most of them from rural schools lacked computer skills:

> In my high school days, we were never exposed to computers. And so we cannot operate computers. I was relying on the university to train us for online learning. So, we are helpless with online learning now (E2).

While another participant believed that literacy in the computer is critical to online learning:

> It is critical that you must be computer literate for you to benefit effectively from the module contents through online learning. Hence, our competencies as rural students cannot enhance that. Our rural high schools did not prepare us for online learning innovations (M1).

The rural students were products of rural high schools, where the computer had never been used before. Hence, these rural students lacked the necessary computer knowledge, with which they could access or maximise online learning.

6.6 Expensive Internet Data

The participants identified the high cost of data subscriptions as a common challenge to rural students who possess smartphones or laptops that can be used for online learning activities. This they expressed:

> I have a smartphone I use for WhatsApp and other social media. Despite the poor network, my data deplete quickly and it's really expensive. So, if I need to use that for active online learning activities, I will spend more (PD5).

Participants acknowledged that the internet is expensive to use for online learning:

> A subscription for a data bundle is too expensive for online learning activities if you want to be regular with the activities. Some of our parents or family members who can support us have lost their

> jobs due to the same COVID-19 lockdown. So, we don't have the means. Some of us do not have NSFAS or other bursaries to support our education (N6).

Participant E1 concurred with the expensive internet data in his expression:

> Honestly, this education is important to our life. As much as we want to be part of online teaching but data is very expensive to us who live in rural areas (E1).

Another participant explained that he could not regularly and adequately use online due to high cost:

> I live with my poor grandmother who is on a grant. The grant is little to cater for us. I cannot ask the poor woman to give me from that to buy data, which is expensive and I need to be buying from time to time. So, I just couldn't engage in online learning as expected (M1).

Internet connectivity is expensive in South Africa generally. The case was worse with the rural students whose economic backgrounds could not accommodate the expensive data cost.

7 Discussion of Findings

The COVID-19 pandemic placed online learning as an alternative option to face-to-face teaching and learning in various learning institutions. Thus, using online fully to deliver learning experiences becomes critical to the education system across the world (Cristobal-Fransi, Montegut-Salla, Ferre-Rosella & Daries, 2020; Owusu-Fordjour, Koomson & Hanson, 2020; UNESCO, 2020; World Bank, 2020). Although, Dube (2020), posits that online learning is not a new phenomenon in some selected South African higher institutions before the pandemic, as some students have been exposed to blended learning. However, online learning became a new approach to all students during the pandemic, without provision for leverage to all students to be included. Zimba, Khosa and Pillay (2021) aver that the adoption of online learning is to continue teaching and learning, despite lockdown/social distancing that prevent the large gathering, in controlling the spread of COVID-19. This is a transformation in the education system (Mezirow, 1994), as most learning institutions swiftly moved their teaching and learning activities online. Though, online learning is beneficial to students, as it makes learning experiences available at the comfort of students' diverse locations. This recent transformation in education is driven by three constructs according to Mezirow (1998), namely the centrality of experience, critical reflection, and rational discourse which the students should encounter in their engagement with online learning. Taylor (1998) asserts that students are provided with various approaches to construct or deconstruct learning experiences through critical engagement in their self-reflection on their prior experiences to reflect a transformation in education. In a longitudinal study conducted in Kenya, Kibuku, Ochieng and Wausi (2020) affirm that despite the benefits of accessing learning experiences online at their

convenience/locations, several rural-based students are cut off. Mezirow (1994) concurs that transformation is accompanied by positive and negative changes as it affects every society. This implies that not all transformative changes can positively transform the education system with an even significant impact.

Online learning is significantly made accessible through internet connectivity. Hence, students need good and stable internet to access learning effectively (World Bank, 2020). This implies that students can only become competent and knowledgeable through regular access to online learning activities. Adarkwah (2020) argues that the inability of rural students to have equal access to education, via online learning deprives them of their right to education. The deprivation is made prominent in various rural communities, where students lack regular internet connectivity to access online learning activities (Mhlanga & Moloi, 2020). Seemingly, Du Preez and Le Grange (2020) aver that online learning during COVID-19 has increased the digital divide against rural students who are limited by various internet network problems, which promotes social injustice in education. Social justice in education is to provide education to all rural and urban students whether face-to-face or online learning. Mezirow (1994) asserts that transformation theory advocates for absolute inclusion of all concerned to make or mar transformation in education. Motala and Menon (2020) avow that limited technological resources in rural areas remain a serious threat to the use of learning technologies, especially during the COVID-19 pandemic in South Africa. Many rural areas do not have technological infrastructures that can ensure good internet networks for learning activities (Kibuku, Ochieng & Wausi, 2020).

This explains why online learning during the COVID-19 pandemic lockdown remains difficult for rural students in different rural parts of South Africa. According to the World Bank (2020), the Fourth Industrial Revolution enhances curriculum delivery in the education system, providing diverse effective online learning opportunities to students, without any student being disadvantaged by locations or resources. Thus, students regardless of their locations should be made to access regular learning experiences regardless of their social status or geographical location (Robinson & Rusznyak, 2020). However, Dube (2020) affirms that many rural students in various South African rural locations are proportionately disadvantaged from accessing online learning due to the lack of resources. Similarly, Ilonga, Ashipala and Tomas (2020) aver that a wide digital divide exists between students from rich and poor families, urban and rural-based, high-performing and low-performing, highly educated families and less educated families. Transforming from face-to-face teaching and learning to fully online learning is a notable transformation that has globally impacted the education system (Mezirow, 1994). Students spend more time with various learning technologies to access in-depth knowledge, skills and ideas that transform their learning experiences (Quyen & Khairani, 2017; David, Pellini, Jordan, & Phillips, 2020).

The adoption of online learning during the COVID-19 pandemic is to continue teaching and learning while keeping people safe at home (UNESCO, 2020). However, its adoption is a critical plight for rural students (Owus-Fordjour, Koomson & Hanson, 2020), whose communities lack internet cafés or the closure of the existing few ones limit students to online learning. Dube (2020) recommends that the Department of Basic Education and other stakeholders should provide more community library centres with computer and internet facilities, for rural students' access to online learning free of charge. Mhlanga and Moloi (2020) further agree that rural students' use of these community libraries will enhance learning in rural areas. Rural students lack adequate computer skills in online learning, as the World Bank (2020) posits that learning is not limited to traditional face-to-face only but the integration of blended learning is an effective approach during pandemics such as the COVID-19 era. However, the World Bank (2020) identifies that most students from developing countries especially those in the rural suburbs lack the necessary computer knowledge or skills to access or maximize online instructional approaches and tools. This is why Zimba et al. (2021) opine that most rural students are the worst hit by the COVID-19 pandemic. Lack of computer skills is from students' high schools where a lack of computer facilities to train the learners for diverse online learning exists (Motala & Menon, 2020; World Bank, 2020). Ajani and Gamede (2020) posit that computer training is necessary for rural students to enhance their knowledge and skills to use learning technologies. Mezirow's (1994) transformation theory suggests that the integration of computers or ICT into teaching and learning is a welcome change in curriculum delivery and exposes students to worldwide views, and critical thinking to construct learning experiences from diverse perspectives. Adarkwah (2020) believes that the use of computer skills is enhanced by the technical know-how of the students. Du Preez and Le Grange (2020) affirm that the absence of computer resources in rural high schools is a social injustice to rural learners who are deprived of computer knowledge and skills.

Dube (2020) asserts that the social status of parents can enhance or limit students' access to quality education. This implies that students from working-class families can procure necessary learning materials or resources while students from unemployed families can only afford some learning materials with the assistance of education grants in South Africa. The high cost of data is a barrier to equal access to education for these rural students. Zimba et al. (2021) argue that despite the huge benefits of transformative ICT in the education system, it has also created a wide digital divide among students with different socio-economic backgrounds in most developing countries. Adarkwah (2020) further posits that the high cost of internet data impedes the attainment of equal access to education in African countries where blended learning is being promoted. UNESCO (2020) argues for the provision of all necessary resources to promote online learning for all students during the COVID-19 pandemic. Seemingly, the World Bank (2020) admonishes that the cost of learning resources should be subsidized by the governments and Non-Governmental Organisations for rural students in developing countries, so as not

to deprive rural students of online learning during the pandemic. Mhlanga and Moloi (2020) further opine that many rural students may be deprived of access to regular and adequate learning opportunities if they lack the necessary resources and support from the government or stakeholders. This implies why necessary transformation may not reflect in these rural students if social justice is not ensured across higher education institutions in South Africa. Similarly, Ilonga, Ashipala and Tomas (2020) submit that the high cost of data subscription is worrisome to rural students because most rural students, according to Robinson and Rusznyak (2020) are from poor economic backgrounds that limit their access to regular internet access, if not supported. In a related study conducted in Ghana, Owusu et al. (2020) assert that access to online learning by rural-based students during the pandemic era is severed due to the high cost of internet subscriptions. Dube (2020) reports that the loss of jobs due to the COVID-19 pandemic has thrown many rural-based families into harder economic situations that make it difficult for the parents or guardians to afford expensive data at regular intervals. Conversely, Kibuku et al (2020) conclude that the high cost of data subscription has impeded rural students' access to online learning. Mag, Sinfield and Burns (2017) affirm that social justice should be applied to drive inclusive education for all students in different locations, ensuring that every student has the constitutional right to access education.

The 'new normal' of online teaching and learning brought a transformative pedagogy into the higher education space in South Africa. The Mezirow's transformative theory highlighted the adoption of various learning technologies into teaching and learning as transformative, which significantly pushed the rural students into active learners, who are responsible for what, how and why they need to learn as adult learners. However, the adoption of various learning technologies by these rural students to access learning or to make a pedagogical inquiry faced diverse technical challenges at the initial conception, but the students continued to struggle with their ways to participate in online learning within the transformed higher education space.

8 Recommendations

Adequate access to online learning is critical to curriculum delivery during this pandemic crisis, to salvage and continue teaching and learning despite social restrictions. The study, therefore, recommends the following:

- The universities should endeavour to support rural students with the provision of personal laptops and monthly data subscriptions. These can be done through partnerships with multinational companies, NGOs and other stakeholders; either through lease or credit facilities.

- NGOs, religious bodies, companies and appropriate government organisations may be encouraged to donate or finance personal laptops and data subscriptions for the rural students.
- ICT training can be provided by the Department of Basic Education through the existing local high schools in the rural communities, on a small scale number to the rural students, in collaboration with ICT companies. The companies can provide learning resources that can be used as 'boot training' for the rural students. The training will enhance rural students' abilities to explore online learning resources. The training will facilitate how rural students can maximize the use of different smartphones, tablets, or normal general phones to access online learning.

These measures will ensure that social justice is promoted in the education system. Thus, closing the digital divide gap between the city and rural students during the pandemic era. Conversely, ensuring that rural students are not excluded from online learning in curriculum delivery, gives them a sense of belonging.

9 Limitation of the study

The study aimed at adding to voices on social justice for rural students in South Africa. However, the study was limited to only twenty purposively selected students from rural communities in the rural communities of North of the KwaZulu-Natal province. The study adopted semi-structured interviews with the participants to generate data.

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Isolation or Interaction? – Challenges in Studying Online Teacher Training Students and their Experiences with Online Teaching

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Abstract

The Corona pandemic has banished students and lecturers alike behind the PC at home. An academic exchange, courses and learning have largely taken place in private. Formal as well as informal exchange is only possible in a modified form. This poses new, previously unknown challenges for everyone involved. Universities have reacted quickly and created a formal framework by providing the necessary infrastructure, such as conference tools or examination platforms. But for students, the overall study situation tends to be difficult. Students have less contact with their fellow students, difficulties structuring their day and coping with the learning material. In this paper, the question of how students deal with the challenges of online study after nearly three semesters of online teaching is explored. For this purpose, results of a study conducted with teacher training students at a German university are presented and put up for discussion. The focus was on the aspects of technical equipment as a prerequisite for being able to participate adequately in online teaching, the interaction with each other and with the lecturers, the design of the online teaching and experiences with online exams. In addition, it will be discussed whether asynchronous courses and online exams are still desirable study formats even after the pandemic and whether the students see added value for their own professional future through participation in digital formats. From this, recommendations can be derived on how students can be supported and benefit from participating in digital study formats during and after the pandemic.

Keywords

Online study, initial teacher education, university teaching, online teaching, further development of university teaching

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1 Introduction

Online seminars, asynchronous lectures or digital open-book exams – these teaching and examination formats already existed before the outbreak of the Corona pandemic. But since March 2020, they have suddenly become the talk of the university sector and have gone from being the exception to the rule within a very short time. What was initially conceived as a transitional solution to keep teaching going has now been in place for three semesters. The so-called „digital semester" has become normal everyday life for students and lecturers. Instead of sitting in packed lecture halls, students sit alone at home at their laptops, meet online with their fellow students and lecturers to work together on content from courses or prepare for exams. But how do students fare in this home-study situation? While general and vocational education institutions are now rarely affected by complete closures, students still have limited access to the university and related infrastructure. Although many universities are planning to return to more face-to-face teaching in the coming semesters, a pandemic-related continuation or even a complete return to digital offerings is conceivable at any time. A discussion of problem areas, but also of the advantages of digital studies, is central to the further development of teaching. A good university education also includes responding to the needs of students. In this chapter, the following questions will be answered: How well does digital teaching work, what challenges does it bring with it and how do students deal with it? Which aspects have proven to be positive and should be further considered for further development of teaching in a post-pandemic period? All this will be discussed using the results of a survey with students at the university location Chemnitz (Saxony/Germany) as an example. Since the participants are students from the primary school teaching programme, it will also be discussed how the pandemic has influenced their practical experiences in connection with school placements and which insights from online teaching they find helpful for their own later professional practice.

2 Study Conditions in Germany in Times of the Corona Pandemic

Numerous studies were conducted in the summer semester 2020 in Germany at various university locations and also nationwide, looking at the study situation during the first semester in the Corona pandemic. They show that in many places the transition from face-to-face to digital teaching initially went well (Berghoff et al., 2020; Karapanos et al., 2021; Kreidl & Dittler, 2021). However, students do not always find it easy to keep in touch with their fellow students or to organize their day with more personal responsibility (Marczuk et al., 2021; Traus et al., 2020). As a result, many feel more burdened in the digital semester (Adam-Gutsch et al., 2021; Hahn et al., 2021; Kreidl & Dittler, 2021; Traus et al., 2020). The reasons for this are manifold. For example, this can be associated with more required independence and a simultaneously increased workload, for

example due to a more time-consuming processing of the accruing learning material (Adam-Gutsch et al., 2021; Feucht et al., 2020; Kreidl & Dittler, 2021). Students also state that they are more often distracted from their studies at home, that they have difficulty concentrating and that they are less able to organise themselves (Karapanos et al., 2021; Kreidl & Dittler, 2021; Marczuk et al., 2021; Traus et al., 2020). Looking at student satisfaction with digital learning opportunities, a very heterogeneous picture emerges. The quality of teaching is perceived as lower than in-person (Kreidl & Dittler, 2021). Especially the didactic design and the motivation by the lecturers seem to be difficult (Berghoff et al., 2020). Individual courses have been replaced by providing material, actual teaching does not take place (Feucht et al., 2020). Communication with lecturers is assessed very differently and ranges from predominantly good (Berghoff et al., 2020; Karapanos et al., 2021; Kreidl & Dittler, 2021) to difficult (Marczuk et al., 2021). Especially the contact with fellow students seems challenging for many students (Berghoff et al., 2020; Feucht et al., 2020; Marczuk et al., 2021), and the active participation in events turns out to be low (Kreidl & Dittler, 2021). The technical requirements of the students are very diverse, but they seem to have the essential equipment (Adam-Gutsch et al., 2021; Feucht et al., 2020; Karapanos et al., 2021). However, due to the occasional instability of internet connections, it seems that the students find it easier to attend asynchronous events than to participate in synchronous events (Feucht et al., 2020). Little evidence is found on the handling of the changed examination situation. This could be due to the fact that many universities try to continue to conduct examinations in-person (Berghoff et al., 2020), as the legal basis needed for online examinations is also missing in the German university landscape so far. In general, however, online examination formats seem to be reasonable alternatives from the students' point of view (Widmann et al., 2021). Besides avoiding the Corona-related hygiene constraints (mouth-nose protection must be worn during the exam, etc.), students see an advantage in the relaxed exam environment (Diel et al., 2021). Last but not least, a worsened financial situation was also evident among some students in spring 2020. The Corona pandemic led to lower employment and reduced income for them (Becker & Lörz, 2020; Widmann et al., 2021). Loss of job or loss of parental support are only some of the reasons. Others have a fairly stable income, either because they are still living with their parents, for example, or are living with them again, or because they are spending less money overall due to pandemic-related restrictions (Traus et al., 2020). A positive aspect is that the intention to drop out has not increased due to the pandemic (Marczuk et al., 2021).

Surveys that look at developments over several semesters are few and far between. A study shows that the perception of stress increases somewhat from spring 2020 to spring 2021 (Besa et al., 2021). Students do see being flexible in their work arrangements as an advantage, but the already very low agreement that more independent learning brings advantages in the digital semester has declined even further. Contact with lecturers and fellow students is also still missed (Besa et al., 2021). Students feel increasingly alone as the pan-

demic progresses (Kindler et al., 2021). Students seem to find it difficult to get used to the changed study routine and to structure their day. The motivation to study decreases (Kindler et al., 2021).

The survey presented here was conducted three semesters after the outbreak of the Corona pandemic with student teachers at the Chemnitz University of Technology in Germany. In this course of study, teaching is still predominantly digital and only in exceptional cases, in compliance with the usual hygiene and distance learning rules, in presence. In addition to a learning platform and a central cloud storage, students and lecturers have access to data protection-compliant web conferencing systems as well as online examination platforms, which are designed to maintain teaching operations in the best possible way. The design of teaching is left to the instructors and ranges from the provision of asynchronous teaching materials to synchronous, cooperative online events.

In July 2021, all students of primary education were contacted and asked to participate in an online survey about their experiences of teaching during the pandemic. After completion of the survey, a dataset of 139 completed questionnaires was available, representing a response rate of 29.5%. The questionnaire survey looks at the study situation during the Corona pandemic from a variety of perspectives and with a view to the current situation of the students. The question is investigated which hurdles still exist and how they can be overcome. In addition, possible positive aspects will also be brought out, which could and should retain their place in studying and teaching even after the pandemic.

3 The Investigation Planning

3.1 The Questionnaire

The questionnaire consists of a total of 43 items focusing on the following areas:

- Social statistics (e. g. age, gender, study term)
- Technical equipment for students (e. g. possession of computer, printer, tablet, wi-fi connection)
- Interaction and design of online teaching (e. g. contact with lecturers, type of courses attended)
- Experience with online exams (e. g. exam preparation, participation in online exams, type of online exams)
- Ideas for the further development of university teaching in a post-pandemic period (e. g. advantages of digital teaching, what should be adopted)

The technical equipment is a central factor here, because only if an appropriate end device is available for unrestricted use can the online teaching be followed both asynchronously and synchronously. This also includes the possession of a functioning camera as well as a headset. On the infrastructure side, a stable internet connection is also required.

Although learning itself is an individual process, it is important for the acquisition of knowledge to be able to exchange information with lecturers and fellow students. Only in this way can theories be thought through, analyzed and reflected upon (Siebert, 2008). For this reason, it is important to record students' experiences of online teaching and also of online examinations and to think further about the insights gained in order to be able to use the opportunities that the forced conversion of face-to-face teaching to the digital space has brought with it for the further development of university teaching.

Thus, this paper will present data and findings that address the design of teaching, experiences with online examination formats, and positive aspects that should be retained for the post-pandemic period.

The questionnaire contains closed questions, which are Likert-scaled in four levels (1=strongly agree, 4=strongly disagree), as well as open-ended questions. The closed questions were analyzed descriptively; in addition, correlations with significances between individual questions were calculated. The statistical software IBM SPSS Statistics Version 27 was used as an aid. The open-ended questions were analyzed with the aid of MAXQDA Analytics Pro 2018 software using content-structuring qualitative content analysis according to Kuckartz (2018). In doing so, the main categories were first deductively derived from the research question. The response texts available in the data matrix were assigned to these main categories in a second step. Subsequently, the individual subcategories were formed inductively on the data material (Kuckartz, 2018).

The questionnaire was designed so that the study participants could answer it in 15 minutes.

3.2 Statistics

3.2.1 Item Analysis

In a first step, item difficulty was calculated at the single item level. „In order for a test to differentiate examinees with different abilities approximately equally well, care must be taken that the items have as wide a spread of difficulty as possible“ (Bortz & Döring, 2002, p. 218). Because the item difficulty of all items ranged from .2 to .8, all items were retained for analysis of the data.

3.2.2 Factor Analysis

Where it made sense in terms of content, the individual items were included in a principal component analysis. The Varimax method was used as the rotation method. The Kaiser-Guttman criterion or scree plot was used as criteria for the formation of the factors, depending on how the factors were to be interpreted in a way that also made sense in terms of content. With regard to the factor loading criteria, it was determined that items with a factor loading less than .5 were excluded, as were items that loaded on multiple factors and the loading difference was less than .2. Based on the factor analytically determined item groups, the discriminatory power of the individual items was calculated in a next step. A minimum of .3 was set as an exclusion criterion (Bortz & Döring, 2002). In a final step, the internal consistency of the factors determined on the basis of the principal component analysis was calculated. Cronbach's alpha coefficient was used for this purpose (Bortz & Döring, 2002).

Overall, two groups of scales were formed from the Likert-scaled items, one concerning the stress situation and the social environment (Table 1) and one concerning the process of online teaching (Table 2).

Table 1: Statistical parameters of the factors concerning the stress situation and the social environment

Stress situation and social environment		
	Burden due to lack of contacts in presence (Factor I)	Keeping in touch with fellow students (Factor II)
Explained variance in %	52.21	26.10
Mean ± standard deviation	1.98 ± .77	2.47 ± .90
Cronbach's α	.795	---
Intercorrelation Burden due to lack of contacts in presence	---	-.35**

Items that load on the first factor are, for example, the question about the stress caused by the lack of personal contact with lecturers, while the second factor is the question about whether it is possible to maintain contact with fellow students in the digital world.

Table 2: Statistical parameters of the factors concerning the online teaching process

	Procedure of the online teaching		
	Work-live-balance (Factor III)	Satisfaction with online teaching (Factor IV)	Focus on the study (Factor V)
Explained variance in %	26.55	26.24	24.35
Mean ± standard deviation	2.90 ± .75	2.62 ± .59	2.17 ± .95
Cronbach's α	.681	.576	.756
Intercorrelation Work-live-balance Satisfaction with online teaching	---	.24**	-.21* -.36**

Items loading on the first factor, for example, address the amount of work during online teaching. Items that load on the second factor include e. g. whether instructors are doing a good job of implementing course content in online teaching. Items that load on the third factor include asking about distraction and maintaining fun and motivation while studying online.

The fact that the individual factors in both constructs are only moderately weakly correlated with each other is another criterion for the clean mapping of different factors.

3.2.3 Qualitative Content Analysis

The answers to the open-ended questions were also analyzed descriptively. Here, the codes assigned in each case in the main categories (derived from the question) form the population of the sample. For the most frequently occurring statements in the subcategories, an initial count was made on the basis of the number of codes assigned in each case. The results are summarized by indicating the relative frequencies of the assigned subcodes.

4 Results

4.1 Description of the Sample

In the summer semester of 2021, a total of 139 students of primary school teaching at the Chemnitz University of Technology, completed a survey. The age range of the students stretched from 18 to 48 years. The mean was 24 years with a standard deviation of 6.6 years. In accordance with the gender distribution in the primary school teaching profession, most of the study participants in the study reported here were also female (92.1%). At the Chemnitz University of Technology, students can only begin their studies in the winter semester; accordingly, the participants were distributed among the second (40.3%), fourth (23.7%), sixth (15.8%), and eighth (15.1%) semesters of study. The outgoing summer semester was the third semester in which online teaching has taken place. 56.8% of the students have taken part in online teaching for three semesters, 42.4% for two semesters.

4.2 Technical Equipment for Students

After 3 semesters of online teaching, three quarters of the students had technical equipment so that they could participate in teaching without any problems. The main problems were still considered to be a partly unstable internet connection, which was mentioned as a problem by almost all students, as well as a lack of peripheral devices such as printers, scanners or copiers. Normally this was compensated by using the university's multifunctional devices for a fee, but this was not possible during the pandemic with the university's closure. However there were also few students who purchased devices such as a laptop or tablet or accessories such as a headset and camera in the spring of 2020:

> "I necessarily had to purchase a new laptop with a microphone and camera because I didn't want to borrow equipment or at the beginning that option didn't exist."

4.3 Interaction and Design of Online Teaching

The pandemic contributed to a social burden on the part of the students (Factor I, M=1.98, SD=.77). Students miss both the social interaction with their fellow students and the personal contact with them. At the same time, the students succeeded quite differently in staying in contact with their fellow students (Factor II, M=2.47, SD=.90; see Figure 1). Nevertheless, 70.5% of the students who began their studies in a Corona semester succeeded in making new contacts. However, there was a very large correlation between the problem of maintaining personal contact with fellow students and the start of studies in a Corona semester (r>.99**).

Students felt that studying during a pandemic is more time-consuming than studying in person (see Figure 2). The students stated that they need more time to cope with the volume of tasks and work. This also resulted in fewer recovery periods during the day (Factor II, M=2.90, SD=.75). When asked about self-organization and structuring of everyday learning, 68.2% of students stated that they are very successful in organizing themselves (M=2.12; SD=.83). At the same time, 86.1% of respondents said that the pandemic and digital teaching have made a big difference in their daily lives (M=1.70, SD=.86). In an open-ended question, nearly half (49%) of these students indicated that they perceive these changes as mostly negative:

> "I hardly ever get out of the house on a normal school day except to go to my own backyard or take a walk. Breaks during the day are neglected or not used. You never really get to rest, you're almost always busy with college because you could be doing something at any time."

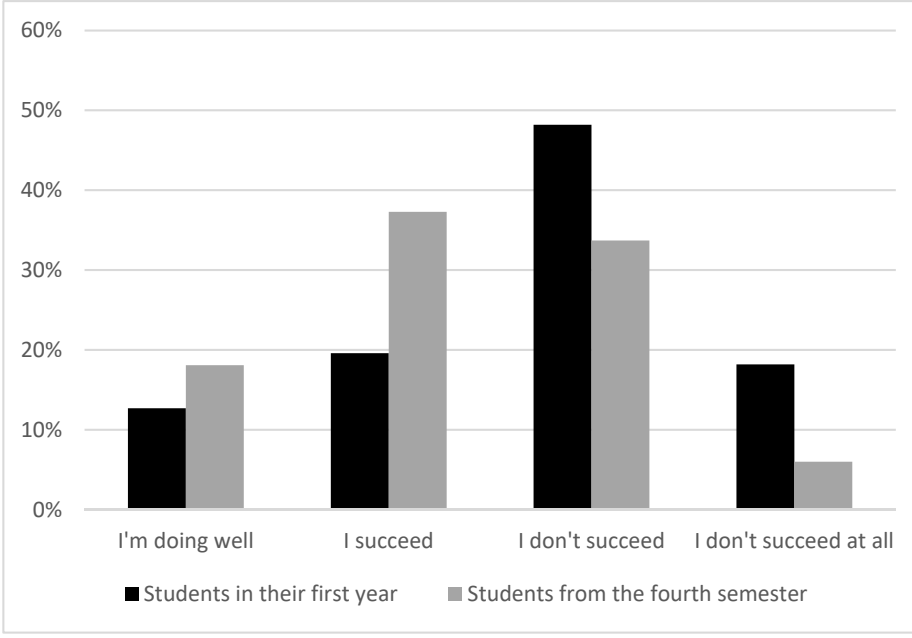

Figure 1: Contact situation with fellow students

However, some students (12.7%) indicated that they would benefit from being more independent in their learning and see the changes as positive:

> "I have learned to organize myself completely and find my own way to deal with the learning content."

There was a rather heterogeneous picture about the quality of online teaching. Basically, the students were satisfied on average with how the lecturers managed to implement the topics in the online courses. When asked about the preferred form of teaching on the part of the students, then 24.1% of the students preferred only asynchronous learning material and 51.1% only synchronous online courses. A return to face-to-face study as quickly as possible was advocated by 68.4%. As a concept for the future, however, a combination of online and face-to-face parts, hybrid teaching, was also being discussed (see section 4.5 below).

Another important factor influencing student-lecturer interaction is the flow of information. Here, the students saw need for improvement. Overall, the interaction between students and lecturers was rated satisfactory (Factor IV, M=2.62, SD=.59).

The third factor concerned the affective aspects in studying. Here, the students stated that they were distracted from their studies by the home learning situation and that it was a challenge to maintain motivation and enjoyment working in the given conditions (Factor V, M=2.17, SD=.95). If asked more specifically what the challenges were, students stated that they lacked social contact and personal interaction with other students and with the lecturers. In particular, students who started their studies in the pandemic found it difficult to get to know other students and to exchange ideas.

Of the 76 more detailed statements made in this regard, just under half (48.7%) of all respondents made comments such as:

> "I only know one other fellow student. The idea of creating study groups via an Opal forum or WhatsApp is unrealistic."

or:

> "There is simply a lack of social exchange with other fellow students. Since you hardly get to know anyone in person, I find it difficult to exchange ideas about topics and discuss difficulties. Especially in exam preparation, this kind of thing is noticeable."

These statements made it clear above all that the study programme was now much more characterized by the students' own responsibility and that an exchange was particularly difficult for those who had only got to know their fellow students in online courses. 38.2% of the respondents stated that they did not find it easy to work at home because of the lack of spatial and temporal separation between studies and private life, for example:

> "It's stressful to spend all day in your own home, separating work and free time/children there. I feel like I have to work all the time, but then I can't concentrate partly because there's too much to distract me."

The constant work on the PC or laptop was perceived as tiring and monotonous (15.8%). Just as often, students felt left alone with their worries and fears, for example:

> "As there is no end in sight and you feel like you are alone with your problems because of few social contacts."

Every fourth student (25%) was of the opinion that online studies entailed an additional workload because a lot of independent text work and self-study was required, too little was explained and there was too little feedback, for example:

> *"You work through big mountains of tasks all the time on your own, but you often don't get feedback for solving them."*

Thus, students tended to find online teaching overwhelming and demotivating, as the following statements show:

> "It takes me 5 hours to process some lectures. After that, you're just frustrated."

or:

> "It's difficult to motivate yourself to watch videos for several hours when they are asynchronous and all relevant information is uploaded on the slides. Further to that, reading texts, which takes another 2 hours."

Almost one third (30.2%) of the students surveyed would like the university to offer them advice on the organization of their studies and teaching. This applied equally to first-year students and to students in higher semesters. If one asked about the wishes of the students, they were very diverse. They ranged from the desire for a regular offer of open online consultation hours by the lecturers, for example, to clarify content-related questions about teaching, to specially established call centers of the university for organizational questions. From the students' point of view, important information should be bundled centrally and adviced on how to deal with digital teaching or courses on self-management and motivation should be available. The students also considered a workshop on the use of digital media to be helpful.

In addition to the organizational aspects of the events, the closure of the university library also meant that important study-relevant infrastructure could not be used. Thus, either online literature had to be used for writing assignments or students had to invest a lot of money and purchased the required literature themselves. But also, the university library as a valued working space, where a quiet and concentrated work is possible and the access to relevant literature is given at any time, was lost due to the pandemic, for example:

> "The university library was a place of learning and writing for me before the pandemic. Here I prepared and followed up on lessons, wrote my papers, because I had access to the literature right here."

At the same time, there were also students who considered the changes in everyday study life to be positive. Just under half of the students (45.3%) stated that they benefit from more flexibility because, for example, they could better coordinate university and private commitments such as childcare, a part-time job or household chores, for example:

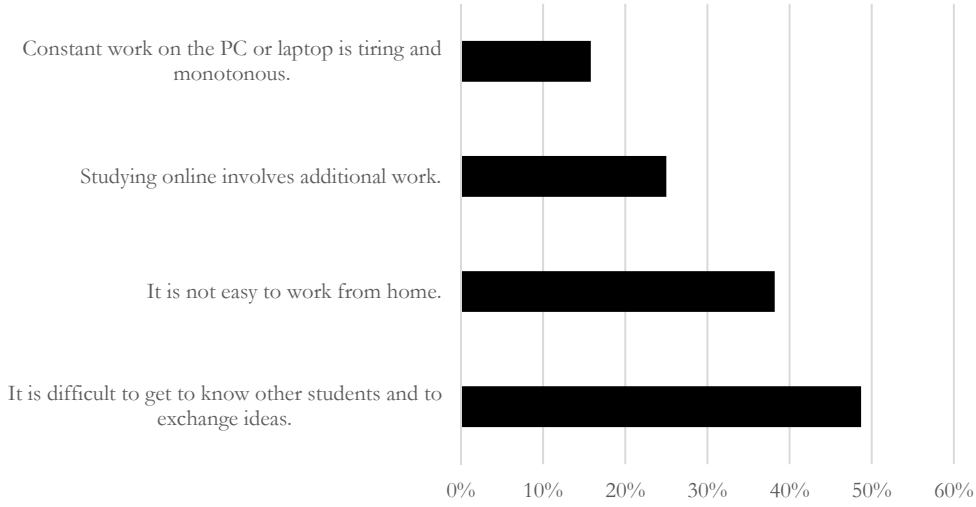

Figure 2: Challenges in online studies

In addition, the pandemic had an impact on practical experience, which is a central component of teacher training. 87.0% of the students succeeded in taking part in an internship. However, the quality of the internships was considered to be very poor. Here it was a matter of supervising children in emergency care or planning lessons theoretically as a substitute for the internship. The practical insight, which was otherwise very much appreciated by students, the opportunity to try things out and to plan and carry out lessons themselves, to reflect on them with mentors afterwards and to optimize them, unfortunately had to be dropped. Here the students feared that they were missing important learning opportunities for the second phase.

However, there were also students who rescheduled their internships to find a time during the summer months when schools had face-to-face classes. This often happened in such a way that the internships, which regularly take place after summer vacation, were extended. This allowed practical experience to be gained, but the extension brought other disadvantages:

> "There was no recovery time at all. You started from the semester into studying, into writing exams, into the [extended] internship and into the new semester. This put a lot of psychological strain on me and many of my fellow students. There are no recovery phases or phases of relaxation at all. As a result, the following semester also suffered."

However, semesters abroad could also not take place in 83.3% of all cases. This applied above all to students who have chosen English as their subject. Here, the students criti-

cized the lack of ideas on how to deal with the lack of stays abroad and how to ensure that the transition from studies to the traineeship is possible without problems.

Further effects of the pandemic on studies were evident with regard to graduation. Thus, 26.1% of the students were concerned about their graduation; 40.0% of the respondents planned to take advantage of an extension of the study period.

Because the participants were student teachers, they were also asked whether they saw added value in their personal experiences with online formats for their future professional activities. A large proportion of the respondents (51.4%) saw an increase in their own digital skills, especially in knowing and using various video conferencing tools, learning platforms, or apps.

> "I have been able to get to know many digital offerings (apps and the like), which I could use well and usefully in everyday school life."

Some stated that they were better prepared for digitalization in the classroom (33.3%) or for future distance learning (10.5%), for example:

> "For primary school teachers, the use of digital media will also become a central teaching content in the coming years due to digitalization. So, it is necessary that the prospective teachers themselves can also work with such formats."

Students also saw wide-ranging applications for their newly acquired skills:

> "Yes, better use of technology can also be used when kids are sick and need to catch up or for a new pandemic."

4.4 Experience with Online Exams

The majority of the students surveyed (84.9%) participated in online examinations in the last semester. In response to the open-ended question of how students felt about participating in online examinations, 101 of the survey participants answered. A heterogeneous picture emerged here (see Figure 3): just under half (47.5%) of the students stated that they found participation to be predominantly positive. In addition, online exams were rated positively because they were perceived as less stressful and open-book exams focused on the application rather than the memorization of knowledge, for example:

> "Plus, the open-book exams allow you to counteract the old-fashioned 'bulimic learning' and actually learn more."

One third (32.7%) of the respondents expressed negative opinions about online examinations. The statements mainly concerned technical aspects (68.3%), for example:

> "Much more stress and excitement, not because of the exam itself, but because of the fear of technical problems and an accompanying disqualification from the exam."

or time management (32.7%). Uncertainties about content were also mentioned by 10.9% of the students, for example:

> "Open-book exams are unusual. I don't really know what I have to know by heart or what I have to be able to do. And when I have my materials attached for reference, it does get quite confusing in bulk and I get time problems when I want to look up something specific."

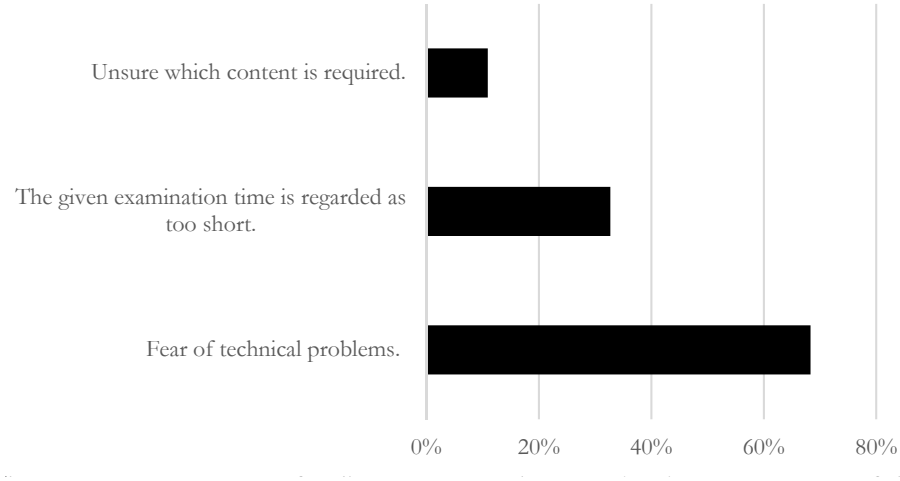

Figure 3: Challenges in online exams

The most common type of online exam was the open-book exam. 99.2% of the respondents stated that they took part in this type of examination, followed by take-home examinations (63.4%). Online oral exams (28.2%) and closed-book exams (25.2%), occurred less frequently. 37.8% of students had the experience of being proctored during the exam. This was perceived as disruptive and unpleasant by slightly more than half (53.8%) of the students, for example:

> "I felt very watched and uncomfortable."

4.5 University Teaching – Quo Vadis?

Finally, the students were asked the open-ended question of which elements could or should be continued or further developed in post-pandemic university teaching. When asked which event formats should be retained in the future, 112 of the respondents answered. Here, the participants were primarily in favor of retaining digital examination formats (35.7%). Likewise, for 33.9% of the students, events, especially lectures, should continue to be offered asynchronously:

> "Asynchronous lecture videos were very good in my opinion because it was free to schedule and always work as it suited your pace. Difficult topics you could watch several times to understand it."

In lectures, there was often a lack of interaction opportunities for students. Therefore, one wish was that they will also be conducted asynchronously and digitally in the future:

> "Lectures in particular are just as easy to follow in the digital setting as they are in the present, since there's usually little sharing in lectures anyway."

Seminars and similar forms of learning, which thrive on interaction and exchange among students and between students and lecturers, should be held in person again as soon as possible. Only a few students (11.6%) considered exclusively online courses to be a sensible study format for the future.

5 Summary and Outlook

Summarizing the results, it becomes clear that in the digital everyday study life, the exchange between students, as well as between students and lecturers, often comes up short. Although students manage to keep in touch with fellow students digitally despite pandemic restrictions, this is not easy and does not replace direct personal contact and working and learning together in the seminar room. Here, in addition to the students themselves, the lecturers are also obliged to maintain or establish contact with the students and not just hope for asynchronous learning success. Above all, students who began their studies during the pandemic should receive support and suggestions from the universities or individual lecturers in order to meet other students and to exchange ideas. This is particularly evident from the evaluation of the open-ended questions, in which students repeatedly expressed a desire for exchange opportunities. However, support for teachers and the university should also focus on how to deal with digital teaching in general. In addition to the technical requirements, the acquisition of individual competencies is crucial in order to successfully participate in synchronous online teaching. Furthermore, students wished for more help in organizing their daily study routine. Here, it is necessary to consider what these offers could look like and also be adapted to the current study situation (e. g., self-management, time planning).

Furthermore, students perceive the preparation of asynchronous teaching material as very time-consuming, especially if lectures are replaced by editing extensive text documents. Whether asynchronous learning is actually more time-consuming than attending classes in person must be interpreted cautiously here, since a large proportion of the students surveyed had not been able to attend any or only a few classes in person. In addition, some respondents felt that the lack of variety due to the monotonous daily study routine at home generally curbed their motivation to study. Here, too, it is important to regularly involve students in synchronous events and to enable exchange in digital learning groups or individual consultation hours. On the other hand, the (additional) offer of asynchronous lectures can support the individual learning speed and a more intensive examination of the content. The offer of synchronous (online) lectures should be maintained after the pandemic. It gives students the opportunity to better structure their everyday student life and it offers an important platform for formal and informal exchange. However, if content is outsourced asynchronously, seminar time can be used primarily for more extensive discussions, individual contributions, joint elaborations, etc. In order to make better use of the travel time that is no longer needed and to make everyday study more flexible and individual, hybrid event formats could also enrich studies after the pandemic.

Experience with online examination formats shows that open-book examinations in particular tend to be rated positively by students. On the one hand, because performance pressure and exam anxiety are reduced and, on the other hand, because knowledge must not only be reproduced but also applied in context. Whether this is actually perceived by learners as more profitable and sustainable than classic closed-book examinations should be discussed further. At the same time, there must also be alternatives for students with limited technical access or the possibility of conducting examinations in presence if desired. Study documents should be adapted to this end, as many lack legally binding flexibility as to the conditions under which an examination can or must be taken.

However, online teaching has also led to students becoming more involved with digital tools and ways of using apps, for example. These experiences are certainly an important contribution to advancing the digitization of elementary schools as well, because many digital tools can also be used in face-to-face teaching. However, the newly acquired knowledge of the students cannot be equated to a basic qualification; continuous further development of the competencies through advanced training is required.

Overall, research about living and studying in the pandemic and about the home office have produced contradictory results (see section 2 in this chapter). Therefore, it is important to conduct further and more differentiated research and to consider different living conditions of students (e. g. studying with children), so that the findings can contribute to the further development of university teaching in a time after the COVID-19 pandemic in an addressee- and demand-oriented way. It would be unfortunate to return unreflectively to the „status quo“, in which further development opportunities for university

teaching are omitted, simply because digital teaching was not introduced out of conviction in spring 2020, but was owed to external circumstances.

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The Relationship of Students' Loneliness and Smartphone Use in a Time of Distance Learning Due to the COVID-19 Pandemic

Kristi Baerg MacDonald[1] *& Julie Aitken Schermer*[1]

Abstract

University campuses and classes provide an environment where individuals can meet new people and establish a community. When universities moved to distant or online learning during the novel coronavirus disease 2019 (COVID-19) pandemic, little was known about how these changes may have impacted students' loneliness. The present study looks at differences in loneliness and smartphone use in university students in the time of COVID-19. Participants were first year undergraduate students. One group completed an online survey from February to March 13, 2020 (Wave 1; $N = 226$, 127 women, 98 men, 1 undisclosed) while they were taking in-person courses. Another group of students completed the same survey November to December 2020 (Wave 2; $N = 251$, 112 women, 138 men, 1 undisclosed) while they were taking courses via distance learning. The survey included a self-report questionnaire on loneliness (UCLA Loneliness Scale), as well as participant-entered information about smartphone use. Smartphone use included frequency, duration, and purpose. Overall, average duration of use was significantly higher in the distance learning group than the pre-pandemic group, with a decreased use of information apps. Ratings of loneliness did not change significantly between the in-class and distance-learning groups. The relationship with loneliness and smartphone use remained similar across the two waves. The correlation between social media app use and loneliness decreased from Wave 1 to Wave 2. The results suggest that students managed to cope with the changes to on-line learning and that the relationship of social media and loneliness has shifted.

Keywords

Loneliness, COVID-19, smartphone, social media

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1 The Relationship of Students' Loneliness and Smartphone Use in a Time of Distance Learning Due to the COVID-19 Pandemic

Distance learning is a solution that provides flexible access to education to overcome challenges of scheduling or health concerns; however, students describe the lack of community as a substantial drawback to the distance learning format. Loneliness is a serious concern for students in university and has been associated with smartphone use (MacDonald & Schermer, 2021). While there have been studies on loneliness at the beginning of the pandemic, few have examined loneliness in university students during a term of exclusively distance learning and have not studied the role of communication technology, such as smartphone use. Engaging solely in distance learning completely changed the university experience, and information from students about their loneliness and its relationship with smartphone usage is needed to guide future programming.

For university students in Ontario, Canada, the COVID-19 pandemic meant moving all classes to a distance learning format for the last few weeks of the winter 2020 term, which continued through the 2020–2021 school year. Distance learning is not unique to COVID-19 as secondary and post-secondary institutions frequently offer courses and programs delivered in a virtual format. There are advantages such as not having to move for a program, being able to have flexibility around other work or family commitments, or more access for students with mobility concerns. On the other hand, previous studies have found that the lack of community in distance learning can be a challenge (Song et al., 2004), and that collaboration and peer connectedness were key parts of decreasing loneliness in distance learning (Kaufmann & Vallade, 2020; Shearer et al., 2020). Moving all classes to distance learning increases the challenge of building a community of peers for many students.

Young adults are at risk for greater loneliness which has negative implications for their academic success. The COVID-19 pandemic brought reductions in social gatherings, through which increased loneliness is almost inevitable. For many adults, social distancing and gathering rules meant less time with others and most studies conducted near the beginning of the pandemic identified that loneliness increased during initial lockdowns compared to before (Bu et al., 2020; Lee et al., 2020). Young adults were identified as being particularly at risk (Lisitsa et al., 2020; Losada-Baltar et al., 2021). Attending post-secondary education is a process of significant change for many students, and past non-pandemic studies have consistently found that young adults in their 20's have higher levels of loneliness and experience more distress from loneliness than other age groups (MacDonald et al., 2020; Rokach, 2000; Victor & Yang, 2012). Loneliness is associated with negative outcomes in higher education, such as lower grades and intention to quit (Fandrem et al., 2021). Factors that prevent loneliness in university include making close friendships in first year, developing a broad group of acquaintances, and staying in touch with old friends (Thomas et al., 2020). Students who were starting their university expe-

rience during the distance learning period would have had more difficulty making close relationships without living in residence or participating in campus groups. On the other hand, developing a network of acquaintances would be possible if courses have been set up to encourage peer interaction through video or messaging. Furthermore, with distance learning, more students were living at home and thus were more likely to maintain friendships in their hometown. While first-year university students are more at risk of loneliness, protective factors like remaining at home may mitigate that risk.

One study that did not find a significant increase in loneliness in the first two months of the pandemic noted that there was in fact an increase in perceived support in their sample (Luchetti et al., 2020). A possible source of support may have been the use of technology to communicate with others. The Internet is a regular part of life as nearly 100% of Canadian youth are online daily (Statistics Canada, 2018). Social communication by instant messaging and social media has been common in the pandemic as over 70% of Canadians aged 18 to 65 chose to communicate with those methods in 2020 (Statistics Canada, 2021). The number is likely higher in emerging adults as MacDonald and Schermer (2021) found that 99% of university undergraduate students have at least one communication or social media applications (apps) as one of their top five most used apps. Communication technology has become a key part of social relationships.

When it comes to social technology use, Internet and social media use that is used to enhance offline relationships can be beneficial ("stimulation hypothesis"). On the other hand, social Internet use that takes away from time spent face-to-face is detrimental ("displacement hypothesis"; Nowland et al., 2018; Winstone et al., 2021). During the pandemic, face-to-face communication with others decreased due to social distancing, which means that relationships may have relied more on smartphone use. Studies found that overall duration of use was higher during the first COVID-19 lockdown than the month prior to any restrictions (Ohme et al., 2020; Sañudo et al., 2020), and that smartphone addiction was high during lockdowns (Hu et al., 2022). An in-depth look into smartphone usage between February and March 2020 revealed that the frequency (number of pick-ups) remained stable, but that more time was spent on news apps, communication apps, and social media (Ohme et al., 2020). Students often report using digital technologies to cope with loneliness, using smartphones for social support, as well as for distraction (Vasileiou et al., 2019) and escape from uncomfortable feelings (Li et al., 2021). Smartphone use has been demonstrated to be a moderator for feelings of social connection due to social distancing restrictions such that greater smartphone use lessens the negative impact of social distancing on feelings of social connectedness (David & Roberts, 2021). The way that people use technology may be important in understanding how smartphones can relate to social connection as Lisitsa et al. (2020) found that during COVID-19, greater social media use mediated the relationship between age group and loneliness scores. The studies above have examined smartphone use and loneliness within the pandemic, but to our knowledge, no studies compared the relationship of loneliness and smartphone

use before the pandemic to the same relationship several months into the pandemic. In addition, little is yet known about changes in behaviour and mental health in later waves compared to pre-COVID-19.

2 Present Study

We collected two groups of data to examine the impact of changes due to COVID-19 on self-report loneliness and smartphone use. Studies in the COVID-19 era suggest longer duration of smartphone use, as well as increased use of news, social media, and communication apps than before the pandemic announcement. Most studies have also found that loneliness increased. In addition, smartphone use has been found to mitigate the negative impacts of social distancing measures (David & Roberts, 2021). Based on these findings, we tested three hypotheses:

Hypothesis 1: In comparing the pre-COVID-19 sample to the during-COVID-19 sample, participants would report greater loneliness, longer duration of smartphone use, and increased use of communication, social media, and information apps.

Hypothesis 2: Smartphone use in the sample during COVID-19 would be associated with lower loneliness than smartphone use duration in the pre-COVID-19 sample.

Hypothesis 3: Social media app use in the sample during COVID-19 would be associated with lower loneliness than social media app use in the pre-COVID-19 sample.

3 Method

3.1 Data Preparation

Initially, 714 surveys were completed where participants reached the end of the survey and spent more than five minutes completing the survey. Data were eliminated on a listwise basis further for a number of conditions to confirm accurate data entry. Participants (n = 54) were excluded if they did not pass the attention checks. Participants also entered both the average screen time and total screen time for a one-week period from their personal smartphone. Several steps are involved for individuals to access this information correctly. To assess for possible reporting errors, we divided the total screen time minutes by the average. According to Wilcockson et al. (2018), five days of screen time data is sufficient to represent a reliable average. Following, we kept cases that fell between five and eight days (n = 149 eliminated). In the data for average pickups, there were some unusual outliers. We kept cases that had more than five and less than 400 pickups (n = 27 eliminated). We also divided the total number of pickups by the average as a precaution; retaining participants who had between two and eight days of data as Wilcockson et al.

(2018) found that pickup data was reliable within two days. This screening eliminated seven additional participants.

3.2 Participants

The first group of participants were 226 (127 women, 98 men, and 1 preferred not to disclose) undergraduate students recruited from a first-year management and organizational studies between February 10 and March 13, 2020. A second group of participants was recruited between November 4, 2020 and December 9, 2020. This sample included 251 (112 women, 138 men, 1 preferred not to disclose). The resulting complete sample was 477 (239 women and 236 men, 2 preferred not to disclose) with a mean of age of 18.50 years (SD_{AGE} = 0.99). The sample was comprised of undergraduate students, with an age range of 17 to 24 and median age of 18; the age distribution was not normal (positively skewed and highly leptokurtic). In addition to age and gender, participants choose from options that best described their living situation: "Alone" (N = 43), "With roommates (shared common spaces)" (N = 314), "With a spouse/long term partner" (N = 11), "With parents/relatives/caregivers" (N = 105) or "Other (please specify)" (N = 4). Participants who rated "other" generally described a combination of living with roommates and with family.

3.3 Procedure

Participants accessed an online survey through Qualtrics. Ethics approval was granted by the ethics board of the institution. The online survey contained demographic questions about participants' age, gender, living situation, and the measures listed below.

3.4 Measures

3.4.1 University of California Los Angeles (UCLA) Loneliness Scale (Version 3; Russell, 1996)

The UCLA Loneliness Scale is one of the most widely used self-report measures of loneliness (Russell, 1996), consisting of 20 items, each responded to using a 4-point Likert scale of "0 = Never", "1 = Rarely", "2 = Sometimes", and "3 = Often". The scale has been shown to have good reliability (Vassar & Crosby, 2008) and good construct and convergent validity (Russell, 1996). The present study resulted in high internal consistency (α = .94).

3.4.2 Smartphone Use

Smartphone use was evaluated using three different types of information taken from built-in applications ("apps") on Apple iPhone devices and Huawei Android devices. These two types of devices collect weekly totals of the information, which gives more robust information about smartphone use than a daily total. Participants were instructed with text and photos on how to access the appropriate information. Participants entered

weekly total and daily average "screen time" (measured in hours and minutes, calculated to minutes for analysis) and number of "pick-ups" (iPhone) or "unlocks" (Huawei), as an estimate of how frequently individuals used and checked their smartphones (note, the term "pickups" is used by the iPhone, but it does not register the count unless the user unlocks the smartphone).

The third type of information participants entered was their five most used apps. We created a coding system for the apps based on their primary function since there is little consistent criteria in the developer-assigned categories. In research about smartphones, the number of app categories can range from two (process and social, as described in Elhai et al., 2017) to twenty-nine (Zhao et al., 2016). Participants in the current study reported using their smartphone 6–7 hours per day and reported over 150 different apps, so two categories did not capture the variety of uses, but 29 categories was too broad for our sample size. We used the methods from a study on smartphone use and personality by Kim et al. (2015) as a guideline for app categories. The authors used five categories: E-commerce, entertainment, literacy, information, and relational. Examining the data we had, the e-commerce and literacy categories were small, so we expanded e-commerce to include other task-oriented apps (such as fitness trackers, maps, or timers) for a category called 'productivity'. Literacy apps were subsumed under entertainment. The biggest category was 'relational', and since we wanted to specifically look at social media, we split these apps into 'social media' and 'communication'. The descriptions for the categories were sent to an independent rater. Coding 10% of the total number of apps resulted in a high level of consensus (Cohen's Kappa = .99).

Once the apps were coded, we arranged them into counts of each category. For example, if a participant recorded their five most used apps as: Twitter, Messages, Clock, Netflix, Podcasts; the data would be: Social Media = 1, Communication = 1, Entertainment = 2, Productivity = 1, Information = 0.

4 Results

The data was analyzed using R version 4.0.2 (R Core Team, 2020). Descriptive statistics of the full sample can be found in Table 1.

Table 1: Descriptive Statistics and Inter Correlations Between Demographic and Scale Study Variables

Variable	*N*	*M*	*SD*	**1**	2	3	4	5
1. Age	476	18.50	0.99	1.00				
2. Gender[a]	475	0.50	0.50	.10	1.00			
3. Screen time	476	372.65	144.46	.08	.04	1.00		
4. Pickups	477	123.02	64.09	-.09	.06	.13	1.00	
5. Loneliness	475	22.28	11.94	.08	.06	.13	-.13	1.00

Note: Sample sizes varied due to missing data; Screen time = average daily smartphone screen time in minutes; Pickups = Average daily number of smartphone pickups; Loneliness = UCLA Loneliness Scale (Russell, 1996).
[a] Male = 0, female = 1
* $p < .05$, ** $p < .01$; two-tailed

The sample was divided into two groups. Wave 1 ($N = 226$) was a sample collected between February 19 to March 13, 2020. Wave 2 ($N = 251$) was collected from November 5 to December 9, 2020. This allows two distinct groups of one prior to COVID-19 restrictions, and one during COVID-19.

One-way ANOVA analysis revealed that participants did not vary in loneliness based on living arrangement ($F(4, 470) = 0.68$, $p = .604$) for the whole sample, nor was there an interaction that would suggest that being in Wave 1 or 2 would have a moderating effect ($p = .413$). *T*-tests showed that female students reported higher loneliness scores compared to male students in Wave 2 ($t_{\text{WELCH}}(246.55) = 2.559$, Cohen's $d = -0.57$, $p = .011$). The difference between male and female students in Wave 1 was not significant ($t(222) = -0.71$, Cohen's $d = -0.17$ $p = .478$).

Independent group *t*-tests were conducted to compare the two samples on UCLA Loneliness sale scores and smartphone use, including duration, frequency, information app use, social media app use, communication app use. Smartphone use duration (average screen time) increased significantly from Wave 1 ($M = 358.01$, $SD = 143.14$) to Wave 2 ($M = 385.78$, $SD = 144.67$, $t(474) = -2.10$, $p = .036$, $d = -.19$). Use of information apps was evaluated by the Mann-Whitney U test due to non-normality and unequal variances; information app use decreased significantly from Wave 1 ($M = 0.58$, $SD = 0.64$) to Wave 2 ($M = 0.19$, $SD = .51$; $p < .001$, $r = .36$; see Figure 1).

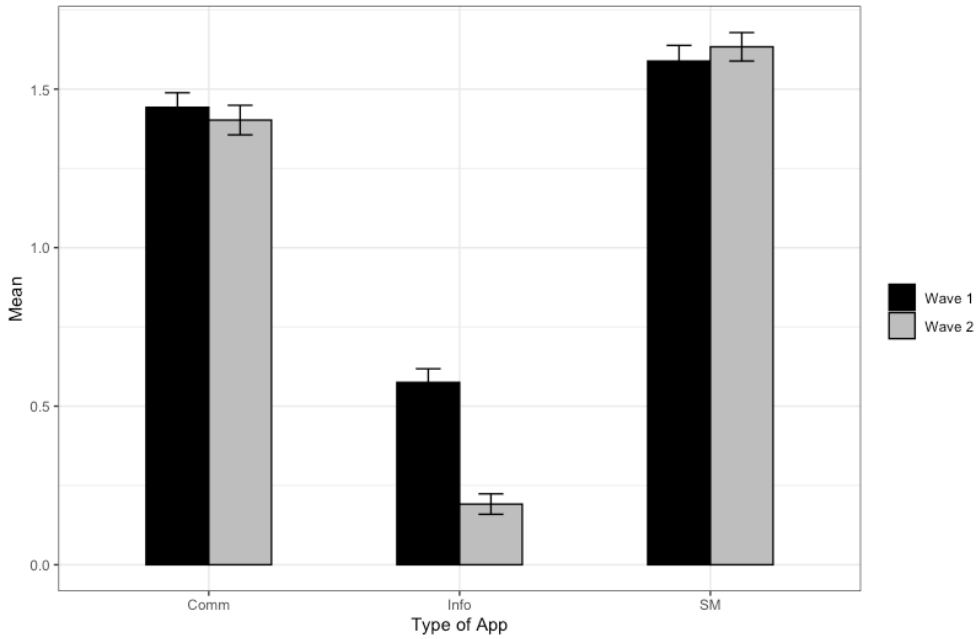

Figure 1: Means and standard errors for usage of app Type across waves

Ratings of loneliness and reports of smartphone use frequency, social media app use, and communication app use were not statistically different from Wave 1 to Wave 2. To examine whether there are changes in the relationship of loneliness and smartphone use between the two samples, the correlations of loneliness and smartphone duration were compared. Correlation coefficients for Wave 1 (r = .14) and Wave 2 (r = .11) were transformed to z scores using Fisher's r to z transformation and compared with the following equation (from Warner, 2012):

$$\frac{z_1 - z_2}{\sqrt{\frac{1}{N_1 - 3} + \frac{1}{N_2 - 3}}} \quad (1)$$

The correlations were not statistically different (z = .33, p = .363). The same method was used to compare correlations between loneliness and social media use from Wave 1 (r = .12) and Wave 2 (r = -.04), with a significant difference between the two groups (z = 1.74, p = .041), suggesting that social media was more highly correlated with loneliness in the pre-COVID-19 sample than in the sample during COVID-19 as depicted in Figure 2.

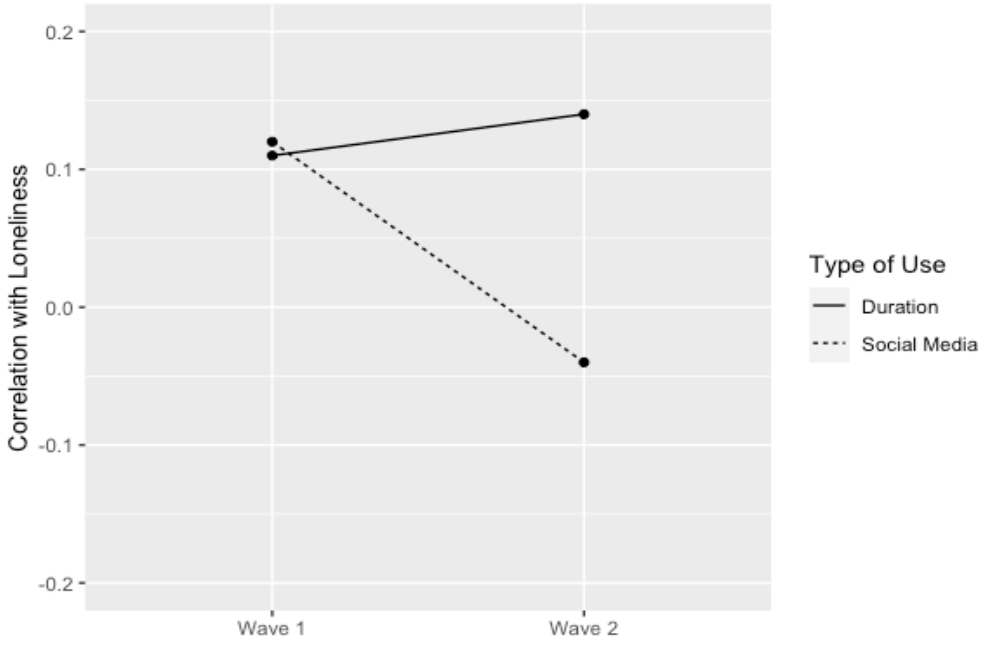

Figure 2: Correlations of smartphone use with loneliness across wave 1 and 2.

5 Discussion

The current study was uniquely placed to be able to compare loneliness and smartphone use before the COVID-19 pandemic, and eight months after the pandemic was declared. With Hypothesis 1, we expected that participants would report greater loneliness, longer duration of smartphone use, and increased use of information, communication, and social media apps in Wave 2, during the pandemic. These predictions were only partially supported. The present study found a significant increase in smartphone duration, consistent with findings from research at the outset of pandemic lockdowns (Ohme et al., 2020; Sañudo et al., 2020). Smartphone use overall increased by almost half an hour a day (to an overall average of about six hours and 40 minutes). In contrast to expectation, information app use (which includes news apps) decreased from Wave 1 to Wave 2. News and information apps may have been more important earlier in the pandemic (Ohme et al., 2020), but as the current study occurred eight months later, smartphone use may have been focussed elsewhere.

Results did not show an increased number of social media or communication app use, but since these two types of apps are already very popular, it is possible that there may be a ceiling effect with respect to the use of these apps. Future studies that wish to focus on types of use would benefit from measuring time spent in each app. There was no significant difference between average loneliness in February – March 2020 and average loneliness in November – December 2020. While this is not consistent with most prior studies on loneliness pre- and post-pandemic declaration, the prior studies were all conducted within the first few months of the pandemic; at the same time as some of the strictest lockdown measures. In November – December 2020 in London, Ontario, the situation was not considered a strict lockdown, with gathering restrictions at 10 people indoors and 25 people outdoors. While students were participating in distance learning instead of in-person classes, there were opportunities to be with other people face-to-face in the community. The measure of loneliness used in the present study is generally considered to measure loneliness as a trait, so while feelings of loneliness may have fluctuated during stricter lockdown measures, it appears likely that when measures are more relaxed, reports of loneliness are at a typical level. The two studies that found significant increases in loneliness had used shorter, three item measures of the UCLA Loneliness Scale (Bu et al., 2020; Lee et al., 2020), which may capture more of a state feeling of isolation (the three items ask about lack of companionship, feeling isolated from others, and feeling left out), as found in a factor analysis of the UCLA Loneliness Scale (Lee & Cagle, 2017). The research by Luchetti et al. (2020), who found no significant change in loneliness, used a longer 11-item measure, which includes item items related to social connections and sense of belonging (Lee & Cagle, 2017). Thus, while the COVID-19 lockdown restrictions result in feelings of isolation, other aspects of loneliness such as social connections and a sense of belonging may be less affected.

In addition, several recent studies have found that psychological responses to COVID-19, as measured by anxiety, depression, or loneliness, have followed a similar trajectory to that of other large-scale tragic events as proposed by Bonanno (2004). Bonanno (2004) described four different trajectories following a tragedy, including resilience (functioning normally soon after), recovery [experiencing post-traumatic distress disorder (PTSD) and recovering over time], delayed (increasing dysfunction), and chronic (continued dysfunctional response). He proposed that resilience was the main response to an adverse event; that most people return to a typical psychological state soon after. While the early a priori hypothesis for the present study expected an increase in loneliness, the result of no difference between the groups is consistent with new research that is finding that resilience is the dominant trajectory throughout the first year of COVID-19 (Gambin et al., 2021; Kimhi et al., 2021; Laham et al., 2021).

There are many pathways to resilience (Bonanno, 2004), and changes in behaviours associated with lower loneliness provide insight into the ways that young adults are managing the challenges of distance learning. Hypotheses 2 and 3 relate to the idea put forth by

David and Roberts (2021) that in the time of social distancing and isolation, smartphone technology becomes a primary means of connection with others, and therefore would be less related to loneliness and may even support feelings of positive social support. This prediction was not supported with general smartphone use; the relationship between duration of smartphone use and loneliness was not statistically different from Wave 1 to Wave 2. Hypothesis 3 was supported as an increased use of social media apps was significantly less associated with loneliness in Wave 2. Prior to the COVID-19 pandemic, use of social media apps was significantly associated with loneliness; however, during COVID-19, the relationship became non-significant and near zero. This result suggests that when in-person interactions are limited, use of social media apps is not related to overall reports of loneliness. There are several possible reasons for this. In keeping with the displacement hypothesis (as described in Nowland et al., 2018), if social media app use is not displacing in-person socializing, it becomes less related to feelings of loneliness. This may also be due to individuals who are not chronically lonely spending more time on social media apps during COVID-19, and thereby reducing the correlation. Another possibility may be a shift in how social media is used. Vasileiou et al. (2019) identified that coping mechanisms for loneliness were often distraction and seeking support; it is possible that social media has been used more as a tool for seeking support in the pandemic than a tool for distraction.

While it is not possible to speculate whether students were interacting with their classmates on social media in the present study, those designing distance education courses may consider the benefits of social media functions for student interaction. Social media provides individuals with space to present themselves, express their ideas, learn about others, and communicate directly with others. Making use of similar functions in the distance learning software and social media could allow students to interact more personally. The personal interactions can increase feelings of peer support and collaboration, which are key elements to decreasing loneliness that is often associated with distance learning (Kaufmann & Vallade, 2020; Shearer et al., 2020).

Despite the challenges of a move to distance learning in 2020, the present study results are encouraging, suggesting that student loneliness did not change significantly. Students' mobile social media use became less associated with loneliness over time, even though most other smartphone use patterns had not changed. In the face of reduced connections with peers, students in distance learning have found ways to access social support.

Open Science Practices

Prior to analysis, this study and its hypotheses were pre-registered on the Open Science Framework (https://osf.io/v7wnb).

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Implementing Conditions of Hybrid Teaching and Learning Environment in Cambodian Higher Education before and during COVID-19

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Abstract

Cambodian Higher Education (HE) has relied on conventional teaching and learning approach; however, this was disrupted by the closure of Higher Education Institutions (HEI) in 2020 due to the COVID-19 pandemic and the move to online learning. This has resulted in significant changes to HE in Cambodia. Therefore, this article aims to explore the implementation conditions of a Hybrid Teaching and Learning Environment (HTLE) in Cambodian Higher Education and analyze the changes related to the situation created by the COVID-19 crisis.

The reader is first introduced to an understanding of higher education in Cambodia today. This justifies the problem of the research. The theoretical framework defines HTLE and proposes a model for the systemic analysis of the implementation of innovations in HE. Then, the research questions and objectives are detailed as well as the method.

There were 20 Cambodian lecturers from 6 higher education institutions participating in this research using online semi-structured interviews from June to September 2020. To identify the HTLE learning design, it adopted the questionnaire from the European research project HY-SUP. A categorical analysis was applied to teachers' discourses.

Results discussed in the light of the systemic model indicated that the main implementation conditions were related to lecturers' characteristics, such as technological knowledge, engagement, openness to innovation, and self-confidence in HTLE. However, they received less support or no support from their institutions. The COVID-19 crisis appears to be an event that favors the deployment of HTLE for them.

Keywords

Hybrid Teaching and Learning environment, Blended Teaching and Learning, Distance Education, Online learning, innovation, COVID-19

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1 Overview of Cambodian Higher Education Institutions

Higher education institutions known in Cambodia were established in the 1940s and were considered the glory years of education in the 1960s (Mak, 2015). However, the civil war during the 1970s widely dismantled educational infrastructure, including systems, facilities, and human resources across the country (Ayres, 2000). Ayres (2000), in his book *Anatomy of a Crisis: Education, Development, and the State in Cambodia 1953–1998*, describes how "75 percent of teachers, 96 percent of higher education students, and 67 percent of primary and secondary school-age pupils were murdered by the Khmer Rouge" (p. 126). Schools and universities were used as prisons and brutal torture sites instead of educating people. The war was to last from 1975 to 1979.

In 1979, at the end of the civil war, the rehabilitation of higher education started. However, the chronic shortfalls of technicians and leaders in economics, politics, and culture proved a considerable concern for the new regime. Noticeably, at this time, education was also used to promote socialism. The Central Committee of KPRP (Khmer People's Revolutionary Party) argued that "the main objective of higher education and technical education is to provide good political training and good technical training. Good political training should be concerned with serving and protecting the nation leading to the socialist way and following the objectives of socialism" (Ayres, 2000, p. 139). This ethos is in contrast to the present day, where the Cambodia Qualifications Framework, the current learning outcomes of higher education in Cambodia, stated the purpose of education is to provide knowledge; cognitive skills; interpersonal skills and responsibility; ICT (Information Communication Technology) and numerical skills (MoEYS, 2012).

Higher education in Cambodia refers to formal education and training activities in post-secondary schooling lasting for around 3–6 years, full-time or part-time in public or private Higher Education Institutions (HEIs), resulting in a degree or qualification. There are three types of higher education in Cambodia: institutes, universities, and academies (You, 2012). Notably, the distinction between universities and institutes is that an institute primarily offers training in a particular field but does not provide a wide range of research or training in multidisciplinary subjects. Universities usually specialize in professional fields such as engineering, medicine, agriculture, education, etc. However, the university is the most popular and preferable for Cambodian perception due to career prospects. Royal academies were supposed to play a crucial role as a think tank; however, the lack of human resources to engage in research means these have not achieved their potential.

One of the issues for HE is that the primary source of funding for both private and public HEIs is students' tuition fees. This problem creates unpleasant implications and consequences for accessing quality and core services of public HEIs, higher education improvement, and society as a whole. McNamara and Ahrens (2013), therefore, argue that Cam-

bodian higher education has been viewed as a private good (knowledge for individual gain) rather than the public good (knowledge for society). They state:

> HE is understood as a private good (the student gets the degree, gets a better job, and higher wages) and is regarded as decreasing government support for the individuals who attend universities. Suppose HE is understood more as a public good (e. g., benefits to society of higher educated citizens, attracting more overseas investment because of worker quality). In that case, the government must support quality tertiary education to the highest level. (McNamara & Ahrens, 2013, p. 3).

According to the Ministry of Education, Youth and Sport (MoEYS, 2019), *Education Strategic Plan 2019–2023*, HEIs increased from 110 in 2014 to 125 (48 publics; 77 privates) in 2018. There were 1,947 lecturers with bachelor's degrees (15.5% of all lecturers), 8,751 with master's degrees (69.8 %), and 1,090 with PhDs (8.7%) in 2018. Sadly, student enrolments decreased by 15%, from 249,092 to 211,484. The decrease in student enrolment is probably related to a sudden reform of the Grade 12 national examination in 2014 to strengthen the quality of education. This reform caused passing students to dramatically decline from approximately 80% (2012–2013) to 26% in the August 2014 national exam result. With this low passing rate, the MoEYS allowed those who failed the first national exam a second chance to retake the exam in October of the same year. The passing rate reached 44 % in 2014 (Maeda, 2021). However, the number of passing the Grade 12 national exam has increased over the years. In an optimistic view, the quality of education has been improving through this reform to get qualified students to enter higher education.

The former public Cambodian higher education had been converted into an uncommon model, which was 80% privately funded, mostly from students' tuition fees, a contradiction to a typical developing country private funding level of 20% only. An estimation of public expenditure on higher education was around 0.09% of GDP by 2008, while private expenditure was responsible for 0.49%. Both expenditure rates reached 0.58%, still under the world average of 1% (McNamara & Ahrens, 2013). According to World Bank (2012), Cambodia is the lowest rate of public higher education expenditure with 0.05% of GDP in the East Asia region. The next lowest is Laos, with 0.21% of GDP expended on higher education, which equals four times the Cambodian government's investment in higher education.

According to the MoEYS report, Cambodian HEIs are challenging to enhance the quality of higher education to improve teaching and learning, and research to produce qualified graduates who meet market and social demand for international standards (MoEYS, 2014, 2019). Additionally, an analysis of the current situation in higher education (MoEYS, 2014) divulges an alarming career mismatch between education and employment. For instance, Cambodian university students' popular areas of study are social sciences and business-related fields. In contrast, a small percentage of students study science, engineering, and agriculture, which are considered vital skills to promote Cambodia's econo-

my. Like other countries, Cambodia also pays close attention to higher education quality improvement in teaching and learning to build teacher capacity through the "Higher Education Quality and Capacity Improvement Project" funded by the World Bank (2018). MoEYS (2019), *Education Strategic Plan 2019–2023*, promotes digital education. It further stated, "MoEYS will integrate ICT as a teaching, learning, and knowledge sharing tool across the education sector to equip students with ICT knowledge and skills to transition to the 21st-century world of work" (MoEYS, 2019, p. 60). In this sense, Hybrid Teaching and Learning Environment (HTLE) is a part of the solution because it involves the use of a techno-pedagogical environment consisting of complex mediatization, mediation, and pedagogical innovation.

Most Cambodian higher education institutions do not provide online learning or have a learning management system (LMS). Additionally, they do not have an email account for lecturers to use. Generally, lecturers use their private email, Facebook group, and Telegram group to contact their students. Some lecturers use Facebook group chat and Telegram to send students documents, discussions, and information. Other lecturers also use Google Classroom to share lessons and other learning resources with their students. However, they started experiencing online, and distance teaching during the COVID-19 pandemic exploded in early 2020. This move was a blessing in disguise to allow lecturers to exercise hybrid teaching and learning environment in their courses.

2 Background of Hybrid Teaching and Learning Environment

Modern Higher Education Institutions (HEIs) apply various teaching and learning models to inspire a learning environment to achieve a better course outcome. Many courses have introduced learning environments using ICT, such as e-learning, open distance learning, web-based learning, blended learning, or hybrid learning. These new supporting, teaching and learning environments allow learners to learn anywhere, anytime with a computer and e-learning application (Eliveria et al., 2019).

Harding et al. (2005) defined hybrid teaching and learning environment (HTLE) as an online learning complement to conventional teaching and learning method (face-to-face instructional method). A hybrid learning environment provides learning interactions and experiences from different places at once. It can be an asynchronous group discussion, where one learner sits at home and another participates in the discussion from a cafe. At the same time, the teacher joins in from a classroom at the campus (Nørgård, 2021). On the contrary, Charlier et al. (2006) argued that HTLE represents specific types of learning design. The choice of the label 'hybrid' instead of 'blended' refers to the creation of a new entity whose significant characteristics are the presence-distance articulation and the integration of technologies to support the teaching-learning process environments (Charlier & Lambert, 2019, p. 2). Thus, Charlier et al. (2006) introduced this definition

"A hybrid teaching and learning environment is characterized by the presence in a learning environment of innovative dimensions linked to distance learning activities. Hybrid teaching and learning environment (HTLE) is based on complex forms of mediatization and mediation because it involves the use of a techno-pedagogical environment" (p. 481). The term 'mediatization' concerns the process of designing, producing, and implementing media communication devices. The other term, mediation, refers to transforming human behavior and knowledge through interactions with objects (symbolic or concrete). Charlier et al. (2006) distinguished four types of mediation: semio-cognitive, pragmatic, relational, and reflexive. This definition of HTLE, theoretically grounded, gave the initial framework to identify the typology of hybrid learning courses designed empirically by the HY-SUP research.

The hybrid teaching and learning environments have been studied under the HY-SUP research project to describe hybrid teaching environments, understand their effects on students' learning and teacher engagement, and get a better understanding of the technological learning environment. According to a mixed-methods study (174 questionnaires and 77 interviews with professors in higher education), through a factorial analysis, 14 factors were identified, comprising in-site active participation; active distance participation; learning support tools; management, communication and interaction tools; multimedia resources; multimedia works; synchronous collaboration tools; comment and annotate online documents; reflexive and interpersonal goals; methodological support; metacognitive support; support by students; freedom of choice, teaching and learning methods; and the use of external resources and actors. Then, a cluster analysis enabled the classification of six types of learning design of HTLE. These types are described below using metaphors (Charlier & Lambert, 2019; Deschryver & Charlier, 2012; Lebrun et al., 2014). As seen below, each type of hybrid teaching and learning environment requires different levels of support and techno-pedagogy (the art of incorporating technology in designing teaching and learning experiences to enrich the learning outcome). Therefore, understanding each type of HTLE will allow us to describe the current teaching and learning environment.

- Type 1 (the Scene): This metaphor presents a space where the teacher plays a central role and textual resources play a predominant role. Teachers favor classroom teaching but provide educational resources for students to download.

- Type 2 (the Screen): This metaphor represents a space of reinstitution of the information, and the student is only a spectator. It introduces technologies and media. Teachers mainly use the teaching and learning environment to make textual and multimedia learning resources for their students.

- Type 3 (the Rural Gite/Cottage Country): This metaphor denotes a traditional place that welcomes guests from various backgrounds to visit and stay, while connotation refers to a combination of tradition and openness content of teaching-learning resources and stakeholders outside the academic world. It emphasizes the organization and

management of the course. Teachers use most of the potential of technological tools to manage their teaching and interaction with students. Therefore, it results in the frequent use of tools to integrate into teaching resources.

- Type 4 (the Crew): This metaphor represents a group of people pursuing a common goal, such as arriving at the port safely or winning the race. To achieve this goal, the Crew must work together, help each other, and communicate effectively within the group. Similarly, teachers pay special attention to students' progress by offering interpersonal and reflexive tools to support learning, communication, and collaboration.

- Type 5 (the Metro): The Metro metaphor is where guidance is essential and freedom is possible. In this sense, teachers focus on supporting and guiding students, being open to external resources and actors, and leaving some freedom to select methods and learning pathways. To sum up, the learning focuses on openness, freedom of choice, and guidance.

- Type 6 (the Ecosystem): This metaphor represents a place of exchange of living matter to ensure balance and development of life. Teachers make use of all dimensions identified to characterize hybrid teaching and learning, such as students' active participation (in-class and remotely), frequent and diversified use of technological tools, availability and production of multimedia documents, peer interaction, and openness of the system to external resources and actors, etc. This type 6 is the one that makes the most use of the techno-pedagogical potential offered by hybrid dimensions.

A second objective of the HY-SUP research was to associate these types of HTLE learning designs with their perceived effects on student learning and teacher engagement. The first three teaching-centered types were perceived by both teachers and students as less supportive of learning. The same was true for student engagement. In our research, this typology will characterize the learning environments proposed by Cambodian lecturers, possibly differentiate their implementation conditions according to the types considered and represent the extent to which lecturers modified the design of their environments during the COVID crisis.

3 Objectives of Research

Higher Education Institutions (HEIs) keep developing and updating their quality of teaching and learning. In this sense, technology often plays a fundamental role in HEIs transformation, and educational shifts benefit from a supportive environment. Therefore, this study examines the present conditions of a hybrid teaching and learning environment (HTLE) in Cambodian higher education. In the absence of studies on HTLE in Cambodian higher education, this study contributes new knowledge to *provide solutions to implementing hybrid teaching and learning environment* in Cambodian Higher Education Institutions.

The key objectives of this research study are to scrutinize and interpret the present conditions of HTLE in Cambodian higher education. Due to the COVID-19 pandemic in early 2020, this research study was expanded to explore HTLE before COVID-19 and during the COVID-19 crisis. Three research objectives have been framed to achieve the aim, such as identifying, exploring, and understanding HTLE in Cambodian higher education. The key objectives are broken down into the following:

- To identify lecturers who have introduced a hybrid teaching and learning environment and describe this environment.
- To explore the conditions that faculty members encounter when implementing a hybrid teaching and learning environment.
- To understand how lecturers implement hybrid teaching and learning environment.

4 Research Question

The main research questions and sub-questions are framed to achieve the objectives.

In which conditions are the Cambodian Higher Education lecturers implementing hybrid teaching and learning environment?

A. Are these conditions different according to the type of environment developed according to lecturers?

B. Could we observe changes in the type of environment related to the new situation created by the COVID 19 crisis? How can we understand these changes?

C. How was this innovation process supported, according to them?

5 The Initial Model of Implementing Hybrid Teaching and Learning Environment

This research study employs and integrates (Depover & Strebelle, 1997; Strebelle et al., 2003) with Ely (1999) model into a new systemic model of the university innovation process to understand implementing conditions of innovation (see Figure 1). The model starts with *"Reasons to innovate"*. It is placed and identified before the "INTRANTS" because it associates with discontent current status quo, such as inefficient, ineffective, or uncompetitive. In contrast, the "INTRANTS" is considered the input of resources from different stakeholders to make innovation possible. After defining particular reasons to innovate, the process moves to "INTRANTS, PROCESS, and EXTRANTS". These terms were similar to Input evaluation, Process evaluation, and Product evaluation, which Stufflebeam (2003) coined in the CIPP model (Context evaluation, Input evaluation, Process evaluation, and Product evaluation) for evaluation.

5.1 The "INTRANTS"

According to Depover and Strebelle (1997) and Strebelle et al. (2003), the "INTRANTS" can be considered at the Micro, Meso, and Macro levels of the system. They are concerned about available resources to start innovation. The characteristics of "INTRANTS" are explained in the following:

(1) Micro-system level (teacher and students): At this level, there are certain variables to look at, such as the level of mastery of IT tools and innovative methodological practices by teachers, and their receptivity to innovation (openness to innovation), plus the entry of students' profile about their level and experiences in the use of ICT. When learners' current knowledge and experience are far behind in applying technology in the classroom, we (implementor, teacher, head of the department, IT team) need to provide short training to learners to support their difficulties. In this micro-system, implementors must also consider teachers' current knowledge and skills to master innovation practices (Depover & Strebelle, 1997). If the level of innovation is too far beyond lecturers' and learners' capacity, the innovation will be less successful in implementation. Ely (1999) added that we need to think about the availability of time for teachers to learn and implement innovation. The value given by the lecturers toward incentives and rewards (letter of appreciation, increase-teaching rate) also plays a vital role in catalyzing innovation because innovation might break teachers' comfort zone for a while.

(2) Meso-system level (school/institution): This level concerns the school profile or facilities such as computer equipment, the openness of innovation, and school climate. Rectors and managers need to prepare and manage a sufficient budget for the physical environment related to implementation. These include internet and WiFi, official email

for lecturers and students, a learning management system to engage students, and the level of freedom for lecturers to exercise innovation.

(3) *Macro-system level (system/society/nation/state)*: At this level, it concerns the state's role to do innovation. This Macro-system might play less involvement in the innovation input if the state offers full authority and decision to the university to innovate itself but still supports the university in case needed. On the contrary, universities might not have enough power to innovate in the centralized education system, especially in developing countries. They need to go through internal to external discussions such as the university itself, the department of higher education, and the ministry of education, youth and sport (MoEYS).

For us, the focal point 'commitment' of micro-system, meso-system, and macro-system play a central role in making real innovation successful and long-lasting because it needs to be congruent. For example, the school manager or program manager may be committed to introducing innovative teaching and learning to the teaching staff. However, the teaching staff could have less commitment and motivation to adopt new innovative teaching methods due to their own reasons. As a result, the innovation could not happen or happens only for a short time. Vice versa, if the teaching staff have a strong commitment to innovate their teaching, but the school manager has less commitment to support, this also leads to unsuccessful implementation.

5.2 The "SUPPORT"

The change "Processes" of innovation consists of three phases: adoption, implementation, and routinization. The main objectives of supporting these phases are maintaining commitment, solving problems on time, providing feedback on an activity, and planning a budget. All phases need active support or facilitation from the meso-system and macro-system in the process of innovation.

Meso-system support: university rectors, program managers, and heads of departments play significant roles in providing funding, supporting, and monitoring the process until the end. The support and monitoring can be done through fortnight meetings or monthly discussions. This approach could be related to the "Process Evaluation" in the CIPP model for evaluation by Stufflebeam (2014) to monitor, document, and give constructive feedback to strengthen program implementation. The university can provide teachers' training, professional development, and technical services. These activities serve as a vehicle to support the innovation processes, such as developing e-resources to support teaching and learning contents, developing teacher guides to using tools, and organizing training to use tools for lecturers and students. Additionally, incentives or rewards (appreciation letters, increased teaching rate) should be considered to motivate and encourage lecturers to implement innovation.

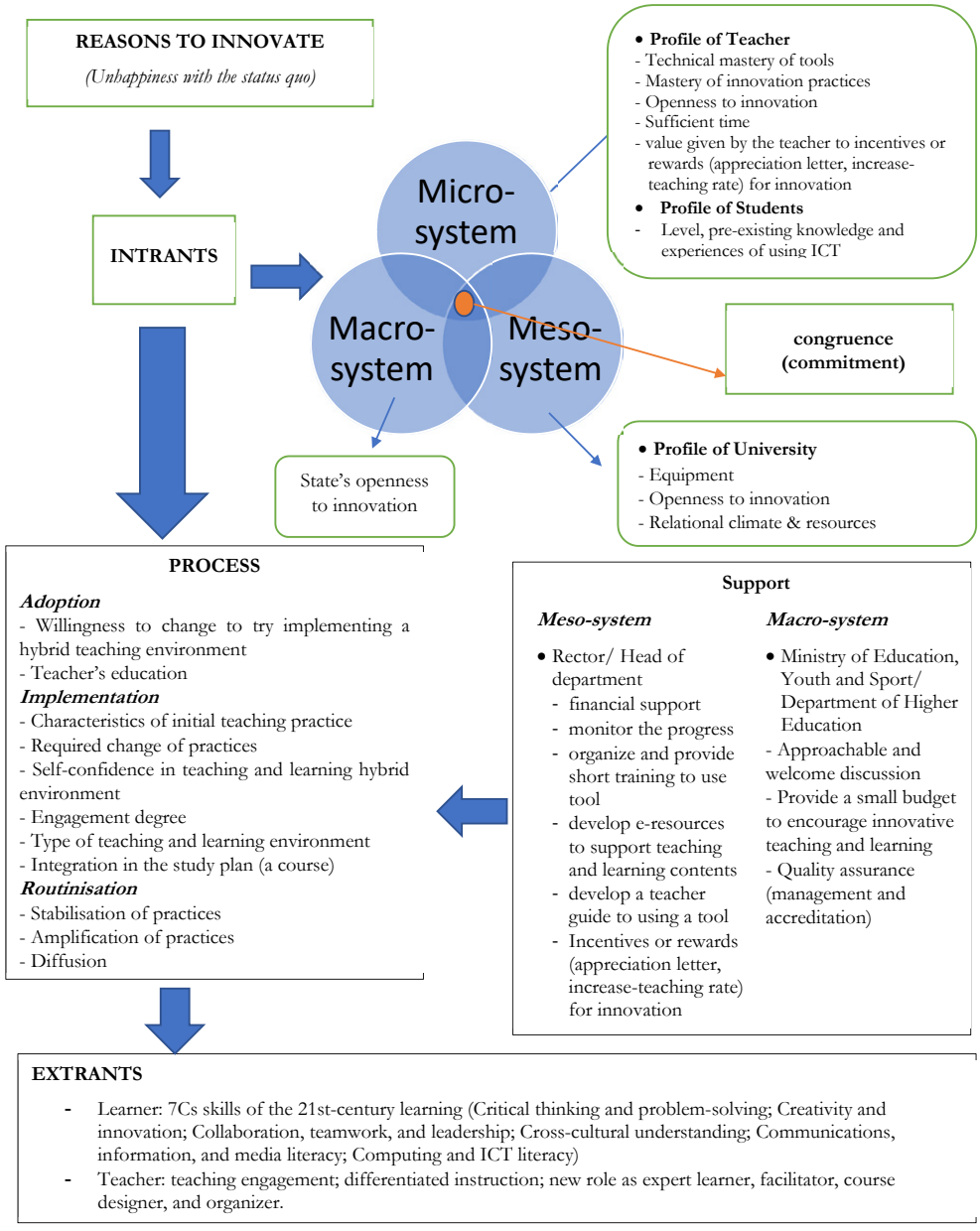

Figure 1: A systemic model of the university innovation process

Macro-system support: Ministry of Education, Youth and Sport (MoEYS) and the Department of Higher Education (DHE) need to be approachable, transparent, accountable, and welcome discussion when the university needs support. Furthermore, the ministry should provide inspection and technical help to ensure the quality of innovation, including management and accreditation to HEIs. Moreover, MoEYS can create a small budget package to provide funding to universities where innovation is implemented to promote higher education quality, accessibility, and engageability.

5.3 The "PROCESS"

As stated above about the focal point of the three systems, the commitment of the stakeholders' involvement to support the process of innovation is crucial to making innovation happen. This commitment can be seen through direct or indirect action such as implementing, monitoring, and evaluating by providing an ongoing check on a plan's implementation and processes, such as the *adoption phase, implementation phase*, and *routinization phase*.

The *adoption phase* is determined by teachers' willingness to change and implement HTLE either internal or under an external pressure of the meso-system, demanded by the students, the university management, or the inspectors. It is essential to identify the source of change either from the teacher's initiation or from outside imposed because the decision to change has distinct psychological consequences on the teacher's implementation. Another variable that closely influences the adoption phase's decision is the "teacher's education" because it mainly relies on teachers' mastery and confidence in using new tools in innovative practices.

The *implementation phase* is the first experience of intention to put ideas or reform into actual practice. This phase is generally modified from the original ideas at the level of educational practices and in the context (environment) where the practices are set up. The first variable of this implementation phase is *characteristic of initial teaching practice.* This includes openness and freedom (students feel free to ask a question without being judged as stupid), knowledge of innovation, responsiveness, and approachability that teacher offers to students. The second variable is the *change in teachers' practices*, including support and teaching methods when shifting from face-to-face classrooms to hybrid courses. Students might need more support, guidance, responsiveness, and approachability during innovative implementation. The third variable is the teacher's *self-confidence in teaching and learning hybrid environment*s. In this sense, teachers need to be knowledgeable about innovation. The fourth variable is the *teachers' engagement degree* which associates with approachability inside and outside schools in academic study. The following variable is the *teaching and learning environment* that the teacher is implementing. The higher level of hybrid type (type 1–6), the more complex support and methods are used. The last variable

is *the integration of practice into a course*. This variable requires flexibility and adjustability based on student knowledge, skills, and study background.

The term routinization would rather be used instead of institutionalization because institutionalization is a more direct remark as an official acknowledgment (Strebelle et al., 2003). There are three main elements in routinization such as stabilization of practices (innovation can be implemented in the long term at the level of the educational practices), amplification of practices (the new practices are regularly employed and integrated into the daily basis of school activities without external help from research or pedagogical team), and diffusion (differential access to information).

5.4 The "EXTRANTS"

The Extrants refer to various types of results and can be generally seen as the degree of improvement in macro-system, meso-system, and micro-system. For example, a micro-level improves students' new knowledge, skills, and attitudes; improves satisfaction from lecturers and school staff; or improves the school's problem-solving capacity as a whole. Because the outputs of the HTLE are more focused on the effect of micro-level such as learners and lecturers, we do not explain meso-level and macro-level in this context. For learners, the innovation may help them improve their 21st-century learning skills, such as Critical thinking and problem-solving; Creativity and innovation; Collaboration, teamwork, and leadership; Cross-cultural understanding; Communications, information, and media literacy; Computing and ICT literacy; and Career and learning self-reliance. These skills were called "7Cs 21st-century learning skills" (Trilling & Fadel, 2009). The second part of our research focuses on analyzing these effects; however, we do not present the result of HTLE on students' 21st learning skills in this article due to time constraints on data analysis and interpretation. For lecturers, the innovation could improve teaching engagement, differentiate instruction, and develop a new role as expert learners, facilitators, course designers, and organizers, leading to the satisfaction of students' needs.

6 Research Method

This research study used a semi-structured interview. It contained essential sections, such as lecturer information, course information (before and during COVID-19), and the effects of implementing a hybrid teaching and learning environment (HTLE). The lecturer information section gave information about the lecturer's experiences, teaching practices, and knowledge and skills of using ICT. The course information section provided information about the nature of the course learning and instruction before COVID-19 and during COVID-19 by translating the questionnaire from the HY-SUP research project to identify the types of the learning environment. The last section of this semi-structured interview gave insight into the conditions, challenges, supports, and effects of implement-

ing HTLE. The interview took us from 40 minutes to 1h:20 minutes depending on the speed of individual participants, preparedness by completing some questions in advance, stable internet connection, and personal disturbed by the participant's family. We also expanded this research study on HTLE during COVID-19 due to the COVID-19 pandemic outbreak in early 2020, even though it was not originally planned.

There are some reasons which influence us to use such a particular method. First, we decided to use a semi-structured interview based on the nature of our research questions. Second, this interview approach allowed us to get detailed information from faculty members about Cambodian higher education's hybrid teaching and learning environment, especially before COVID-19 and during COVID-19. The qualitative methodology allows participants to talk about their feelings, ideas, and experiences. The researcher (Mack et al., 2005) can understand how people interpret the world with this approach. Anderson and Arsenault (2005) also underlined the usefulness of using interviews for data collection; for example, participants are more easily engaged than just asked to fill out a questionnaire. The interviewer can clarify questions and probe the answers.

We invited lecturers implementing hybrid teaching from four universities and two institutes in Phnom Penh, Cambodia. We did pilot testing with 3 participants by online interview call to ensure validity and reliability. The pilot testing allowed us to make an amendment and unclear information on time before doing an actual interview. Twenty lecturers participated in a real interview using a snowball sample. According to Mack et al. (2005) in the book "Qualitative Research Methods: A Data Collector's Field Guide," a snowball sample is also known as a chain referral sample. In this method, the potential participants will be introduced by the previously contacted participants through their social networks. Among the 20 participants, there were 16 male lecturers and 4 female lecturers. They taught different subject areas, such as Research Methodology, Survey Research, Introduction to Linguistics, Comparative Public Policy, Critical Thinking, Professional Writing, Quantitative Research, Contemporary Politics Thoughts, English for Writing Skill, Leadership Skills, Teaching English as Foreign Language, Introduction to theory of public policy, Media and politics, Academic writing, Business negotiation, People skills, Ethic, Biochemistry, English terminology, Academic skill development, Core English, Introduction to political science, Digital literacy, and Academic English.

We decided to do online semi-structured interviews instead of face-to-face interviews in the classroom because of the pandemic COVID-19 during data collection. First, there was no flight operation from Switzerland to Cambodia in June 2020, and people practiced social distance. Second, people were unwilling to accept face-to-face interviews even though the number of infected with COVID-19 was not high compared to the region and globally. Third, all education systems in Cambodia have been physically closed and moved to online or distance learning instead of virtual classroom learning since May 2020. Last

but not least, it was convenient with snowball sampling, fast approach, and timely manner with fewer administration tasks.

Data collection was conducted online with 4 universities and 2 institutes in Phnom Penh, Cambodia, for 3 months, from *June to September 2020*. There were two main reasons to collect data during this period. First, most lecturers are less busy with lecturing because they are lecturing at more than one university and moonlighting. Moonlighting refers to working an extra job to earn extra money outside official working hours. Second, it might be surprising to hear that some students are studying at two universities simultaneously in Cambodia, so this period is a vacation for them to do less homework. However, something turned out to be surprised and unpredictable when COVID-19 had been shaking the world since early 2020. All education systems have been delayed and moved to online or distance learning in Cambodia. However, we were able to complete data collection. There were two simple procedures to get participants involved in this research study. First, we used our network in the university, such as the dean, head of the department, and lecturer himself. We were preparing informed consent for the rector and lecturer; however, due to COVID-19, the university required lecturers to offer online and distance teaching using various tools and platforms. Therefore, we decided to send a request to deans and lecturers directly. Through personal networks in those universities and institutes, we received names of recommended lecturers from the head of department and snowball sampling. After we negotiated with lecturers and agreed to participate in the research, we sent semi-structured interviews through Facebook, Telegram, or email based on their preferences. Before starting the interview, we requested to record their voice for transcribed data.

We also informed them about anonymity and confidentiality to keep their identity anonymously by using a letter to represent their university. During the interview, some accidental problems caused disturbance to the interview process. First, the time zone of Switzerland and Cambodia are six hours apart. For example, if we arranged to interview at 10 AM in Phnom Penh, using Cambodia time, it was at 4 AM in Switzerland. Second, the internet caused trouble with our interview process on some days, which led to cancellations and changed dates. Third, interviewees sometimes texted to change the date to another day due to personal reasons, such as childcare or family health problems. Finally, some interviews took longer than expected and had to be paused since the interviewee's device had to be used by another family member, for example, to take an online examination. We transcribed each audio record into words, merged small themes, and coded. For example, we used (*Ua.L1*) to present *university A* lecturer 1, and *(Ua.L2)* presents *university A* lecturer 2. We also used *(Ia.L)* to represent *Institute A* and *L for the lecturer.*

7 Analysis

This research study is exploratory research. It was analyzed through a self-positioning tool (Deschryver & Charlier, 2012) to classify the type of hybrid teaching and learning environment. The Self-positioning tool, which consists of 14 items, allows us to identify the type of hybrid learning environment, such as "the Scene, the Screen, the Rural Gite, the Crew, the Metro, and the Ecosystem". This research also employed MAXQDA 2020 qualitative software to analyze lecturers' views and experiences on conditions, challenges, and support for implementing HTLE.

8 Result

Type of hybrid teaching and learning environment before COVID-19: By analyzing the type of learning environment through a questionnaire on the self-positioning tool HY-SUP, the results indicated that 50% of the course was type 5 (the Metro) and 50% type 6 (the Ecosystem) before COVID-19 based on lecturers' descriptions. Before COVID-19, lecturers responded highly to in-site active participation, management, communication and interaction tools, use of external resources, freedom of choice, teaching and learning methods, etc. Based on the interview with lecturers, the use of management, communication and interaction tools are to engage students' learning outside the university, send homework and assignment, notify a special event or learning opportunity, and share documents with students. They usually use Facebook groups, Telegram groups, and sometimes Google classroom to reach their students rather than email accounts. One of the lecturers provided the reasons that he integrates online and offline activities in the following:

> I think integrating "online and offline activities" is essential for students because it can help prepare them to (1) work in an international environment, (2) make ease the study because we can engage students, and students can reach us easily when they have questions, (3) improve their self-study if they know and use it in the right way (Uc.L1).

Type of hybrid teaching and learning environment during COVID-19: With 19 courses offered during COVID-19, the result proved that 18 courses (95%) were type 6 (the Ecosystem) among 19 lecturers' responses based on self-positioning tool analysis. We noticed that the courses in type 5 before COVID-19 evolved towards type 6 during COVID-19. During COVID-19, 19 lecturers gave a high rate to 14 descriptive factors of HTLE on *In-site active participation (synchronous); Distance active participation (asynchronous); Communication and collaboration synchronous tools; Management and interaction tools; Use of multimedia resources and works; Providing metacognitive and students' support; Offer freedom of choice, teaching and learning methods; and Use of external resources and actors*. One of the lecturers, UC.L20, stated, "I use online applications such as Google classroom,

Skype call, and Telegram to communicate with students during COVID-19. However, before COVID-19, I used Telegram to communicate and engage students, but not Skype".

8.1 Conditions of Implementing Cambodian Hybrid Teaching and Learning Environment (HTLE)

In this section, we will describe in which conditions Cambodian higher education lecturers implemented HTLE. This description is based on the theoretical model, "a systemic model of the university innovation process".

8.1.1 Lecturers' Motivation to Integrate Online, Offline Activities

According to Depover and Strebelle (1997) and Ely (1999), a systemic model of the university innovation process (Figure. 1), innovation begins with the reason to innovate. Based on the finding, there are two main reasons (intrinsic and extrinsic motivation) to implement HTLE. Regarding intrinsic motivation, some elements push lecturers to implement HTLE. These elements include engaging students' learning inside and outside the classroom, offering external learning resources, preparing students for the workplace, introducing a new way of teaching and learning, developing digital skills, saving time and material, improving self-study, and helping slow learners and absent student to catch up the lesson.

First, the most crucial point that lecturers implement HTLE in their courses is **to engage their students' learning** both inside and outside the classroom. This consists of sharing documents, discussion, accessing students' work, and other activities. When students get absent, they can get learning material, information about the class, and lessons online. Students can also reach their lecturers easily when they have questions. One of the lecturers mentioned that "I can send more learning resources to students than just using the textbook" (Ia.L3). Another lecturer stated that "students can learn faster than before when using technology, for example, getting course content faster, more engagement outside the classroom, which improves rapport between teacher and students, and improves the quality of teaching than before" (Ub.L8).

Second, the reason that lecturers implement HTLE is **to offer external learning resource**s to their students. Five lecturers mentioned that online activities help students expand their learning experience outside the classroom; lecturers can upload video records for absent students to watch; it also makes it easy to share documents and journals to coordinate students' learning. One of them expressed that "I integrate online, offline activities because I think students can submit, do, access learning material every time and everywhere they want with an internet connection" (Ub.L13).

Third, lecturers integrate technology into their courses **to prepare students for** the workplace. They elaborated that technology plays a vital role in daily human life, research, and

the international work environment. One of the lecturers underlined, "I want students to learn and experience online, offline activities to prepare themselves to study abroad and workplace" (Ub.L18).

Fourth, lecturers implement HTLE to introduce a **new way of teaching and learning and develop digital skills.** They want to innovate the way they work and communicate with students more conveniently and easier than before, and students have the flexibility to learn. One of the lecturers expressed his opinion in the following:

> What motivates me to integrate online and offline activities into my course is that I think Cambodian students' knowledge of online learning is not widely known. Compared to other developed countries, they existed long ago and now use it better. Looking at our curriculum, we have not been accustomed to existing technology yet. I want young teachers and students **to get used to technology** by using online teaching activities to gain new experiences, enrich knowledge, get fast information, and do an internet searches. So, I encourage other people **to use technology to facilitate teaching and learning**. (Uc.L14)

Last but not least, other lecturers implement HTLE **to save time and material**, **improve self-study, and help the slow learner and absent students catch up with the lesson**. One of the lecturers provided her reason in the following:

> I think I am young to adopt technology if looking at my age factor. Technology can help me facilitate my task quickly and save time. For example, I do not need to print documents for my students; I just upload them to the platform. So, they can go and download it by themselves. (Ub.L10)

Two factors induce lecturers to implement HTLE in the course regarding extrinsic motivation. First, **the COVID-19 situation** is a significant factor. COVID-19 pushes us to use online learning and distance teaching by using Google Classroom, Skype, Telegram group, and other applications. One of the lecturers stated, "COVID-19 forces institutions to use online learning through Google Classroom and Zoom" (Ia.L17). Another factor is an **institutional requirement.** Three lecturers said that "this is a requirement by the university, so we need to encourage students to use it" (Ub.L8, Ub.L13, Ia.L17).

8.1.2 Teacher Profile

The interview with 20 Cambodian lecturers indicated that they implemented HTLE based on their teaching characteristics. These characteristics included being like integrating technology into their course (M=3.55), more open to adopting innovation (M=3.50), self-confident in the use of technological tools (M=3.30), and having enough freedom to innovate teaching practices in their course (M=3.20). The result also revealed that they had insufficient time to prepare online/offline activities and received no incentive or rewards for their innovation practices (table 1).

Table 1: Frequency of teacher profile

	Strongly disagree	Disagree	Agree	Strongly agree	Total (N)	Mean
A You are self-confident to use technological tools in your course.		1	12	7	20	3.30
B You like integrating technology into your course.			9	11	20	3.55
C You are more open to adopting innovation.			10	10	20	3.50
D You have enough freedom to innovate teaching practices in your course.		1	14	5	20	3.20
E You have sufficient time to prepare online/offline activities for your course.		7	13		20	2.65
F You receive incentives or rewards (letter of appreciation, increase-teaching rate...) for innovation practices.	4	14	2		20	1.90

8.1.3 Implementing Support

As mentioned in the theoretical model (Depover & Strebelle, 1997; Ely, 1999), innovation requires support from stakeholder involvement. While implementing HTLE, some lecturers mentioned that they received some support from their institution, while others said they did not receive any support.

Regarding institutional support, they mentioned that their institution provides technical support to help them implement HTLE in their course. Their institution introduced technology to engage students and encouraged them to use Google classroom and Zoom. However, only have lecturers from University B prepared and provided support to lecturers. Five of the lecturers from University B mentioned they received welcome support from technical support and their department. One of the lecturers said, "Of course, there are some supports from the institution to use Moodle as a learning platform, training how to use Google Classroom, Google doc., email, conference classroom, and training online activity improvement" (Ub.L18). The other two lecturers have mentioned similarly, "I receive much support from the institution, especially from the teaching and learning department, and the IT office department while implementing HTLE" (Ub.L13). "Additionally, we have the training and a user manual for teachers to read and support. If the

teachers cannot understand and need more support, they can go to IT technical support" (Ub.L8).

Some of the lecturers addressed their institution orientation about implementing HTLE. The orientation includes how to check students' attendance, how to upload documents, how to use Zoom, and how to put assignments for students. There is also a short training to use the tool to teach during the COVID-19 offering by the institution. One of the lectures stated that "lecturers and students get trained to use tools and applications for online learning. Some lecturers are old to catch up with technology. That is why they find it hard to adopt new technology. However, young generations can catch up with new technology more effectively" (Ib.L16). Similarly, another lecturer raised that "If lecturers have a question regarding the use of the tool, the institution will find a solution to help. The institution also helps recommend new applications to the lecturer, but no training is provided" (Uc.L14). Another lecturer described his response in the following:

> The university calls for a meeting with lecturers to inform them that we will use online, but there are no technical or training support lecturers to implement online. University does not have a budget to provide training, while some universities confront bankruptcy during COVID-19. Additionally, lecturers need to download and use the unlicensed online application. University does not have any license tools to provide to lecturers. However, the university is considering buying the online application package so that all teaching staff will use the license application. Currently, the university bought Microsoft Teams for lecturers to use; however, some lecturers have not been familiar with using it yet {laugh....}. (Ua.L4)

As a reflection, some lecturers taught at the same university or institute but provided different perspectives regarding supporting innovative teaching and learning. Some lecturers mentioned that they received support, while others stated they did not get supported even though they taught at the same university or institute. There might be relevant assumptions to this issue. Firstly, most universities and institutes in Cambodia do not have an email account for lecturers, but they use Telegram Group to inform lecturers. The Telegram Group will produce lots of communication, which is hard to follow up on important information, unlike email. Secondly, the university itself failed to disseminate information about training or support to lecturers due to communication channels. Thirdly, it was related to the lecturers' moonlighting (extra career); that is why they did not join the training due to the loss of opportunity cost.

8.2 *An Enhanced Model of Implementing Hybrid Teaching and Learning Environment*

A hybrid teaching and learning environment plays a crucial role in the 21st century of education. There are certain conditions that Cambodian lecturers implement HTLE in the following paragraphs and highlighted in our revised model (Figure 2). We added new information from our findings in the italic.

Profile of Lecturers. The lecturer's profile counts, such as *self-confidence to use ICT, integrating ICT into teaching, being open to adopting innovation, getting enough freedom to innovate, and having enough time to innovat*e. The institution itself needs to provide enough freedom for lecturers to innovate their teaching methods. According to the interview, the result shows that lecturers have enough freedom to innovate teaching practices in their courses. However, they seem to have insufficient time to prepare online/offline activities and receive no incentive or rewards for their innovation practices. Therefore, universities or institutes should recruit full-time teaching staff and provide them adequate time to prepare teaching tasks and research. Another condition links to lecturers' English language proficiency to understand the instruction of using tools because most teaching tools have been developed using the English language as an instruction. Moreover, the lecturer's health and living standards should be considered. If a lecturer has good health and a living standard, he/she is more likely to invest in supporting, guiding, and engaging with students' learning outcomes. Other conditions might be considered, for example, the lecturer's motivation (**intrinsic and extrinsic motivation**) to integrate online and offline activities. Intrinsic motivation includes *engaging students, offering external learning to students, preparing students for the workplace, introducing a new way of teaching and learning, saving time and material, improving student self-study, and helping slow learners and absent students to catch up on the lesson*. On the other hand, extrinsic motivation includes *COVID-19 and institutional requirement*s.

Profile of Students. This condition links to *pre-existing experiences or knowledge of students using ICT*. In this regard, applying technology to the classroom will become easier if students understand some primary use of ICT. The other condition is related to students' *independent learning and self-study*. This condition is essential because HTLE requires students to do more research independently.

Home Learning Facility. This condition is associated with a stable internet connection, teaching and learning devices (laptops, computers, smartphones), WiFi, and electricity. These conditions are taken into account in both lecturers' and students' home learning facilities.

Profile of University. This condition is linked to the supporting system from the university. The result shows that some universities provide technical support and orientation about using tools, while others fail to support their teaching staff. Therefore, those teach-

ing faculties get support from their peer and self-discovery. In this regard, the implementing conditions of HTLE are closely connected with the university's profile to provide support and training to lecturers struggling with technology to produce high-quality teaching delivery. These conditions concern facility and resources, openness to innovation, technical support team, budget to support innovation, willingness to enhance professional development, and designing a clear hybrid teaching and learning policy for internal use.

Challenges during Implementing. There were many challenges to take into account when implementing HTLE. These problems are a natural factor and an individual factor. Natural factor happens during the monsoon season, which causes heavy rain and lightning. As a result, it disturbed online teaching and learning. Individual factors include institutional challenges, lecturers' challenges, students' challenges, the nature of courses (inappropriate course syllabus, mixed-major of study), and home learning facilities. Institutional challenges deal with system errors and technical problems that cause challenges for people who hate technology. Lecturers also face challenges, such as difficulty monitoring students' learning during online teaching and having limited knowledge of using tools. Online teaching is more exhausting than a physical classroom, and lecturers need to modify teaching and learning assessments to adapt to the situation. Other challenges include privacy on sensitive online topics, adapting teaching methodology, time-consuming correcting students' work, wasting time when tool errors, responding to student's questions, and time on learning design.

Students also encountered challenges such as less participation during the COVID-19, being less active, and getting disturbed by the family. They also have limited knowledge of tools. An outsider sometimes joins the class. Other challenges include suspending study due to the financial crisis during COVID-19, no private room to study, forgetting the password, not getting used to self-study, lack of language proficiency to use tools, and getting more stressed than in a physical classroom. Both lecturers and students mentioned problems with their home teaching and learning facilities. These facilities include low internet, use of a smartphone instead of a computer, electricity-failed, and unstable internet connection.

Among these challenges, we attempt to select some considerable challenges to put into our enhanced model framework. They are system error, difficulty to monitor students' learning, knowledge of using tools (students and lecturer), techno-pedagogical skills (how to make interactive online learning and monitoring student's progress), preparation and management of virtual classrooms (more exhaustive), privacy on sensitive topics during online, and time consuming (correcting online work, wasting time when tool errors, responding students' questions, learning designed). The interview result indicated that lecturers have a challenge with time while implementing HTLE. One of the lecturers (Ib. L16) stated, "I find it hard to correct and take time because some students send a file as

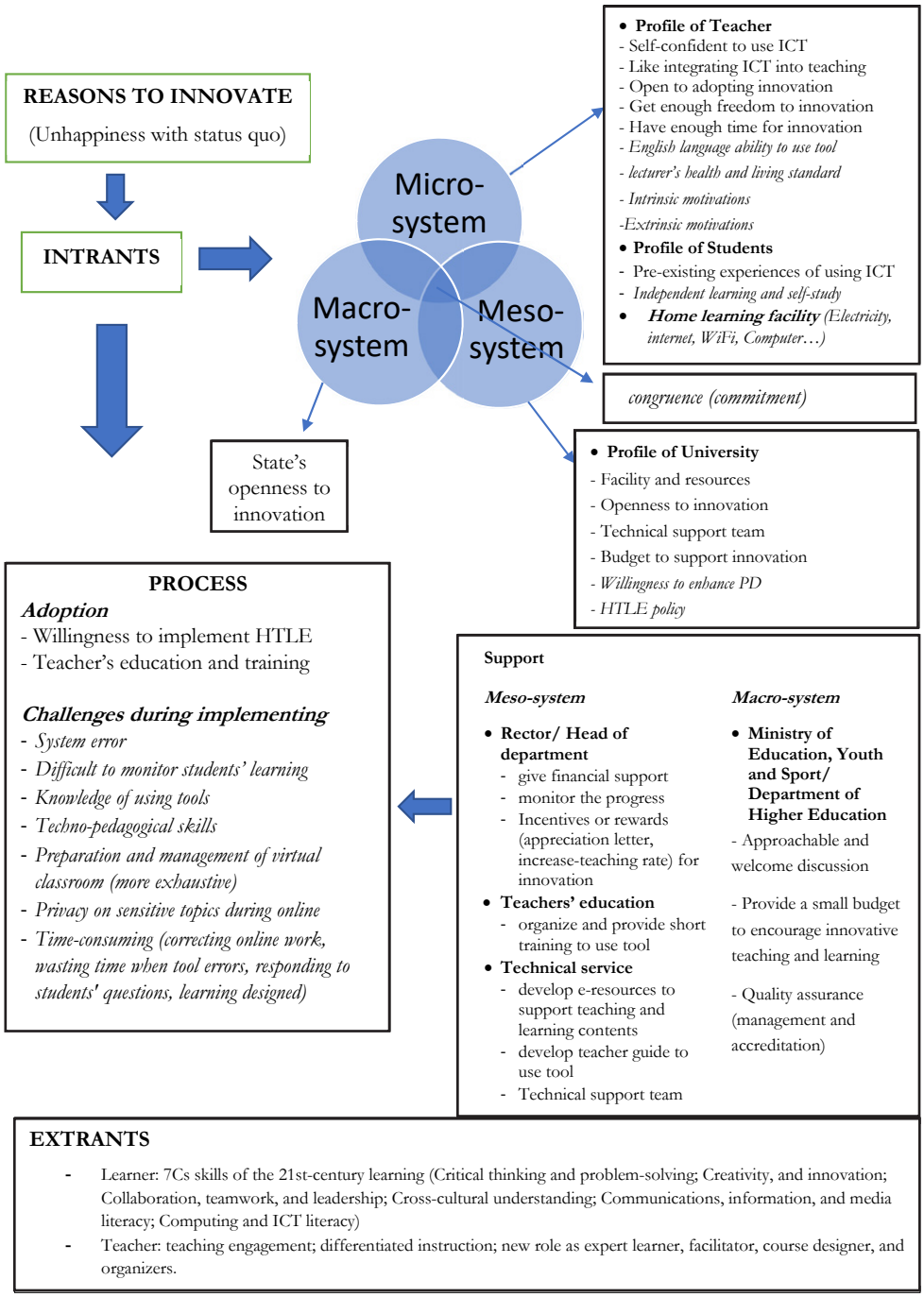

Figure 2: An enhanced model of implementing hybrid teaching and learning environment 2021 (credit author)

an image". Another lecturer (Ia.L3) added about wasting time when tool errors "It is a waste of time when it is stuck or error while we are using it, interruption because of using unlicensed tools". Three lecturers (Ua.L4, Ia.L17, Uc.L20) mentioned time-consuming responses to students' questions. They stated the following:

> Online activities make lecturers even busier than in a face-to-face classroom. For example, in the face-to-face classroom, you go to teach and finish; it finishes. However, for online learning, students keep asking questions almost every hour. Additionally, lecturers are busy when students submit their assignments and almost find no time to comment and reply. (Ua.L4)

> There are some challenges, for example, "time" because we need to spend time checking, reading, and commenting on students' online assignments almost every time and day after teaching. By comparing in class, we just do discussion and use verbal comments. (Ia.L17)

> It is more time-consuming than before. For example, we spend three hours online streaming with students and extra hours supporting students through group chat and learning design. (Uc.L20)

The other four lecturers (Ub.L1, Ia.L5, Ua.L9, Ub.L13) underlined time challenges in learning design. For example, it takes time to prepare learning material compared to face-to-face learning, and time-consuming to design online tests or quizzes. It is also a new burden because lecturer needs to prepare online lessons and spend time learning to use technological tools. One of the lecturers stated the following:

> I need a lot of preparation (material) on the LMS, which requires technological competency to prepare an online lesson. I also need to learn to build technological capacity for myself to produce qualified online materials for students. (Ua.L9)

9 Recommendation

Based on our analysis, some recommendations consider improving HTLE in Cambodian higher education. These consist of an institution, lecturer, student, and transitional period.

The institution needs to provide physical and technical support, including good internet connection and technological tools. The institution also needs to consider having HTLE policy and its own LMS. Institutions should not offer too many courses to lecturers so they have time to prepare lessons and do more research to improve their knowledge and teaching skills. Other things include paying regular salaries on time, increasing teaching rates, and revising the learning curriculum based on the student's level. Additionally, lecturers themselves need to strengthen and develop technological skills. They need to have a strong commitment to follow the course syllabus, amend assessment and learning outcomes, create more interaction with students, and check students' attendance regularly.

On the other hand, students need to read documents in advance, strengthen their knowledge of technology and turn on their cameras while online learning. However, it depends

on the individual economy of the students. The higher the economy, the higher chance, and resources they can access. Finally, we need to consider the transitional period by offering step by step implementation of HTLE.

Among these recommendations, we attempt to select firm recommendations to institutions and lecturers who wish to improve the quality of teaching and learning when applying HTLE in the enhanced model framework. Institutions should have a technical support team, provide techno-pedagogical training, have a good internet connection, have HTLE policy, and have their own LMS. On the other hand, lecturers should strengthen and develop their technology skills, commit to following course syllabus, amend assessment and learning outcomes, create more interaction with students, and check students' attendance regularly.

Covid-19 is a blessing in disguise. It alarmed Cambodian educators, policymakers, and MoEYS to re-design teaching and learning approaches and assessments for the 21st century of education. To re-design teaching and learning in post-Covid-19, Cambodian higher education institutions need to have their LMS, have university email accounts for both lecturers and students, adopt a flexible approach to synchronous and asynchronous and promote project-based and group-based learning. Additionally, rectors and educational leaders need to provide capacity building and support for teaching staff, faculty members, and students. For example, the university or institute can help lecturers improve their digital pedagogy and digital literacy of both students and lecturers, develop an e-community where students can seek support, and develop positive attitudes toward hybrid teaching and learning.

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Learning from Student Feedback – Developing University-Wide Guidelines to Support Distance Learning after COVID-19

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Abstract

Higher education institutions in Finland continuously develop the distance learning opportunities and delivery methods. Nevertheless, the sudden university-wide move to fully online implementations due to COVID-19 created many challenges for students and teachers alike. This study presents a case from Turku University of Applied Sciences, Finland. The study uses mixed methods and examines the results of an annual student feedback survey in 2020 and 2021 conducted with all currently enrolled students, focusing on their experiences of distance learning during COVID-19 and its impact on their studies. The results show the importance of using student feedback to reveal students' negative and positive experiences of the studies and the needs that arise from the experiences in different study years. The results reveal a high need from students to university-wide shared, common practices in terms of planning and implementation of teaching. In addition, several interesting categories rise from the open answers, ranging from poor quality of teaching, inadequate utilisation of educational technology and lack of joint planning in teaching teams to aspects of inequality in learning, feelings of isolation and lack of motivation. The implications of students' experiences to teaching are discussed. Also, through the students' eyes and experiences, an interesting insight into teachers' attitudes, behaviour and actions towards students is gained. The results are used to create university-wide guidelines to support teachers design quality teaching, materials, and guidance in moving towards hybrid education. Additionally, some suggestions are made to how teachers and the university could support the students better. The recommendations from the results include university-wide guidance needed for planning of teaching in the different modes of teaching: campus, hybrid and online, as well as for supporting the students in the selected mode of teaching. The results may be of interest to education designers, man-

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agers and teachers who are interested to utilise university-wide guidelines for distance learning that have been created using student feedback.

Keywords

Higher Education, Student feedback, Distance learning, Quality, Guidelines

1 Introduction

Finland ranks no. 1 in digitalisation of everyday life and society as well as proportion of people with above basic digital skills (European Commission, 2020). Digital learning paths and online degree programmes are developed in national collaboration (eAMK, n.d.). However, despite the on-going development work for online skills and study, the sudden university-wide move to fully online implementations due to the recent COVID-19 pandemic created many challenges for students and teachers alike.

Hofer et al. (2021, p. 15) found that emergency teaching during the pandemic has highlighted the need for agency and digital competence especially for the future, where "strategic digital infrastructure and support, and digital competence development are a shared responsibility". Adedoyin & Soykan (2020) suggest that the crisis response focused more on digital platforms than utilising pedagogical models for online teaching, and thus research community should aim for the development of a more uniform online learning model to solve problems of compatibility.

Hodges et al. (2020) conclude that emergency remote teaching (ERT) suffers from lack of quality due to rushed implementation, minimal features, lack of time and resources. They suggest that systematic planning and careful design processes are needed for quality online implementation. Moreover, they highlight that successful online programme design considers an investment in the ecosystem of infrastructure, online community, instruction, and support. These form the basis for this current study, where the aim is to support well-designed online learning for the post-COVID-19 education.

According to OECD (2021), Finland was among the slightly over 40% of countries where tertiary education institutions stayed partially open either in hybrid mode or open for certain grades. At Turku UAS, the decision was made to organise on-site teaching for the 1st year students to support their collaboration and orientation to the university.

This study presents a case from Turku University of Applied Sciences, Finland. The study uses mixed methods and examines the results of an annual student feedback survey in 2020 and 2021 conducted with all currently enrolled students, focusing on their experiences distance learning during COVID-19 and its impact on their studies. The results are used to create university-wide guidelines to support teachers design quality teaching, ma-

terials and guidance in moving towards hybrid education. Additionally, some suggestions are made to how teachers and the university could support the students better.

The implications of students' experiences to teaching are discussed. Also, through the students' eyes and experiences, an interesting insight into teachers' attitudes, behaviour and actions towards students is gained. The results are of interest to education designers, managers and teachers who are interested to utilise university-wide guidelines for distance learning that have been created using student feedback.

1.1 Context of the Study

Turku University of Applied Sciences (Turku UAS) is a multidisciplinary higher education institution (HEI) that offers higher education in the field of Technology, Communications and Transport, Culture, Health Care and Social Services, Business and Administration. In total, there are over 10,000 students in both Bachelor and Master level degree programmes, some of which are offered fully online and in English, and some as double degrees with international partners. Turku UAS is also developing the region actively through projects and applied research, and coordinates or participates in over 200 research, development, and innovation (RDI) projects yearly (Turku UAS, n.d.).

Studies at Turku UAS are working life oriented, combining theoretical studies with professional skills (Turku UAS, n.d.). Turku UAS follows a specific pedagogical strategy, innovation pedagogy, in all its educational services (Joshi, 2022). Innovation pedagogy is a pedagogical approach that aims to educate graduates who succeed in their professional and personal life by taking into consideration the needs of the changing world and society (Konst & Kairisto-Mertanen, 2020). Innovation pedagogy is implemented in the curriculum work through eight cornerstones that support the learning process. Figure 1 presents the innovation pedagogy in a nutshell.

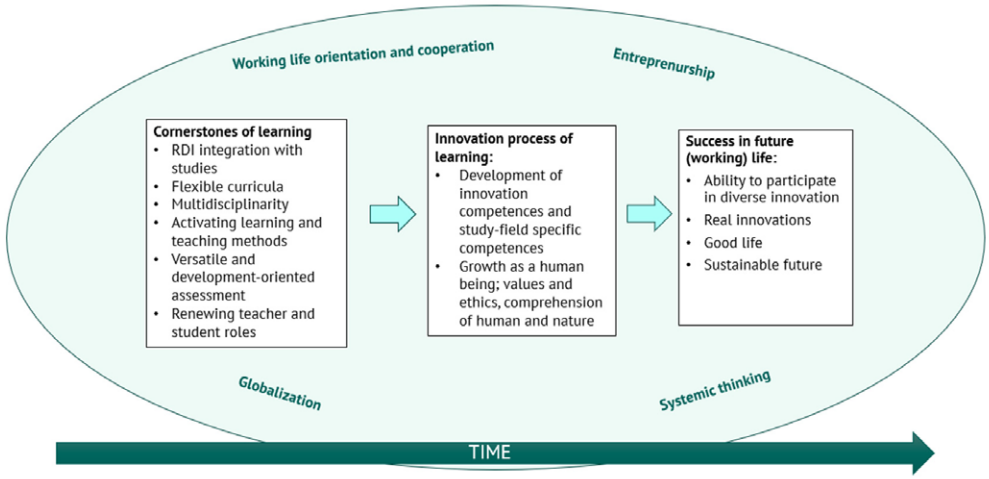

Figure 1: Innovation pedagogy in a nutshell (Konst & Kairisto-Mertanen, 2020)

Innovation pedagogy also supports the development of five innovation competences (networking, creativity, teamwork, initiative, critical thinking) that are gained alongside necessary study field competences during the learning process (Keinänen & Kairisto-Mertanen, 2019). The pedagogical approach is applied in both physical and online study contexts. The pedagogical approach is considered in the design of learning environments, where the collaborative learning and teaching spaces support the implementation of the cornerstones of innovation pedagogy and enable interaction and networking for development of innovation competences (Forstén et al., 2016).

Already prior to the pandemic, Turku UAS offered teachers support and training for online pedagogy and educational technology, and there were many good examples of online and blended implementations (see e. g., Tanskanen & Rännäli, 2016). Most teachers and students were used to having a mix of campus-based, blended, and online courses in their curriculum, so a sudden change to only online required a mental shift without sufficient preparation. Also, many courses were relying on a blended approach or campus-based teaching due to the practical nature of the subject, so the content or practical activities were not readily transferrable to fully online mode. The technical preparedness for online teaching was relatively good as most teachers had laptops and headphones as well as good internet connections, and the university allowed staff to borrow technical equipment from work to implement teaching from home during lockdown.

The staff and students at Turku UAS were familiar with certain online learning platforms and tools prior to the pandemic. However, in the autumn preceding the pandemic, the university had completed a tender for a new online learning platform to be introduced

in spring 2020. The new system *itslearning* is a learning management system (LMS) that gives the possibility to create customised courses, communicate and collaborate by using various tools of the LMS (itslearning, 2021). To start using a new platform for online learning during the pandemic was both a challenge and an opportunity, as it offered a modern learning environment with various tools for learning and tracking progress, but its introduction during the pandemic required significant effort as all user training had to be done remotely, with staff and students having to acquire new environment and its features from their own homes. Therefore, it can be concluded that although the general readiness for online learning was relatively high, it was challenged by the simultaneous use of old and new platforms affected by the staff and students' competence and accessibility.

The empirical data in this study comes from the National Remote Learning Survey and the annual Student Barometer Survey, which has been in use at Turku UAS since 2002. The barometer is part of Turku UAS quality system, and through it, extensive feedback is collected on teaching and teaching-related support services. The survey has been regularly updated according to the feedback and existing situation. The survey consists of two parts: a common part for all students that assesses general satisfaction and services and a part where students respond to different themes according to their year of study.

2 Background Literature

Ashwin (2020) suggests that excellent study programmes are well designed and are student-oriented in all actions. Also, quality is related to the educational purposes of higher education, which is to give students an understanding of their place and role in the world (Ashwin, 2020). In our study, we use student feedback as part of our university's quality process to find students' experiences of teaching quality during the transition from classroom to distance learning mode. We hope the results can aid to reach a situation where online education quality is equal to classroom-based education, an important objective recognised by Palvia et al. (2018).

Skaniakos et al. (2019) found that university students in Finland seem to be quite satisfied with study guidance and conclude that universities have been able to organise guidance for their students. However, they recognised disciplinary differences in students' study progress and the development of academic and generic skills and suggest that guidance be organised differently to support the progress of those progressing slower than expected. In sum, they found that the more satisfied the students were with guidance, the better their studies progressed, and the learning outcomes were also achieved (Skaniakos et al., 2019). In this study, we attempt to find out how satisfied students are with their studies during the pandemic, and therefore an interesting comparison between the two studies can be made.

Reunanen & Taatila (2021) researched the felt justice between students and staff, which refers to situations where staff feels fairness and justice from their leadership, translating to a same feeling amongst the students, and the feeling of being heard is one of the contributing factors to the experience of being treated well. They found strong indication of a connection between university staff's felt justice and student satisfaction. One of the suggestions is that if a university has a strong structural guidance, the individual aspects may stand out more rather than be indicative of student satisfaction. Our study can reveal students' feelings of fairness and equal treatment in distance learning setting and provide a further connection to teacher and student relationship and creating university-wide guidelines.

Eteokleous and Neophytou (2019) found that student-to-student and student-to-teacher interaction and collaboration is important but that teachers need guidance and training in giving the students the interactive and collaborative study experience needed in quality distance education. Their research focused on implementation and evaluation of an internal quality assurance procedure that was aimed at course development and delivery following a pedagogical framework of the organisation. They also examined how to support distance learning programs, staff, and students. Their results can be considered interesting for our study that is placed in the context of the pedagogical framework, the realization of which is evidenced in the student feedback and can in turn inform the support needed for staff.

Grabowski et al. (2016) suggest that those instructors teaching with technology must continuously keep their skills up to date and be prepared to make informed decisions regarding the planning and implementation of teaching and assessment strategies. They also state that learners who start studying online for the first time may encounter a culture shock in terms of different practices, expectations, ways of communicating and so on. Their list of competencies for online instructors and learners are relevant in the context of the societal and educational change, and when used appropriately, they can facilitate the design, delivery, and learning online. In our study, the focus is on supporting the learning through feedback to aid design and delivery for better satisfaction, and the results of this study may further complement their results.

Liesa-Orús et al. (2020) remind that the use of ICTs is important not only for the academic purposes but also from a global viewpoint to support sustainable education. They found the use of ICTs in the classroom to have a significantly positive effect on students' learning and therefore the use of ICTs is justified and beneficial. Their research concludes that educational institutions need to adapt and assume challenges with the aim of providing quality, where the use of ICTs is integrated in the pedagogical approaches. Our research aims to create guidelines for teachers using student feedback to further aim for sustainable quality education and therefore it is important to link the pedagogical use of technology as a background to our research.

According to Damşa et al. (2021), COVID-19 pandemic forced higher education to integrate various elements, including pedagogical, organizational and technological, and teachers would have to manage the integration. Moreover, in addition to placing stress on individual teachers, the pandemic also put pressure on infrastructure and technology of the educational organisation. They argue that whilst the emergency online teaching is the implementation an individual teacher's pedagogical solutions, the context of the organisation cannot be removed from the equation, where also technology plays an essential part. Their findings strongly suggest that teachers must be supported in the digital competence and pedagogical use of the technologies in the context of their own HE organisation, which affirms the need for the present study.

3 Methods and Materials

This study examines students' satisfaction with studies during the COVID-19 pandemic. This is further complemented by examining the perceptions that students in different study years have of quality of teaching in distance learning mode during the pandemic. The specific research questions are as follows:

1. *Are there differences between those who are satisfied and those who are dissatisfied with their studies during COVID-19?*
2. *Do the students' perceptions about transferring to distance learning mode differ in terms of their study year and quality of teaching?*

Mixed methods are used to examine the results of an annual student feedback survey in 2020 and 2021 conducted with all currently enrolled students, focusing on their experiences distance learning during COVID-19 and its impact on their studies. The next section presents the quantitative and qualitative methods and materials.

3.1 Methods

3.1.1 Quantitative Method

The first stage of the research was a quantitative analysis of student barometer survey 2021. First, questions related to COVID-19 and distance learning from all year groups 1–4 were selected. The students answered statements using a Likert scale where 1 refers to very satisfied, 2 satisfied, 3 not satisfied nor dissatisfied, 4 dissatisfied, 5 very dissatisfied. The data was combined into two categories: satisfied and dissatisfied students, where scale 1–2 formed the group satisfied and scale 4–5 dissatisfied. Scale 3 'Not sure' was left out from analysis. This was compared with the satisfaction levels in 2019 and 2020 to evaluate the change from pre-pandemic to pandemic.

The quantitative data was then examined to find statistically significant connections between different variables using Chi-Square test. Only those connections that were statistically significant (p=0,01) were selected. The themes that were selected are: General satisfaction; use of technology; quality of education provided; study progress; participating in exams; and participating in practical training.

3.1.2 Qualitative Method

In the Annual Student Barometer Survey, the students also had the possibility to share their views by answering one open question *"You can write here how the remote learning has influenced the progress of your studies"*. In total, 801 students answered the open question, making the response rate to the open question 27%.

The open answers were categorised into two groups according to satisfaction: satisfied answers (very satisfied and satisfied) and dissatisfied answers (dissatisfied and very dissatisfied). Answers 'Neither satisfied nor dissatisfied' were excluded from the analysis. The categories were used to find answers to the first research question about the level of satisfaction when transferring to distance teaching mode during COVID-19. The open answer results were further divided according to the different study year groups to find answers to the second research question about the differing perceptions of quality.

After that, a word analysis in Webropol survey tool was used to categorise the open answers into themes according to year group and level of satisfaction. The word analysis tool recognises automatic categories using text mining. After word analysis, eight of the most often mentioned words or word combinations were selected to create the following themes: Distance and campus-based teaching; teaching and competence; social relationships; teachers; motivation and focus; IT equipment and systems; stress and mental health; practical training; and graduation.

3.2 Materials

The empirical data consists of two data sets, National Remote Learning Survey and annual Turku UAS Student Barometer Survey both from years 2020 and 2021.

3.2.1 National Remote Learning Survey

The remote learning survey was created by a nationwide student organization of students in universities of applied sciences in Finland (SAMOK). SAMOK consists of student unions of 24 universities of applied sciences in Finland and supports local student unions to advance the interests of students at each university (SAMOK, n.d.). Each student union implements the survey independently, and at Turku UAS, the survey was conducted in cooperation with Student Union TUO and the Future Learning Design team that is responsible for pedagogical development and support for teaching processes at the university.

The survey was conducted in May 2020, when distance learning had only just begun. The survey was based on a common nationwide questionnaire template. The survey included questions about the effects of distance learning, exceptional teaching conditions during COVID-19, and social relationships.

The survey was conducted with the Webropol survey via an open link. In total, 1,298 Bachelor's or Master's degree students responded to the survey, making the total response rate about 14% out of a total of 9,000 students. However, as the survey is sent as an open link, it is difficult to estimate the exact total number.

3.2.2 Annual Student Barometer Survey

Turku UAS organizes an annual student barometer survey. The survey has been used since 2002 and is sent to all students as a Webropol survey and sent to each student by email. The student barometer survey is conducted every year at the turn of January and February.

The survey data presented in this paper was collected in the surveys conducted in February 2020 and 2021. It contains questions related to teaching, guidance, feedback and support services received by the students. Since 2019, a personal answer link has been used in the student barometer survey. This means that the students' background information of the respondent, e. g. gender, age and field of education have been entered into the Webropol system. In 2021, the questions of the national remote learning survey were added to the student barometer as a new section to give a better understanding of how the prolonged distance learning during the pandemic may affect the students. This survey also included the open answer question that was used in the qualitative research part of this study.

In 2020, the number of respondents was 2,996 and 2021 the total number was almost the same with 2,934 degree programme students responding to the survey, making the total response rate 34% in 2020 and 35% in 2021 (Table 1).

Table 1: Description of data set and total number of respondents

Data set	*2020*	*2021*
National Remote Learning Survey	1,298	*Remote Learning Survey included in Annual Student Barometer Survey*
Annual Student Barometer Survey	2,996	2,934
Total	**4,294**	**2,934**

Turku UAS offers education in four fields of study and altogether in over 70 degree programmes in both Bachelor and Master level. Data was collected from all Bachelor level degrees in all study fields. Figure 2 shows the distribution of all respondents (n=1280, 2020; n=2932, 2021) by field of study before processing the data.

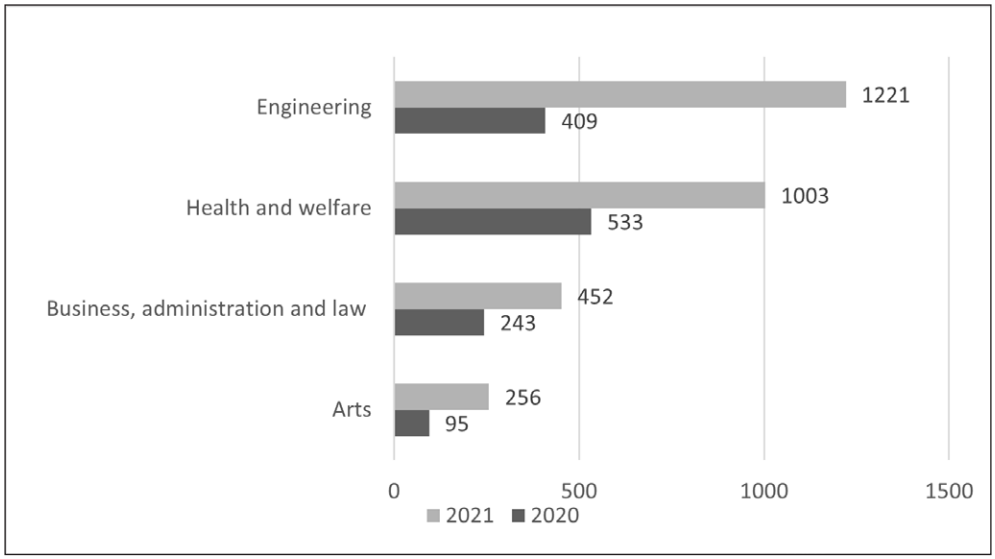

Figure 2: All respondents by field of education

The following section presents the results of the research, followed by a discussion and conclusion.

4 Results

The study attempts to reveal students' satisfaction level with their studies in transferring to distance learning mode during the pandemic by examining the results of an annual student feedback survey in 2020 and 2021. First, the results of the quantitative analysis of the electronic survey statements in the following themes are presented: General satisfaction; use of technology; quality of education provided; study progress; participating in exams; and participating in practical training. This is followed by the results of the qualitative analysis of the open answers in the following themes: Distance and campus-based teaching; teaching and competence; social relationships; teachers; motivation and focus; IT equipment and systems; stress and mental health; practical training; and graduation.

4.1 Quantitative Analysis

The quantitative analysis gave answers to both research questions by showing the satisfaction of the students with their studies and the differing perceptions. The following Figure 3 and Tables 2–4 present the results in the following themes: general satisfaction, use of technology, quality of education provided, participating in practical training, participating in exams and study progress.

General satisfaction

The general satisfaction level with studying at Turku UAS has increased despite the pandemic. Figure 3 shows the comparison between all years of study in the past three years.

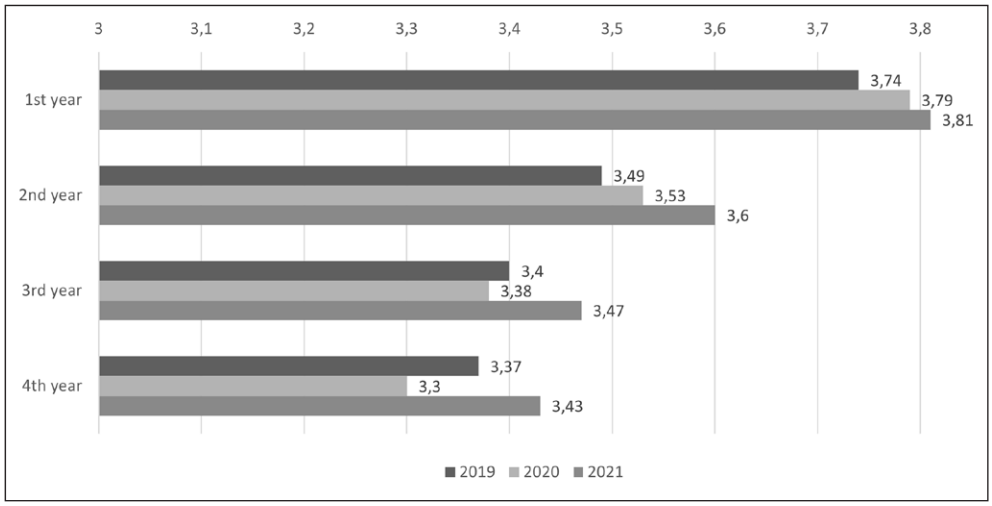

Figure 3: Student satisfaction level with studying at Turku UAS in general according to year of study in 2019–2021

Use of technology

Data shows that students are satisfied with the technology but dissatisfied with the quality (significance level p<0,001) in the transferring to distance studying. According to results, 68 percent of those who felt the use of technology was performing well, felt that the quality in distance studying was getting worse. This group represents 32 percent of the total number of respondents. (Table 2)

Table 2: Overall satisfaction level in terms of quality and use of technology during transition to distance studying

			Subjective experience on the use of technology in distance studying			**Total**
			Very weak – weak	Well	Excellent	
Quality during transition to distance studying	Worse	Count	300	859	105	1264
		%	23,7%	68,0%	8,3%	100,0%
	No change	Count	92	952	212	1256
		%	7,3%	75,8%	16,9%	100,0%
	Better	Count	13	106	64	183
		%	7,1%	57,9%	35,0%	100,0%
Total		Count	405	1917	381	2703
		%	15,0%	70,9%	14,1%	100,0%

*According to Chi-Square tests the connection between the variables is significant (p<0,01)

Study progress

Data shows that students' subjective experience of their study progress in the transition to distance studying is that 33,5 percent of first year students felt that COVID-19 had a very low effect on their study progress in the entire data set, whereas the corresponding figure for fourth year students is 18,6 percent. From all the students (N=2584) the majority, 77 percent, experienced low or very low effects on their study progress (Table 3).

Table 3: Year of study by the subjective effect of COVID-19 on study progress

			Subjective experience of COVID-19 effect on study progress				**Total**
			Very Low	Low	High	Very High	
Year of study	1st year	Count	279	414	96	44	833
		%	33,5%	49,7%	11,5%	5,3%	100,0%
	2nd year	Count	260	419	108	66	853
		%	30,5%	49,1%	12,7%	7,7%	100,0%
	3rd year	Count	181	275	100	57	613
		%	29,5%	44,9%	16,3%	9,3%	100,0%
	4th year	Count	53	108	68	56	285
		%	18,6%	37,9%	23,9%	19,6%	100,0%
Total		Count	773	1216	372	223	2584
		%	29,9%	47,1%	14,4%	8,6%	100,0%

*According to Chi-Square tests the connection between the variables is significant ($p<0,01$)

Exams

According to data, students' subjective experience of performing exams 14 percent of first year students felt that COVID-19 had a very low effect on performing exams in the entire data set, whereas 17,2 percent of second year students felt that it has a high effect. In overall, most of the students answered that COVID-19 had very low or low effect on performing exams, total 63,3 percent. There's notable difference compared to previous question concerning study progress (Table 4).

Table 4: Year of study by the subjective effect of COVID-19 on performing exams

			Subjective experience of COVID-19 effect on performing exams				**Total**
			Very Low	Low	High	Very High	
Year of study	1st year	Count	118	439	196	89	842
		%	14,0%	52,1%	23,3%	10,6%	100,0%
	2nd year	Count	142	366	208	110	826
		%	17,2%	44,3%	25,2%	13,3%	100,0%
	3rd year	Count	76	264	116	81	537
		%	14,2%	49,2%	21,6%	15,1%	100,0%
	4th year	Count	21	102	61	25	209
		%	10,0%	48,8%	29,2%	12,0%	100,0%
Total		Count	357	1171	581	305	2414
		%	14,8%	48,5%	24,1%	12,6%	100,0%

*According to Chi-Square tests the connection between the variables is significant ($p<0,01$)

Practical Training

According to data, students' subjective experience of performing practical training 54,4 percent of the first-year students felt that COVID-19 had a very high or high effect on performing practical training, and the trend is the same among other students. Compared to previous COVID-19 questions the subjective experience of performing practical training has the most considerable effect on students' education (Table 5).

Table 5: Year of study by subjective effect of COVID-19 on performing practical training

			Subjective experience of COVID-19 effect on performing practical training				**Total**
			Very Low	Low	High	Very High	
Year of study	1st year	Count	81	233	248	127	689
		%	11,8%	33,8%	36,0%	18,4%	100,0%
	2nd year	Count	80	245	248	204	777
		%	10,3%	31,5%	31,9%	26,3%	100,0%
	3rd year	Count	68	199	163	161	591
		%	11,5%	33,7%	27,6%	27,2%	100,0%
	4th year	Count	28	75	67	80	250
		%	11,2%	30,0%	26,8%	32,0%	100,0%
Total		Count	257	752	726	572	2307
		%	11,1%	32,6%	31,5%	24,8%	100,0%

*According to Chi-Square tests the connection between the variables is significant (p<0,01)

4.2 Qualitative Analysis

The qualitative analysis gave further information to the research questions regarding the satisfaction of the students with their studies and the differing perceptions in the different study years.

The open answers given by students (n=801) gave many concrete examples and suggestions for development in open answers to verbalise their satisfaction or dissatisfaction in different themes. However, eight prioritised themes according to year of study were identified after the word analysis using the text mining. The groups include both satisfied and dissatisfied students. Table 6 shows the themes according to year of study.

Table 6: Prioritised themes from word analysis according to year of study

Prioritised themes	**1st year**	**2nd year**	**3rd year**	**4th year**
Distance and campus-based teaching	1.	2.	2.	2.
Teaching and competence	2.	1.	1.	3.
Social relationships	3.	4.	5.	6.
Teachers	4.	3.	4.	5.
Motivation and focus	5.	5.	6.	–
IT equipment and systems	6.	6.	7.	8.
Stress and mental health	7.	8.	–	7.
Practical training	8.	7.	3.	1.
Graduation	–	–	8.	4.

Further explanations to the identified themes were sought by examining open answers for the different year groups, as there seemed to have been some differences in their satisfaction levels and priorities.

First Year Students

In general, first year students felt they don't really know what studying in higher education is like. Distance learning is an equally new situation and therefore it is difficult to know whether the challenges are caused by not being familiar with HE studies or distance studies. The study workload was experienced to be heavy by some during the distance learning, but nevertheless, they had difficulties concentrating on studying in distance

classes. Mobile phone was mentioned as a tempting distraction in working from home. Another disturbing factor mentioned was the teachers' lack of technical competence in using tools, such as Zoom or Teams, which resulted in lack of intensity in class. They also mentioned that teachers seemed stressed, which caused dissatisfaction amongst students.

Still, some of the first-year students stated that they enjoyed studying online, and distance studies suited their life situation well. There were also some students who were studying in a fully online degree programmes and for them the distance situation was as expected and a positive experience. Many students also expressed a wish for continued good practices post-COVID, such as use of lecture recordings.

Second Year Students

Second year students seemed to have experienced group work stronger than other year groups, as this was a new theme that appeared only in their open answers. Some students felt that it was difficult to work in multiple new groups online and trying to fit together multiple schedules, personalities or methods without proper support. They also mentioned that they were in close contact with their friends despite the pandemic, so it would have been easier to work in familiar groups rather than trying to get to know new ones. This was further complicated by the lack of shared practices, platforms, and communication channels amongst teachers. Some students also felt that there was pressure for students from the university not to contact the teachers, as they were experiencing a heavy workload already due to the pandemic measures.

Second year students were more concerned about acquiring the professional skills required for their practically oriented work and expressed a wish for more emphasis on practical skills during studies. Although studies progressed during the pandemic, it was felt to be more focused on theoretical than practical orientation. There seemed to be too much of a focus on independent studies and students taking too large of a responsibility of their own learning. Nevertheless, some second-year students stated, similar to first year, that they preferred online studies to what they called normal studies and mentioned they felt more motivated and were able to study independently. This was not the view of all, as some complained about lack of motivation as studying from home seemed to have multiple effects, including varying sleep patterns.

There were some mentions about the hybrid model, and how students would be able to respond to the expectations of studying on campus or online, depending on each teacher's and course's requirements. Many students felt hybrid was more stressful as there may be a mix of campus and online activities in the same day, which requires a lot of physical arrangements from the student. They also found it surprising that teachers would have the power to decide how their classes would be held, instead of following one common policy during the pandemic.

Third Year Students

For third year students, a common theme was practical training, which was heavily impacted by the pandemic. Things mentioned included difficulty finding placements, lack of guidance, lack of shared practices and difficulty completing studies because of incomplete practical training period. This seemed to have caused feelings of inequality amongst students from different backgrounds and varying levels of work experience. In addition, students lacked confidence in their own professional skills, and coping in working life with the skills acquired thus far. This was felt to be caused by the distance learning and not being able to follow the teaching as well as hoped. Similar to second year students, they felt that more responsibility was placed on the students to learn and complete the excessive amounts of homework, and there was a feeling that teachers expected students to dedicate more hours to studying than before the pandemic. Some students also complained about the lack of motivation and wellbeing, even if the actual transfer to distance mode was smooth. Some commented on the difficulty of separating school from free time and the line between home and school became too blurred, a view shared by especially first year students. This view was opposed by some who felt that, like first year, some courses could be offered online even after the pandemic.

Third year students made some comments on the quality of teaching, as they possibly felt they had had experience of studying prior to the pandemic to give a point of comparison. Some students felt that the quality of teaching had decreased significantly, but it was focused on specific teachers, not the entire study programme. Dissatisfaction also seemed to be related to the lack of contact teaching and excessive use of independent study materials that led to the feeling of not learning or preparing for profession. Some commented that the quality had only gotten worse from an already poor quality during the pandemic. Some comments were made to poorly designed courses without proper objectives. Students felt empathy towards teachers and understood that not everything could be done during the exceptional circumstances but still the wish was to have the teachers use technology in a more competent manner. Specific mentions included using several platforms and not having clear guidelines for the purpose and use of each, and this was a theme that came up in all year groups 1–3. They also commented that teachers were difficult to reach, something that was also mentioned by the second-year students.

Fourth Year Students

The open answers from fourth year students highlighted the importance of practical training and thesis work. The difference to third year answers was that the students seem to be aware of the effects of prolonged completion of the practical training to study progress. There were also answers from students who were near completion of the entire degree and only had thesis to complete, and both these groups commented on having to create new schedules and plans for graduation, which took a mental toll on them and also created some feelings of injustice. Some comments were also made by those who had children,

where studying at home became more difficult after the children's schools were closed because of the pandemic and they were also in the distance learning mode.

Next, the implications of students' experiences to teaching are discussed. Also, through the students' eyes and experiences, an interesting insight into teachers' attitudes, behaviour and actions towards students is gained.

5 Discussion

The results revealed a high need from students to university-wide shared, common practices in terms of planning and implementation of teaching. The same need was strongly expressed for the use of platforms, where shared guidelines could facilitate learning. In addition, several interesting categories were found from the open answers, ranging from poor quality of teaching, inadequate utilisation of educational technology and lack of joint planning in teaching teams to aspects of inequality in learning, feelings of isolation and lack of motivation.

It was interesting to note that the general satisfaction level with studying at Turku UAS has increased despite the pandemic. This may be because various actions have been put in place following the student feedback already in the pre-pandemic time. For example, university-level development actions for offering all services online were created for fully online degree programmes, and it is possible that these facilitated the pandemic operations but were not fully utilised by those students who are not used to using those services online. One possible interpretation is also that after the first year of pandemic (2020), students felt that it is possible to continue studies even if the implementation is online. An important finding is that the first-year students found it difficult to know what the so-called normalcy in higher education would be and therefore had no point of comparison. Many students also reported the positive effects of the distance learning, such as more time for studying through absence of commuting or blended study mode, being able to focus better or use online study materials, such as recordings. It is also an interesting thought to consider how much the implementation of the new online learning environment and its features may show in the results of especially the new students, who have no prior experience of the old system, which was felt not to be fully utilised.

It is important to note that some students felt their wellbeing suffered despite a smooth transfer to distance mode, and expressed lack of social contacts, difficulties in life management, low study motivation or increased workload. This indicates that even in the situation where the education and services are well designed for the context and mode, it is still important to provide support for emotional and mental wellbeing of students. Another worrying finding was related to feelings of inequality amongst students, which was felt in different situations and contexts, and this indicates that more efforts should be placed in ensuring inclusive and equal education. Reunanen and Taatila (2021) suggest

that student satisfaction is linked to teachers' felt justice. It is interesting to speculate how much the teachers' feelings during the pandemic may have influenced the student' feelings of fairness and quality, as Damşa et al. (2021) mention the stress levels of the pandemic on individual teachers. Another interesting comparison can be made in terms of being heard, which according to Reunanen and Taatila (2021) is one factor for feeling of fair treatment, and in our study the students expressed difficulties in reaching the teachers, which could in turn enhance the feeling of isolation and feelings of unfairness. This feeling of isolation may be reflected also in the blurred line between home and school. These should be considered in planning teaching that supports the inclusive and fair treatment and enables students to create a sensible schedule between study, work, and personal life.

The results show that the first-year students felt that COVID-19 had a very low effect on their study progress in the entire data set, whereas it seemed to increase in the older year groups. Although it seems that the effect of COVID-19 on study progress overall was relatively low, for those who felt the effect, it was significant. In the open answers, the students commented that although studies progressed during the pandemic, some courses were poorly designed without proper objectives or sufficient contact teaching, and there was a lack of practical element to the studies, which led to the feeling that their professional skills were not developed adequately during the pandemic. These results confirm the findings of Eteokleous & Neophytou (2019) who suggest that teachers need guidance and training in giving the students a quality study experience of interaction and collaboration in the distance learning mode. These findings confirm the need for the guidelines for teachers that will be created as a result of this study.

The lack of practical element in courses also influenced their practical training, where they expressed a feeling of incompetence due to lack of skills. When looking at the results for effects of COVID-19 on practical training, there seems to be a difference between year groups where second to fourth year students seem to have felt the effect of COVID-19 more than first year students. This may be related to the normal curriculum cycle where first year students don't tend to take practical training yet, but in the second year it is already part of many students' curricula. It is also important to note the flexible curricula practices in the local context of this study that extend to practical training, too, where students are encouraged to create individual study paths that are discussed and agreed with teacher tutors in personal development discussions. The strong need expressed for shared practices in practical training may reflect the fact that in the local context currently there are no university-wide shared guidelines, which may translate into feelings of unfairness and frustration, which highlights the importance of the guidelines created from the results of this study. Another interpretation is that the effect may be more severe for third- and fourth-year students as they may be dependent on the completion of the practical training for their planned graduation time. Skaniakos et al. (2019) found that it might be useful to focus on supporting those progressing slower, which may be something beneficial to be applied in the distance and hybrid learning mode, too.

According to results, great majority of students felt that the technology was used well, but quality is lacking, thus quality does not necessarily increase with the use of technology. This gives us the interpretation that when the technology doesn't work, the blame is put on the technology, but when the technology works, the lack of quality is related to something else: possibly lack of competent or suitable application of it. It seems we have the relevant educational technology but there is inadequate utilisation. Therefore, our findings support those of Liesa-Orús et al. (2020) and Damşa et al. (2021) of the need to integrate technology and pedagogical approach in the educational organization and training teachers in the pedagogical use of technology, an aspect especially relevant for the local context, where the entire university follows one pedagogical strategy. Another possible answer to the results is that students may have varying levels of technical skills, which may translate to their feelings of weak use of technology or decreased quality. One solution already implemented at Turku UAS is a course DigiStart, which enables students to get used to ways of working and tools used for studying already before starting their studies. However, more ways should be found to support students' competences in the use of technology, and one possibility could be to create a guide for students to follow the guide for teachers created as a result of this study.

In terms of performing exams, the results show that older year groups felt the impact of COVID-19 on their exam performance more than first year. This can be interpreted as a contextual matter in terms of study year, as the first-year students are not used to the study and exam methods of the university yet, and the older students' expectations may be higher in terms of teachers implementing certain types of exams in a particular manner. This follows the findings of Grabowski et al. (2016) regarding first year students' culture shock, and their conclusion of making informed decisions regarding teaching and assessment strategies. It is important to support teachers in using various forms of assessment, where exams and e-exams are just one form of assessing students' competence and progress. It is equally important to train students in the assessment methods of the university and inform them of the criteria to fulfil their expectations and thus achieve the desired satisfaction and quality level.

6 Conclusion and Recommendations

This paper presents a case from Turku University of Applied Sciences, Finland. Mixed methods were used to examine the results of an annual student feedback survey in 2020 and 2021 conducted with all currently enrolled students that focused on their experiences distance learning during COVID-19 and their level of satisfaction to studies when transferring to distance teaching mode.

The results highlight the importance of taking student feedback into consideration when developing the teaching in the post-pandemic era. Also, the study reveals the positive and negative student experiences of the actions in individual teacher and university level. The results will be used to create university-wide guidelines to support teachers design quality teaching, materials, and guidance in moving towards hybrid education. One interesting possibility is to extend the guide for students to benefit the entire community.

Specific recommendations

The following themes can be found from the results and are recommended for consideration when creating university-wide guidelines for distance learning using student feedback collected during COVID-19 pandemic. The themes are divided into two parts based on the evidence found in this study: 1. Planning of teaching and 2. Supporting the students. It is important to note that these are reflected in the selected mode of teaching and learning, which may in the future be a combination of campus-based, hybrid and online modes.

1. Planning of teaching in the selected mode of teaching (campus, hybrid, online) in terms of:

    a) teacher's workload, training possibilities and wellbeing

    b) common policy for implementation of teaching

    c) clear guidelines and jointly created timetables for the degree programme

    d) course design and objectives support the selected mode of teaching

    e) pedagogical use of technology in design and implementation of teaching

    f) purposeful selection of online platforms and clear guidelines for their use

    g) shared practices, platforms, and communication channels amongst teacher teams

    h) equal treatment, access, and support to all students

    i) utilisation of various forms of assessment

    j) shared practices for practical training

2. Supporting students in the selected mode of study (campus, hybrid, online) in terms of:
    a) students' emotional, mental, and social wellbeing
    b) balanced workload, clear scheduling, and motivation
    c) specific needs of each year of study and curriculum
    d) pedagogical approaches and technical solutions
    e) acquisition of practical skills
    f) easy and open communication channels to reach teachers
    g) group work and collaboration
    h) specific needs of slower study progress

All in all, it can be concluded that student feedback is essential in developing the quality of teaching and finding new solutions for education in the post-pandemic higher education. These results show that the experiences and feelings are supportive of a multitude of teaching modes, including online, campus-based and hybrid modes, provided that it is well designed, used by competent staff and sufficient support for motivating studies is offered in purposefully selected environments.

It is important to note that these results reflect the experiences of students in the context of one university of applied sciences in Finland, and therefore the results may not be directly transferrable into different national or local contexts. However, the process of collecting the feedback and using it to create university-wide guidelines can be adopted to find the guidelines that are relevant in that context. Also, since the results seem to support the findings in the literature, it seems that challenges and solutions are shared across borders and boundaries.

In the future, it would be interesting to compare the student feedback between different countries to find out if these experiences are shared between students of applied sciences across national or cultural boundaries, or do differences exist perhaps due to national higher education or curriculum structures. Also, as this research focused on applied university context, it would be interesting to see how the results compare to science universities and what kind of solutions and shared practices can be found. Also, another future research possibility could be to compare the student feedback against staff feedback and find shared challenges and create solutions for the entire higher education community. Finally, it would be important to further research the effect of low motivation and lack of social contacts on study progress and student wellbeing.

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II Learners & Teachers (Mixed Target Groups)

The Impact of COVID-19 Pandemic on the Child-Parent-Teacher Triad Functioning and Migrant Children's Distance Learning in Poland

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Abstract

This paper is aimed to present the investigation of the functioning of the Child-Parent-Teacher triad partnership of migrant families during the COVID-19 schools' shutdown and implemented distance learning. Its purpose is also to assess the shift of roles in the Child-Teacher, Child-Parent, and Parent-Teacher dyads functioning by drawing on 47 semi-structured interviews with migrant children, their parents and teachers in Poland. Migrant children and their parents from private and state schools reported different dyad functioning due to the shifted control and unequal distribution of labor among three agents. This research first presents the model of the triad functioning before the pandemic and then illustrates the changes during distance learning. Findings indicate that migrant children experienced the strengthened empowering in contributing to their relationships with teachers and parents. The results point to the substantial difference in the distribution of labor and responsibilities between migrant children in private and state schools. The outcomes illustrate that migrant children in private school experienced little changes in the arrangement of the educational process during the lockdown and reported agreeable support from the school, which enables them to maintain the satisfying school-family partnership. Meanwhile, children and parents from the state schools claimed a considerable shift of the duties and responsibility distribution, the main share of which was put on children, who through excreting own agency sought to retain school-family cooperation.

Keywords

distance learning, COVID-19, child-parent-teacher triad, migrant children

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1 Introduction

Experiencing migration during childhood affects the social, educational, and psychological aspects of a child's development (Aronowitz, 1984; Slany et al., 2016). Migrant children are known to be more prone to educational setbacks, which may be further exacerbated by concurrent crises (Stodolska, 2008). Distance learning, which took place in response to the COVID-19 pandemic, became a new vulnerability factor for migrant children and their parents by accentuating migrants' economic status, insufficient cultural and societal knowledge and foreign language skills, as well as a deficit of social support from the non-migrant family members and friends (Popyk, 2021b; Bol, 2020; Di Pietro et al., 2020; Doyle, 2020; Gornik et al., 2020; Markowska-Manista & Zakrzewska-Olędzka, 2020).

To study migrant children's learning processes during distance education, we examined the impact of the COVID-19 pandemic on the functioning of the Child-Parent-Teacher (CPT) triad. The data we used derives from a child-centred qualitative study dedicated to *transnational transitions* (Pustułka & Trąbka, 2019) and the formation of the sense of belonging in migrant children in Poland. Transnational transitions (Pustułka & Trąbka, 2019) illustrate migrant children's transitions and adaptation/socialization process from one social, cultural, educational context to another, as well as the transition to become a migrant child. The research was conducted with migrant schoolchildren aged 8–13 (n=20), their parents (n=19), and their teachers (n=10) in the first phase of the COVID-19 lockdown in the Spring and Summer of 2020.

We adopted the Overlapping Spheres of Influence Model proposed by Epstein (1986) to investigate the ways the pandemic affected children's learning and the functioning of both the whole Child-Parent-Teacher triad and its individual elements. Our study presents an integrated Child-Parent-Teacher triad model, which illustrates the roles of Child-Parent, Child-Teacher, and Parent-Teacher relationships in children's learning processes during COVID-19 distance education.

This paper presents the shift of engagement/support roles from the school/teacher to the parents, who were the least engaged during traditional learning due to their low cultural, linguistic, and social knowledge of the residence country (LaRocque et al., 2011; Schneider & Coleman, 1993). Moreover, the study highlights the substantial role of a migrant child's agency (Prout & James, 1997; Qvortrup et al., 2009) in CPT triad functioning and the educational process. This factor is often overlooked in studies, with prevailing attention given to the child-parent and child-teacher roles (Christenson & Sheridan, 2001; Epstein, 1986; Hornby, 2011).

This paper contributes to the discourse on the impact of the COVID-19 pandemic and lockdown and the resulting distance learning process on migrant children, as well as the

modification of family and school roles in education. Additionally, it enriches the existing child-centred studies by highlighting the importance of the child's agency in the educational process and building relationships with parents and teachers.

2 Theoretical Framework

2.1 Overlapping Spheres of Influence in Families and Schools

Family and school are the two major institutions that contribute to a child's social and cognitive skills (Deslandes, 2001; Epstein, 1986; Handel, 1990; Hornby, 2011; Johnson et al., 2002). These two institutions define the role of each agent (child, parent, and teacher) and create grounds for their collaboration and partnership. Additionally, family and school determine the child-adult (child-parent and child-teacher) relationships that are central in childhood education and development (Bandura, 1971; Christenson & Sheridan, 2001; Epstein et al., 2009; Gordon & Browne, 2015; Pianta & Stuhlman, 2004).

To present school and family engagement and collaboration, Epstein (Epstein, 1986; Epstein et al., 2009; Sanders & Epstein, 2005) introduced the model of Overlapping Spheres of Influence. She adopted Yuri Bronfenbrenner's ecological model (1978) and organizational theory to demonstrate the way school and family establish separate, shared, and sequential responsibilities (1986). The author claimed that shared responsibilities are the most efficient for both the school's and the family's functioning, as well as for the child's education. Besides, they foster communication and collaboration not only between the individuals but also institutions. The responsibilities of both institutions encompass engagement, support, and complementarity.

Common responsibilities and aims form a framework for parent-teacher partnership (Christenson & Sheridan, 2001) based on the *control* and *division of labor* (Epstein, 1986). This labor division anticipates that the school activates the resources to engage and assist parents with the children's education and interacts with children both inside and outside the school by organizing the learning process, creating a safe and friendly atmosphere, and contacting parents (Gordon & Browne, 2015). At the same time, parents should take responsibility for developing children's learning skills throughout the whole process of education (Hornsby, 2011; Sanders & Epstein, 2005).

Mutual relationships and partnerships of schools and families also create "a social climate for student learning and culture for students' success" (Christenson & Sheridan, 2001, p. 16). Nevertheless, the institutional partnership often fails due to bilateral disagreements. On the one hand, teachers often do not empower parents and children through considering their actual resources and skills (Deslandes, 2001), as it could demonstrate teachers' incompetency and status (Popyk, 2021b). What's more, families' cultural backgrounds and experiences are undervalued in educating children, because it would require

the revision and revaluation of the existing teaching approaches (Herudzińska, 2018). This makes teachers 'initially resistant to increasing family involvement," (Sanders & Epstein, 2005, p. 215) as it may undermine their competencies (ibid). Such attitude comes to define parents' and children's roles in the educational process (Deslandes, 2001).

On the other hand, parents themselves vary in their involvement with the school lives and learning processes of their children. This is particularly notable among low-income, ethnic minority, and migrant families (LaRocque et al., 2011; Lareau, 2011), who are often overwhelmed with establishing the economic situations of their families or lacking sufficient knowledge and skills to support their children's education (Barglowski, 2019; Janta & Harte, 2016; Reay, 2004; Ryan & Sales, 2013). This has been particularly visible with the overlapping crises of migration and the pandemic (Guadagno, 2020).

Nevertheless, Epstein (1986; Epstein et al., 2009) stated that in order to support education and development, educators should perceive students as children and create family-like schools, which provide better programs and opportunities for children through viewing each student as a child with special needs and skills. It also requires engaging each parent in the educational process and school life regardless of their backgrounds and competencies (Epstein et al., 2009). Meanwhile, parents should identify their responsibilities and shared interests and create a school-like home, where children are also perceived as students, with their educational needs and potential. Parents should engage in children's knowledge building and achieving success processes (ibid). The author presents the school and the family as the two main institutions (apart from a third one, community) that contribute to children's cognitive skills development, such as attention, memory, and logic. The role of the child is perceived as secondary, determined by the actions and attitude of the adults.

By drawing on the concept of children's agency (Alderson, 2016; James & Prout, 2015), we claim, however, that children themselves play an equal role in education, initiating and regulating child-adult interactions and relationships. Moreover, children play an active role in establishing and maintaining parent-teacher interactions and relationships. For this reason, children's education should be perceived as an overlapping of three integrated spheres: family (parents), school (teachers), and children, which construe the Child-Parent-Teacher triad.

As family and school are complex institutions (Deslandes, 2001; Epstein, 1986), the level of their contribution to the dyadic partnerships is influenced by four key elements: structure, status, engagement, and competencies. Figure 1 presents the interrelation between each element, which affect children's learning. Family structure, namely the number and roles of family members, family relationships and type of communication is tightly connected with parents' engagement in the children's education. Kalmijn (2018) stated that immigrant children from families, where the father is not present or active in the family life, experience a negative effect on their well-being. Besides, siblings play important

role in children's well-being, socialization and learning (Baldassar & Brandhorst, 2021). The engagement also depends on parents skills and competencies, which are needed to support the learning process and maintain the relationships with children and teachers. Migrant parents, particularly labour migrants, are usually characterized as less engaged in the children's education than non-migrant parents. Among the main reasons are: insufficient familiarity with the foreign country's education system and school structure, low foreign language skills and foreign culture and society knowledge (Slany et al., 2016; Janta & Harte, 2016). Families' socio-economic status (SES) affects not only the families' income level, but also the choice of school, or amount of time spent with children. Lareau (2011) mentioned, that parents from the middle class use to spend more time with their children, particularly on reading and other educational activities. This, consequently, has a positive impact on children's learning outcomes and learning success at school.

2.1.1 School's status (private or state), and position in the national school ranking

Teachers' competencies and engagement in the process of building relationships with children and parents are mutually defendant. The sufficient pedagogical, cultural and social skills and competence result in teachers' greater engagement in supporting children's education and building relationships with parents (Herudzińska, 2018). Teachers' eagerness to contribute to the dyadic contact also motivates raise competencies (Suryani, 2013).

Children's personal and demographic characteristics, agency, as well as their previous school and migration experience, affect children's participation in the dyadic relationships with parents and teachers. They also directly impact the learning process. Previous research (Qian et al., 2018) also illustrates that teachers and parents are likely to have different approaches and expectations towards children of different ages and gender. Qin (2006) mentioned that migrant girls usually have better grades and catch up faster at school than boys. Moreover, girls are more likely to be in teachers' favor than boys. Though, the expectations of parents and teachers are also higher for girls than for boys (Ravecca, 2010).

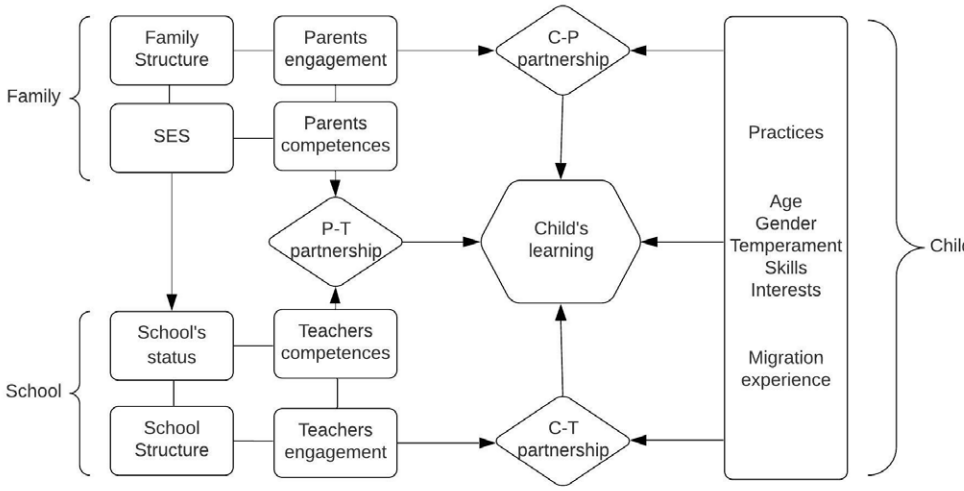

Figure 1: Child-Parent-Teacher triad pre-pandemic functioning and its impact on children's learning. Source: Own Elaboration

2.2 *Children's, Parents', and Teachers' Partnerships in the Context of Migration*

In the case of migrant children, the learning process is determined not only by the two primary agents, parents and teachers, but also by various accompanying factors, including migration experience, foreign culture, and linguistic knowledge (Cebotari, 2018; Darmody et al., 2016; Slany et al., 2016). Additionally, migrant children's education also largely depends on their personal characteristics (e.g. age, gender, temperament) and the chance and space for expressing their agency (Popyk, 2021a; Strzemecka, 2015). Migrant children also lack experience with cooperative learning (Johnson et al., 2002) due to scant peer contacts and the effect of transnational transitions on friendships (Pustułka & Trąbka, 2019) as children adjust to changes in place of residence, living context, and social and educational contexts. Transnational transitions require adaptation, learning cultural and societal norms and practices, learning a new language, and making up the curricula differences. The psychological, social, and educational consequences of the migration experience impact child-parent and child-teacher relations in a new context. Consequently, migrant children are in greater need of parents and teachers' engagement in their education.

Multiple studies (Amadasi, 2014; Iglicka, 2017; Popyk, 2021b; Slany et al., 2016; Strzemecka, 2015) indicate that school is particularly important for the education and development of migrant children, because school is the first institution children need to face

during transnational transitions (Pustułka & Trąbka, 2019). It is the "first complex and unknown labyrinth" (Nowicka, 2014) children need to come through.

For migrant children, a school can become either a place of inclusion and facilitated transitions or a place of marginalization. Carola Suárez-Orozco and Marcelo Suárez-Orozco (2001), by studying migrant children in the USA, pointed out that contemporary schools struggle to support migrant children's education because of overwhelmed teachers, overcrowded and hyper-segregated classes, limited and outdated resources, and other "decaying infrastructures" (p. 2), as well as a lack of "pre-service, in-service, and advanced education" for developing teachers competencies (Sander & Epstein, 2005, p. 216). Carola Suárez-Orozco and Marcelo Suárez-Orozco (2001) indicated that migrant children from the labor migrant families come to a new country full of positive attitude and enthusiasm, which are valuable resources that should be cultivated, but they are exposed to "negative social mirroring" (p. 2), and can be '"locked out" of "opportunities for a better tomorrow" (p. 3). Furthermore, vivid discrimination (personal, cultural, religious, etc.) at school negatively affects children's well-being and prolongs the adjustment process (Vandell, 2000), which consequently impedes children's education. The latter has been observed in Poland, in terms of schools being ill-prepared and prone to discriminatory practices (Grzymała-Moszczyńska et al., 2015; Kościółek, 2020). Although school education in Poland is free and obligatory, the process and responsibility of including migrant children, who require additional cultural, linguistic and educational support, is put on individual schools and teachers. Those, often lack the necessary experiences, skills, knowledge and resources to provide migrant children and their families with efficient support and education (Herudzińska, 2018).

Another challenge brought on by the growing number of foreign children in Polish schools, noted by the educators and pedagogues, was insufficient methodological and technical support for intercultural education and pedagogy (Iglicka, 2017; Szelewa, 2010; Torovska, 2016). Despite increased financial support from the Polish Government for educating return and foreign-born children, in 2020 the principals of 24 Polish schools disregarded various aspects of the legal procedure concerning migrant children (NIK, 2020). This included the impeded procedure of registering migrant children at the schools, e. g., requiring additional documents, residence registration; excluding children from the state exams, which could possibly lower the overall schools' position in the national schools' ranking. Besides, schools did not ensure educational support (such as extra Polish language and other subjects lessons), due to the insufficient teaching staff, overloaded teachers, not enough teachers of Polish as a foreign language (Herudzińska, 2018).

Language issues, together with cultural differences, have been the most common issues brought up in the Polish discourse on educating migrant children (Błeszyńska, 2010; Grzymała-Moszczyńska & Trąbka, 2014; Szelewa, 2010; Torovska, 2016). The low level of Polish language skills in migrant children qualifies them as "disadvantaged" in na-

tional schools because language incompetence causes hardships for teachers as they try to educate and communicate with foreign pupils (Iglicka, 2017; Nowicka, 2014). Besides, language is seen as an obstacle in solving cultural, educational, or pedagogical problems with children (Błeszyńska, 2010). That's why, migrant children in Polish schools are often perceived as those, who tend to cause "specific problems" (Nowicka & Połeć, 2005, p. 31), as they require the teacher, school and the educational system to adjust the curricula and approaches of teaching. Moreover, language differences are one of the most common obstacles in maintaining contact with migrant children's parents. For this reason, these parents feel excluded from school life and prefer to remain "invisible" in order to avoid being judged and pointed out for their insufficient foreign language skills (Deslandes et al., 2012; García-Sánchez & Nazimova, 2017; Wærdahl, 2016). The exclusion of parents is exacerbated by their lack of familiarity with the school and its educational procedures (Schneider & Coleman, 1993) and insufficient parental involvement by schools (Sanders & Epstein, 2005), which tend to perceive parents as uninterested in children's education (Schneider & Coleman, 1993).

It is worth noting, however, that along with the growth of multicultural classes in Poland, teachers started to recognize the positive impacts of the presence of migrant children in their schools. The outcomes of recent research (Bulandra et al., 2019) conducted at some Polish schools demonstrated that multiculturalism can be perceived as an asset for Polish teachers and pupils. "Mutual merging" (p. 18) of cultures supports native children's openness to new cultural knowledge and traditions. Furthermore, migrant children often are described by teachers as hard-working and enthusiastic. This inspires native children to be more motivated to perform better at school. Similarly, through exposure to cultural conflicts, both native and migrant children learn to solve problems and negotiate effectively (Bulandra et al., 2019). Bulandra et al. (2019) also illustrated a shift from ethnocentric Polish schools towards more culturally diverse and tolerant teachers. This reflects slight changes in perspectives on immigration in Polish society (Okólski & Wach, 2020). Still, the aforementioned research focuses on the Polish schools' and communities' perspectives rather than on migrant children, their migration experiences, and their socialization processes.

3 Distance Learning in Poland and Child-Parent-Teacher Engagement

In response to the spread of COVID-19, most countries worldwide immobilized migration (Merla et al., 2020). This was followed by school closures and the transition to distance learning. In Poland, distance learning lasted from March 15, 2020, until June 2021, with the exception of one month of face-to-face education in September 2020. For detailed descriptions of the education during the pandemic in Poland, see our previous works (Popyk, 2021b), which also include the migration profile of migrant families in Poland.

The first lockdown in the spring and summer of 2020 left schools and families with children in bewilderment and disorganization (Markowska-Manista & Zakrzewska-Olędzka, 2020; Parczewska, 2020). Distance education and differences in child-parent and child-teacher relationships resulted in institutional (family and school) diffusion and the merging of spaces, as home became a place of activity saturation (Popyk, 2021a).

Experiencing changes in social and learning practices (Popyk, 2021b; Borkowski et al., 2021; Gornik et al., 2020), migrant children faced multiple burdens in both their learning and their social lives. They were unable to rely on either teachers' or parents' support, and they no longer had access to the tutors and assistants who taught them in person before the pandemic. As a result, distance learning led to an increase in the learning gap and the cumulation of educational disadvantages for migrant children (Bol, 2020; Di Pietro et al., 2020; Engzell et al., 2021).

4 Methods

This paper is based on a qualitative study, which applies the child-centred mosaic approach (Clark, 2017) to the transnational transitions (Pustułka & Trąbka, 2019) of migrant children in Poland. A detailed description of the study's methodological and ethical issues can be found in our earlier works (Popyk, 2021a, 2021b). The study includes 49 semi-structured interviews with migrant children aged 7–13, (n=20), their parents (n=19) (there were two siblings), and their teachers (n=10). The child participants' median age was 12. The residence time in Poland varied from 1 to 6 years, with an average of 3 years. There was an equal number of girl and boy participants. Child participants also attended one private (7) or different public schools (13); some of these schools were located in the city district of residence and some were dispersed over the city. The participants diverged according to their nationality: five of the child participants were Ukrainian, thirteen were Turkish, one was Romanian, and one was Lithuanian. The divergence in the participant groups was intended to enable the comparison of migration experiences between families

of various ethnicities. The analysis for this paper is based on 47 interviews, as the first one with a child and her parents took place before the pandemic started.

In the second group, the participants were parents. All of them stated that their families had regular financial income. This was mostly from the employment of fathers, as most of the mothers (n=14) were housewives. One-third of the participants, however, stated they did not have valid residence permits and were in a process of acquiring visas or residence cards. This also made the families more vulnerable and their situations more precarious, as in Poland the lack of a residence permit and working permit prevent official employment, which results in having no state health insurance. Consequently, migrant families (from non-European Union countries) have to buy private health insurance or live without insurance, which was quite unsafe as the pandemic spread.

The third group of participants, teachers, were from private primary school. They differed in age (varying from 26 to 65 years old), gender (males = 3, females = 7), experience working with migrant children (mean = 5 years), subjects taught (Maths, English as a foreign language, Art, Science), and nationality (Polish = 6, Albanian = 2, Turkish = 2).

The research was approved by the Ethics Committee. All interviews were held online, following the required methodological and ethical considerations for conducting online interviews (Eynon et al., 2009; Weller, 2017) with vulnerable groups, such as children and migrants (Due et al., 2014; Morrow, 2012; Morrow & Richards, 1996). The interviews were held in five languages, namely Polish, English, Ukrainian, Russian, and Turkish (the last with the presence of a qualified interpreter), to ensure the participants' free and convenient conversation and avoid ambiguity during the study (Seidman, 2006). The interviews with children lasted on average 45 minutes, while the interviews with parents and teachers were about 60 minutes long.

The main themes addressed in the interviews were migration decisions and experiences of children and parents, family and school life in the home and in the countries of residence, reflections on distance learning during the COVID-19 pandemic, family life across borders during the pandemic, and future plans.

To study the child-parent-teacher triad during distance learning, the following subjects were analysed: learning under an immobility regime; school-family relations; children's, parents' and teachers' engagement in the online educational process; and social life and support during the lockdown.

The collected data from the qualitative study has gone through meticulous transcription of recordings (voice-to-text) (Miles & Huberman, 1994) and was uploaded to the coding and analysis software MaxQDA. I created the code tree and provided coding for all interview scripts. I applied both selective and complete coding of the data (Braun & Clarke, 2013). Additionally, the traditional paper and pen method was used to analyse the major

themes of the study (Braun & Clarke, 2013). I have also used the interview notes, which were completed after each interview. These three sources of data (coded fragments, theme scripts, and interviewers' notes) were used to develop a baseline for analysing the data (Seidman, 2006).

This paper presents the analysis of all the themes, which have not been discussed in the previous papers based on this study. Besides, it is the only paper, which presents the responses of all three groups of the respondents (children, parents and teachers).

5 Results

The analysis of migrant children's education during the school closure illustrates the disruption of the family and school institutions' functioning (see also Di Pietro et al., 2020; Dietrich et al., 2020; Gornik et al., 2020) and the modification of the Parent-Teacher, Child-Teacher, and Child-Parent partnerships (see Figure 1). Furthermore, in times of distance education, migrant children's education relied mostly on their skills, knowledge, engagement, and individual efforts. Hence, the learning process was mostly based on imbalanced dyadic relationships with limited shared responsibilities and labour between family and school. The study demonstrates that the inter-institutional interactions between parents and teachers were also limited. As a result, distance learning reinforced the boundaries, which separated family and school cooperation.

The study provides evidence of the substantial role of migrant children's agency and engagement in establishing and maintaining relationships with parents and teachers. Additionally, the study shows the direct impact of children's agency, backed by socio-demographic variables such as age or gender, skills, interests and practices, previous migration experience, in contributing to the Child-Parent, Child-Teacher and Parent-Teacher relationships.

Each of the dyads' functioning during the first pandemic lockdown and school closure is discussed below.

6 Parent-Teacher Relationships in the Time of the COVID-19 Pandemic: Perplexed but Engaged

Parent-Teacher partnership during the beginning of the pandemic spotlighted issues related to the family's and the school's functioning, such as the family's socioeconomic status and the status of the school, which in the pre-pandemic period were less noticeable. Lower socioeconomic status (SES) families (LaRocque, 2002; Lareau, 2011; Schneider & Coleman, 1993), whose children attended state schools, experienced double pressure: to support their children's education more frequently and efficiently than in pre-pandemic times, as most of the educational work was passed on to parents and children (see also Bol, 2020; Gornik et al., 2020), and to provide their families with substantial financial support, as migrant families were particularly vulnerable due to their precarious employment and residence status (Guadagno, 2020). On the contrary, migrant families with a higher economic status could benefit from superior school engagement and preparation in a time of regime shift and crisis, as their children attended private schools, which were more organized and involved than public schools in Poland.

Furthermore, private school teachers and families each positively assessed parents' and teachers' efforts and engagement in establishing the new learning mode. They pointed to positive attitudes and bilateral empathy. For example, Ella, a private school early-childhood teacher (grades 1–3) noted that parents provided considerable technical support by ensuring children access to the learning platform and necessary technological devices (e. g. printer, scanner). However, she also noted that parents vary in their engagement and there are those, who are less eager to make efforts and reach out, instead of expecting teachers to ensure the whole learning process.

> In general, parents have a positive attitude and try to be very responsive. They try to overcome all these technological difficulties at their homes, e. g. providing a printer, a computer, etc. They also help children to learn where to click or how to prepare learning materials. Of course, some parents will complain about having no printer. In that way, we come across and type everything in Microsoft Word documents, so parents and children can edit it without printing. This costs us [teachers] our own private time. But later, turns out that they [parents] actually printed everything. So this is such a strange confusion. But in general, the parents are disciplined, they keep an eye on these lessons, they turn on the link for the kids and reach out to be able to help, if necessary. (Ella, a private school teacher)

Another private school teacher, Anna, stressed the differences between state and private schools' functioning in Poland at the beginning of the pandemic spread and distance learning implementation. She noted that despite a tough beginning, private schools tried to reinforce the teacher's engagement ad tried to carry on education with minimal changes in the curriculum. Anna's statement also discloses that parents have higher expectations towards the private school's education and organization of the learning process.

> It seems to me that the learning process in our school goes very well. When I read some forums or comments on Facebook, it appears that teachers in state schools do not do anything, and children are overburdened. They [people] say it is not proper education, because teachers just send the materials for individual learning. And children have to complete the tasks. Our school is private, so there are more expectations for children and teachers. So we [teachers] provide learning online. We meet with the webcam and do the activities from the curriculum. (Anna, a private school teacher)

Similar experiences were reported by parents whose children attended state schools. They pointed to the impeded partnership between schools and teachers, who were overwhelmed with technical, administrative, psychological, and personal challenges as they navigated distance learning. This included the schools' technical readiness (e. g., sufficient number of computers, stable Internet), adjusting lessons plan, teachers digital skills of using a computer for various teaching programmes and applications, ensuring place and space for teaching, which often collided with the personal and family obligations of teachers. Additionally, public school teachers in Poland established unidirectional contact with parents, sending materials for individual learning and extensive homework; parents responded only to request a reduction in the number of assignments. It took state schools some time to develop the new educational mode, leaving children and their parents with a lack of clear instruction and support for four months (see also Popyk, 2021b). Additionally, two months of summer holidays were perceived to exacerbate the language gap between children in state and private schools. This became a prominent factor in widening the educational gap between non-migrant and migrant children, as the latter endured deficient parental educational assistance and support (Darmody et al., 2014; Gornik et al., 2020; LaRocque, 2002; Schneider & Coleman, 1993).

Nina, a mother of a 12-year-old boy from Turkey who had just switched from a private English language school to a state school run solely in Polish, pointed to the difficulties her son and family faced during distance learning. Her interaction with teachers was limited to receiving assignments, without any guidance:

> First of all, I think that schools were absolutely not ready for this mode of education. Our school also could not switch to online mode. Many subjects, particularly those hard ones, just were explained and taught well. As children had just one lesson on the subject per week, it was not enough for them… For us, as this is a new school, a new language, pandemic and distance learning were a double challenge. First, the school tried to organize the learning process in a way of sending lots of homework and checking whether children completed and learned the material. And that homework was really extensive. But children do not understand that it was homework or what it was for. They complained a lot. We just could not handle it, so we were forced to ask teachers for help and reduce the homework size. (Nina, mother of 12-year-old boy from Turkey)

Emine, a mother of an 11-year-old girl from Turkey, mentioned the hardships she and her children met during distance education, pointing to language issues that exacerbated problems with individual material sent by the teachers. She also noted that teachers lacked the initiative to support children, including those who required more assistance because their parents did not possess the language skills to engage in the learning process.

Emine and her children were dealing with the school material by translating back and forth into/from their native language. This process is overwhelming for children and parents, leaving minimal time for anything other than school activities.

> At first, we ask the teachers to send us the materials earlier to be able to translate everything, and only then I explain it [in the native language] and we complete the tasks somehow. Teachers usually treat us well and support us. But they do it only when we ask them to send the tasks prior to the lessons. If we do not contact and ask them, they do not express any initiative. (Emine, a mother of an 11-year-old girl from Turkey)

Therefore, in Poland, the first pandemic lockdown and distance education resulted in the disruption of Parent-Teacher partnership functioning, which is considered to be fundamental for a successful learning process (Gordon & Browne, 2015; Deslandes, 2001; Epstein, 1986; Suryani, 2013). What's more, Parent-Teacher relationships also affected Child-Parent dyadic functioning, which is presented below.

6.1 Child-Teacher Relationships in the Time of the COVID-19 Pandemic: The Role Shift

Similar to parents, child participants also noted impeded contact and partnership with teachers and schools during distance learning. For migrant children, distance education was particularly challenging, as they were cut off from direct contact with the most important institution and people in their country of residence (Nowicka, 2014; Ryan & Sales, 2013; Slany et al., 2016). The school closure resulted in the role shift from teachers, who had previously served as educators and guides to the norms, values, and educational system in Poland and functioned as a first-hand Polish language learning bridge, to children, who were left with limited educational support from teachers and parents. Migrant children became the main initiators to establish cooperation with teachers, in order to fulfil their educational duties. Izabella, a 12-year-old girl from Ukraine stated:

> It was easier for me, as I could translate everything from Polish and then learn, but every time I had to ask teachers to send some material earlier or wait until I completed it. I try to do all the tasks because if I get five minutes for not completing the assignment, I will have a bad mark for the semester. (Izabella, a 12-year-old girl from Ukraine)

Children also complained about homework being the most common tool for child-teacher interaction, which the migrant children in state schools believed was based only on the educational requirement to realize the curriculum and produce grades at the end of the school year. Hence, teachers' key aim was to send the materials for children to complete and return. Chasing for grades also illustrates the education system and requirements for schools in Poland. Distance learning at some point revealed that the major focus in education is placed not on the children's achievements and knowledge, but on fulfilling the state's requirements at the cost of children's actual knowledge and skills.

> I do get a lot of homework sent by teachers. They're saying we need to complete the tasks, as we need to get grades. (Ellen, a 13-year-old girl from Turkey)

In contrast, teachers from private schools positively assessed children's engagement. At first, it was hard due not only to the organizational and institutional quandaries but also to the children's attitudes towards the extra learning activities. Anna, a private school teacher, pointed to the children's excitement about having online lessons and using technological gadgets, which they had limited access to previously.

> The first few weeks were very tough. Because children, especially from the early grades, were so excited, causing noise and chaos. It was not comfortable, because we [teachers] were not even heard. But now it's much better. Children learned the rules and procedures; they know we treat online lessons as seriously as regular ones. So they try to be active and disciplined. (Anna, a private school teacher)

This was supported by the children's responses. They viewed virtual learning as a unique chance to spend time online, chatting with classmates and teachers. However, it appeared that this mode of education was not as fruitful and enjoyable as the traditional one. Children lost the ability to directly connect to their classes, due to the absence of physical contact, eye contact, and physical intervention from teachers. This is reflected in what Ezra, a 12-year-old girl from Turkey, and Bohdan, a 12-year-old boy from Ukraine, had to say about distance learning:

> First, I thought that having online classes would be good, but I didn't like those classes so much and I don't learn things like this. I mean online lessons. I didn't learn many things. Teachers were mostly using presentations, but sometimes they were explained by themselves. It was too hard to understand in this way. (Ezra, a 12-year-old girl from Turkey)

> It [online learning] is harder because when a teacher says something, I cannot understand it. The teacher doesn't have a whiteboard or any, other like the way to explain or tell us how to do the tasks. That's why we have to do everything on ourselves. (Bohdan, a 12-year-old boy from Ukraine)

To conclude, during the pandemic, migrant children experienced simplified learning, as they were able to translate the material into their native languages and learn it in that way. Though, this type of education placed more responsibility on children, as they had to work independently, self-manage, and negotiate their interactions and relationships with teachers. Consequently, the role of a teacher as a guide and instructor was shifted to children. This required children to exercise their agency (Alderson, 2016; Prout & James, 1997), and changed hierarchical child-teacher relations to more equal ones in terms of engagement and responsibility.

6.2 *Child-Parent Relationships in the Time of the COVID-19 Pandemic: Seeking Balance*

The outcomes of the study show that most parent respondents noted that, despite academic challenges, the first lockdown was an important time for developing relationships with their children, as they spent more time together and could assist them by preparing lunches or checking online learning platforms. Parents enjoyed being more engaged in their children's learning than they were when children were attending school in person. This was particularly true for migrant parents, who were likely to be stressed by sending their children to a school in a new country, with a new environment and new rules. Moreover, the migration experience and the feeling of being separated from their home, family, and relatives resulted in a desire to "reunite" with their immediate loved ones and stay together in that difficult post-migration period. Additionally, while parents were saddened by their inability to take care of distant family members, they were also "rewarded" with the chance to care for their children, who spent much of their time at school prior to the pandemic. Hence, the lockdown was viewed as a fairly agreeable requirement. Nurey, a mother of two schoolchildren from Turkey, and Olga, a mother of an 11-year old girl from Lithuania, stated the following:

> The good sides are that I see my children all the time at home. I can ask what are you doing, I can know more about what they are learning. (Nurey, a mother of two schoolchildren from Turkey)

> I see maybe only positive things. Children stay with us at home; we are not stressed. In my opinion, everything is even better than at school. (Olga, a mother of an 11-year-old girl from Lithuania)

During distance learning, parents were forced to become more engaged in their children's learning, as they had to ensure technical access and support them through online lessons. Furthermore, because children were overwhelmed with individual learning and homework, parents had to help them complete assignments. Inga, a mother of two schoolchildren from Turkey, described her experience as follows:

> Children treat distance learning as holidays, I think. Only when there are actual lessons, they learn. Children also are at home all the time, where other activities take place, for example, housework: cleaning, cooking, dishwashing, and so on. Children get lost between learning and home time. This also affects their concentration and understanding ... I, for example, control everything by myself by checking Microsoft Teams [learning platform]. I log in and check grades, schedules, or homework and tell my children what they have to do. Because children cannot understand it by themselves. And I much value the time when children were going to school physically. (Inga, a mother of two schoolchildren from Turkey)

Most parents noted the lack of social contact and interpersonal skills development as the negative side of distance education. The school not only plays a role as an educational institution but also as a place for socialization (Gordon & Browne, 2015; Nowicka, 2014). It is designed to ensure learning with other children; this is particularly important for migrant children, for whom the school is often the only place to socialize (Strzemecka,

2015). Additionally, during distance learning, children were deprived of basic physical activities and sports. Migrant parents were concerned and anxious about how to provide their children with social development and adequate exercise and amusement during the lockdown.

> First of all, social life is an important aspect for children. When they stay at home, they get used to being alone. This also affects the whole family, who feel lost and helpless. Parents do not know how to treat children, how to support and influence them. So I think it would be a great loss if distance learning will last long. (Serife, a mother of two schoolchildren from Turkey)

Esat, a father of two schoolboys from Turkey, shared his concerns about family troubles caused by the pandemic, pointing to school as not only a place for learning but also socializing, entertaining, day-to-day experiences:

> For me, school is not only about having lessons and answering questions. It also ensures social life. So children learn not only from books, textbooks but also by observing teachers, building relationships with peers ... they really learn life at school. When children learn from their homes, they miss it. And that's the biggest disadvantage for me. Not only children are disadvantaged but also the whole family. Children close themselves off and seek entertainment at home, which they find in online games. In this way, children get used to living online lives. They learn nature from the book, without experiencing it. Moreover, they have access to energy and begin to make trouble for parents. So families suffer from these reasons because children do not have a place to blow off the steam. (Esat, a father of two schoolboys from Turkey)

Esat's son, Melih, also shared his anxiety about not being able to spend time with his father as he did before the quarantine. The boy appreciated his father's efforts to amuse him and his brother when they had to stay at home. He mentioned:

> Before the quarantine, my father often took us to swimming pools or various amusement parks and playgrounds. And we were very happy. It was very cool. So we look forward to this time back. Overall, I'm happy, but we have to stay at home during quarantine, so I'm not too happy. But my father does everything he can to keep us entertained. (Melih, a 10-year-old boy from Turkey)

Quarantine also greatly affected families, in which fathers were temporally living out of Poland. Mothers were responsible for their usual housework and family duties, as well as for supporting children's learning, entertainment and social life. One of the mothers of three children noted, that quarantine cut the only possibility to provide her children's entertainment while going shopping or to the park together. She felt overburdened, waiting for a new school year to start with the traditional learning mode.

> I'm alone with my three kids, so this is difficult to go out. I have a car, thanks to God, so sometimes we go to the park or shopping center or a friend. And it was really good for us to relax. Now it's really difficult times for us to stay at home. And as my husband is not here, it's even more difficult. (Eva, mother of three children from Turkey)

In conclusion, migrant child-parent relationships were rather positively assessed by both children and parents. Both parties noted the enhancement of their ties at the beginning of

the quarantine. However, with time, parents became overwhelmed with children's challenges in learning, disrupted social lives, and excess energy, causing feelings of anxiety and helplessness. Parents could not ensure proper social contacts and activities for their children while simultaneously being overloaded with housework. Hence, the research indicated that parents tried to seek a balance between learning, social life, and entertainment to establish partnerships with their children (Epstein, 1986; Christenson & Sheridan, 2001), instead of just being guardians.

7 Discussions and Conclusions

This paper demonstrates that the COVID-19 pandemic affected migrant children's learning not only by forcing a change from traditional methods to online/distance learning but also by affecting Child-Teacher and Parent-Teacher relationships, as well as parents' and teachers' engagement and support.

The outcome of this study supports the previous research (Kościółek, 2020; Strzemecka, 2015; Wærdahl, 2016), which pointed out that migrant children's learning processes are complex, multisided, and largely dependent on multiple factors, the majority of which relate to the interaction between the school and the family (teachers and parents) and the functioning of the Child-Teacher, Parent-Teacher and Child-Parent dyads (Deslandes, 2001; Epstein, 1986; Suryani, 2013). This paper presents the shift in dyadic functioning and child-parent-teacher partnerships due to changes in the control and division of labor (Epstein, 1986).

Migrant parents whose children attended state schools reported that they experienced empowerment (Deslandes, 2001) from teachers, who had not taken their competencies and needs into account prior to the pandemic. Parents were enforced to arrange *school-like homes* (Epstein, 1986) and were empowered to take control (ibid.) of their children's learning processes and provide them with additional activities and entertainment as a school previously would have done (Sanders & Epstein, 2005). The school's level of control was reduced to delivering tasks and evaluating the processed school material.

Additionally, in cases of parental inability to provide efficient learning support, migrant children had to reinforce their own agency (Prout & James, 1997) and take over both parents' and teachers' responsibilities in seeking support to complete assignments and establishing independent learning during distance education.

At the same time, migrant parents and children from private schools claimed they received adequate support from the school and from teachers during the pandemic. Both teachers and parents reported a rational division of labor and shared responsibilities (Epstein, 1986), which encouraged engagement and strengthened the partnership.

Consequently, all three groups of dyads (Child-Parent, Child-Teacher, and Parent-Teacher) underwent change and development, which either strengthened the partnership (as with the Child-Parent, Child-Teacher, Parent-Teacher dyads in private schools) or aggravated the relations (as in the Child-Teacher and Parent-Teacher dyads in state schools). At the beginning of distance learning, children in state schools in Poland could not enjoy the amicable *social climate* (Christenson & Sheridan, 2001) and substantial school-family partnerships that ensure an auspicious learning process (Hornsby, 2011; Gordon & Browne, 2015; Sanders & Epstein, 2005; Suryani, 2013). This is likely to increase the learning gap and educational inequalities, not only between native and migrant children but also between different social groups of migrants (Gornik et al., 2020; Janta & Harte, 2016) in Poland.

Besides, as children stayed at home having few lessons per week and were overloaded with the assignments, parents took the responsibility for the learning process and endeavoured to keep children busy and amused. This caused the shift in the Child-Parent and Child-Teacher relationships. Overburdened parents underlined the value of education which takes place at school, where children are under the control of teachers and have a space for practising other activities and maintaining social contacts.

During distance learning, as noted by children and parent participants developed the family-like school model, where children were also treated as students. Parents acted as teachers, experiencing the weight of teaching and organizational duties. Besides, children themselves were given a space to become more active and responsible for their education process.

The study also reveals that teachers and schools, particularly the state ones, used to follow the traditional mode of educating children. Hence, when distance learning was introduced, most were neither personally, nor professionally prepared. This also points to the low preparation of public schools for the changing nature of the classes due to the growing number of migrant children in Polish schools. The paper indicates that the changes in the classroom ethnic composition and modifying the nature of educational needs require substantial reconsideration of the education system, curricular and school's approach. Which, in future, will make Polish schools more prone to upcoming changes.

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Implementation of Emergency Remote Education (ERE) in the Brazilian Context: An Analysis from Students' and Professors'/Instructors'/Teachers' Perspectives

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Abstract

This paper aims to analyse the implementation of Remote Emergency Education (ERE) within the context of the COVID-19 pandemic in Brazil – which has befitted the pandemic epicentre worldwide due to the number of confirmed cases and deaths. Faced with the challenges related to biosecurity measures and social distancing strategies, ERE has employed an adaptive didactic-pedagogical approach through distance learning tools and techniques and hybrid teaching mechanisms, together with the interaction in digital social media and the provision of school material (mainly in digital format). This work addresses the perspectives of the two essential actors in that process: students (of all educational levels), and both schoolteachers and professors/instructors in higher education, based on the literature on the context at hand. Thus, the paper presents experiences described and data collected and presented by studies carried out during the COVID-19 pandemic, associated with ERE, and published in this period, covering part of the educational dynamics in Brazil. By addressing aspects such as the ability to study and work in the home environment, problems related to psychosocial well-being and socioeconomic vulnerability, and support from educational institutions, we proposed reflections on the practices in distance learning for that context. To reduce the educational damage, efforts are required cohesive adaptations, integrating curriculum and digital technologies. Therefore, educational institutions must involve the learnings from this period and the use of ERE, for a better conception for the traditional face-to-face classes, given the need for a new school and academic life that arises in the world.

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remote emergency education (ERE), distance learning, Brazil, COVID-19

Introduction

In 2020, the world suffered from the impacts caused by the COVID-19 pandemic at various levels and contexts (social, sanitary, political, economic, and educational). The number of deaths and the strategies for mitigating and suppressing the contagion of the new coronavirus (SARS-CoV-2) were determinants for increasing these impacts. The measures of biosecurity and social distancing brought particular challenges (Lima et al., 2020). Idiosyncratically for Brazilian education, this scenario represented numerous changes in the new ways of conceiving teaching-learning relationships.

Concerning the transmission risk of the new coronavirus among professors/instructors/teachers and students, Brazilian educational institutions suspended face-to-face classes in March 2020, based on recommendations from the National Health Council (Conselho Nacional de Saúde, 2020). Complementary, aiming to continue teaching activities, the Brazilian government authorized remote classes (at a distance) through digital information and communication technologies (DICTs) (Ministério da Educação – MEC, 2020a). The replacement of face-to-face classes for remote (virtual) classes (or adoption of distance learning practices) occurred gradually at the national level. These further intend to reduce student dropout and develop a sense of continuity to the educational process (Fernandes et al., 2021; G. H. S. de Souza, Jardim, et al., 2020).

The challenge imposed by the complexity of the context (diversity of students and education levels) highlighted the need to structure new ways for returning the school activities through remote (virtual) classes/studies, under the expressions Emergency Remote Education (ERE) and Emergency Remote Teaching (ERT) (Toquero, 2020; Williamson et al., 2020).

It is noteworthy that distance learning (DL) and Emergency Remote Education (ERE) are conceptually distinct, although there are pedagogical practices and platforms commonly used in both. DL is an educational modality structured in medium and long-term pedagogical planning, using tutored support in virtual learning environments (VLE) and specific communication platforms. In DL, the development of the teaching-learning process presupposes autonomy on the part of the student in the use of available didactic material, as well as previous training for professors/instructors/teachers, tutors, and pedagogical support staff (Coelho & Tedesco, 2017; Nunes et al., 2019).

On the other hand, ERE represents a temporary and strategic solution that allows, in the context of the COVID-19 pandemic, to provide to the academic community the possibility of maintaining, within the possible circumstances, the activities of school education,

using Digital Information and Communication Technologies (DICTs) for the exchange of knowledge. ERE is established as an adaptation of didactic-pedagogical tools and teaching methods (some appropriated directly from DL), using instructions for oriented and autonomous studies. Additionally, there were implemented remote teaching-learning activities mediated by DICTs, as well as synchronous and asynchronous interactions for the resolution of doubts or the provision of curriculum content through digital social media and the prior availability of didactic and academic material (in print or digital format) (Arruda, 2020; Joye et al., 2020; Souza et al., 2021; Williamson et al., 2020).

Nevertheless, the need for implementation of the ERE required operationalization strategies, whose innovative character and urgency evidenced a chaotic scenario. Amid the imposed adversities, schools (all levels) and universities were compelled to reinvent and innovate its pedagogical activities, preserving the quality of teaching. In Brazil (a continental-size country), within a pre-pandemic political and economic crisis, the adaptation process to supply the schooled education remains, until now (October 2021), without a standard model for all education levels.

In this sense, this paper proposes presenting a general analysis of the implementation of Emergency Remote Education (ERE) within the context of the COVID-19 pandemic and Brazilian education, addressing the most common perceptions and challenges that impacted professors/instructors/teachers and students, whether in public or private educational institutions, in both basic and higher education.

In this paper, findings on mental health, access to and use of technology, and studying and working in the home environment have been approached within the same perspective, as the context highlights the multifactorial and systemic impact that the pandemic has brought to society.

Although for professors/instructors/teachers and students the challenges were similar – especially regarding to the anxiety caused by the social distancing and the pandemic in general, low productivity in the home environment, lack of custom with digital learning platforms, etc. –; the literature on which this paper is based allows us to understand that the challenges of public and private institutions in Brazil were different amid the pandemic, especially concerning the timeliness with which solutions were implemented to enable the continuity of school/academic activities. Therefore, this paper covers the perspectives of the two essential actors in that process: students and professors/instructors/teachers – evidencing the perception of these subjects within this new educational process and then discusses the general aspects that Brazilian education faced in the period.

For that purpose, this paper was conducted as a bibliographic and documental study design with a qualitative approach to collect and use secondary data (for better comprehension on the methodology used, see Leavy, 2017). We did a literature review and researched national (qualitative and quantitative) studies by Brazilian researchers, published in 2020

and 2021 in the SciELO and Google Academic databases, using the following descriptors: Emergency Remote Teaching; Emergency Remote Learning; Distance Learning and COVID-19, in an equivalent manner in the databases, with the Boolean operators "E/AND". The research strategy was limited by saturation. The articles were identified and selected after reading them in full. We excluded those articles that did not precisely describe gaps related to the theme. For the analysis, this paper presents a synopsis of these articles.

Based on this proposal and guided by empirical studies, this paper is divided in the following parts: this Introduction; (1) Structural Organization of the Brazilian Education, considering the scenario of ERE; (2) Students' perspectives on the ERE; (3) Professors'/Instructors'/Teachers' perspectives on the ERE; (4) School and Academic Daily Experiences, bringing real cases and experiences from the pandemic period; and a (5) Discussion, with analysis of the general conjuncture and prospects for the coming years of world education.

1 Structural Organization of the Brazilian Education

Brazilian education is structured among public and private institutions, being divided by education levels: early childhood education (up to 6 years of age), elementary education (6–14 years of age), and high school (15–18 years of age), and higher education (undergraduate and graduate). Due to this diversity, the National Council of Education (in Portuguese, *Conselho Nacional de Educação – CNE*) is responsible for the regulations. The mission of CNE (2022) is to guarantee institutional democracy and provide the participation of society in the development, improvement, and consolidation of education in the country.

Guided by the CNE, the Ministry of Education elaborates and implements educational policies in Brazil (in Portuguese, *Ministério da Educação – MEC*). The entire Brazilian educational system, from early childhood education to professional and technological education and higher education, is under the responsibility of the MEC. Locally, the process of implementing policies and regulations is the responsibility of states and municipalities.

Thus, on March 17, 2020, through ministerial ordinance No. 343, the Brazilian Ministry of Education (MEC) approved the replacement of face-to-face classes for remote classes with digital media for higher education courses during the COVID-19 pandemic. This order established that it would be up to the hierarchically inferior spheres (states and municipalities) to organize this replacement or adopt distance learning practices (MEC, 2020a; 2020b; 2020c).

Complementary, it is necessary to analyse the number of students in each education level and its coverage in the Brazilian territory to understand the teaching-learning process

during the pandemic. According to the *Instituto Nacional de Estudos e Pesquisas Educacionais Anísio Teixeira* (INEP) (an institution focused on studies and researches on education), linked to the Brazilian Ministry of Education, from the 2020's School Census, there were 179,533 primary education schools in Brazil, with 47.3 million enrolled students. Evaluating the distribution by administrative area, there is the dominance of the municipal schools, which hold 48.4% of enrolments in elementary education. The state schools were responsible for 32.1% of the enrolled students in 2020, while the private schools had 18.6% of the enrolled students, and the federal schools had less than 1% of the enrolled students (INEP, 2020a).

In 2019, there were 8.9 million enrolments in day-care centres and preschools. The municipal schools concentrate most enrolment sprees: 71.4%. Subsequently, it comes to the private schools with 27.9% of the enrolled students (INEP, 2020a).

In elementary education, there were 26.7 million regularly enrolled students in 2020. In turn, in high school, professional education, and adult education, 7.6 million enrolled students were registered in 2020, with 2.2 million teachers. The elementary school concentrates the majority of teachers, equivalent to 63% (INEP, 2020a).

In Higher Education, there are 8.6 million enrolled students. The vast majority, about 6.5 million, is in private universities. Exclusively in the pre-pandemic period, there were 2,608 institutions in Brazil offering higher education courses, of which only 302 are public. By 2020, 3.6 million more people started studies in higher education, of which about 3 million entered private institutions. In turn, there are 122,295 enrolled students in postgraduate courses: 76,323 are academic master students, 4,008 are professional master students, and 41,964 are doctorate students (INEP, 2020b).

In front of that scenario, this paper tries to clarify the consequences of the pandemic period for the teaching and learning process to generate reflections and data that can contribute to world education in the current period. Therefore, it is necessary to understand the action of schools and universities in the pandemic period, covering factors as: decisions at the governmental level (e. g., ordinances that defined requirements, restrictions, and possibilities of academic action); and flexibility and dynamism capacity (e. g., technical and human capacity to use new technologies or alternative teaching and learning methodologies). The following sections detailed several efforts to implement the ERE in the Brazilian context, considering students' (section 2) and professors'/instructors'/teachers' (section 3) perspectives.

2 Students' Perspectives on Emergency Remote Education (ERE)

By understanding the complexity of education and its several levels, we realize students were probably the most impacted in the adoption of ERE. In the Brazilian context, what needed to be answered initially was whether students maintained (i) the infrastructural conditions in the home environment for this type of remote schooling practice and (ii) the psychosocial conditions (personal and familiar) to feel comfortable and motivated to study (G. H. S. de Souza, Jardim, et al., 2020).

In line with the questions raised here, researches conducted with Brazilian students indicated that the critical factors favouring the continuity and effectiveness of the ERE were: internet access, capable use of ICTs, better socioeconomic conditions, individual motivation, and a suitable home environment for studies (Fossa et al., 2020; G. H. S. de Souza, Jardim, et al., 2020; G. H. S. de Souza, Lima, et al., 2020; Universidade Federal de Minas Gerais, 2021). Additional insights from G. H. S. de Souza, Lima, et al. (2020), in a quantitative study (using multiple linear regression) with students of high school and higher education from a federal educational institute, showed that students in higher education demonstrated an indeed broader availability and interest in distance studies, i. e., ability to maintain academic activities. In that case, the factor "social class" (socioeconomic conditions) demonstrated a moderating effect on the access, skills, and technical capacity in the face of DICTs (see Figure 1).

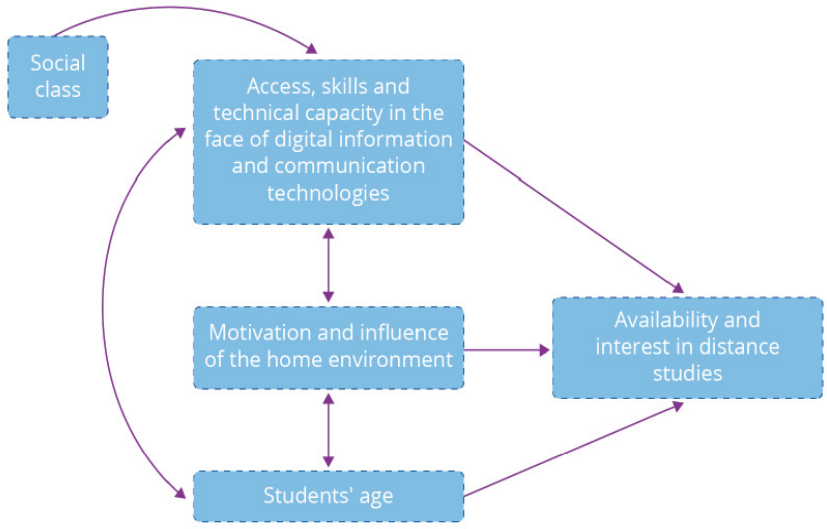

Figure 1: Predictive models diagram. Source: G. H. S. de Souza, Lima, et al. (2020, p. 19)

After the understanding that the infrastructural and psychosocial context was relevant, other aspects began to stand out in the process. The study conducted by the Federal University of Minas Gerais (Universidade Federal de Minas Gerais, 2021), with over 12,000 students, showed that most students identified or experienced some challenges regarding their relationship with the professors during the ERE. In the mentioned study, only 39.91% of the students were satisfied with the ERE, 38.70% were indifferent to the ERE, and 21.38% were dissatisfied with the ERE.

G. H. S. de Souza, Lima, et al. (2020) bring results that corroborate this perception and point to the use of social media and digital materials as ways to pedagogically approximate students and professors/teachers, due to the limited ability with virtual learning environments – which are more common in distance education.

In addition, the use of synchronous methodologies alternated with asynchronous activities seems to have demonstrated good acceptance among Brazilian higher education students (Fossa et al., 2020). In most cases, self-directed reading does not seem to remain an alternative that appeals to students in general. This problem limits or undermines the academic planning of the ERE that foresees independent studies as part of the teaching and learning process.

Nevertheless, the critical point (especially noticed by going back to Figure 1) remains the economic, social, and psychological (personal/family) conditioning, which can be characterized as a barrier or a facilitator to remote studies, considering the underlying context of the student (G. H. S. de Souza, Lima, et al., 2020; G. H. S. de Souza, Jardim, et al., 2020). I. e., in addition to efforts to establish a feasible and appropriate remote classroom format for improved student learning, the students' economic and psychosocial reality is a more effective predictor of the success of schools with the ERE adoption.

3 Professors'/Instructors'/Teachers' Perspective on Emergency Remote Education (ERE)

From another analytical point of view, it is worth mentioning that the implementation of ERE represents a political and economic decision in Brazil. I. e., although professors/instructors/teachers remain the agents for conducting and practising the ERE, the decision to implement it did not arise from a didactic-pedagogical demand but comes from social and governmental pressure (Costa, 2020). Over time, a consensus among professors/instructors/teachers about the need for remote teaching was established, thinking about the continuity and maintenance of the connection between school and student (Rondini et al., 2020; Souza et al., 2021).

About this aspect, a quantitative analysis with 588 teachers and professors from public and private Brazilian school and universities (Souza et al., 2021) showed the vast majority

presented infrastructural conditions and interest in performing academic activities remotely even though they also manifested hesitation and insecurity about the effectiveness of this type of didactic-pedagogical activity.

This insecurity about educational effectiveness comes from the perception, not recent, of the need to modify pedagogical practices to efficiently engage students, who have become increasingly restless, dispersed, and unmotivated with the traditional teaching model (see Reynolds et al., 2014). As follows, the use of DICTs was already present in many classrooms and many courses. When investigating the use of educational technologies about ten years ago, Bacila (2021) states that the use of educational technologies is a reality. Redoing his research in the pandemic period, with the same professors, the author concluded that now, the total adherence to the DICTs and the ERE happened abruptly and compulsorily, without an established term and with students' resistance. Even so, there was an effort to overcome the difficulties. Professors who test the new resources and their effects on the learning process tend to present a more satisfactory didactic-pedagogical performance with the ICTs.

This abrupt adaptation to remote work is also cited as a challenge by Alves et al. (2021). The authors also reinforce that the effort to update is characteristic of education professionals, most of whom are considered "digital immigrants" that obtained their education in the last decades of the 20th century – before the most considerable advances in DICTs.

In this way, professors from face-to-face classes started to develop the skills of professors who already worked in distance learning, using video classes and virtual learning environments in an emergency way, "but without time to prepare themselves and learn more about how they could explore certain technologies to employ the best pedagogical use of them and in a critical way" (Alves et al., 2021, p. 68).

Before the pandemic, teaching practice, especially in higher education (see Farias et al., 2018), already had numerous challenges related to students' lack of discipline and motivation, excessive administrative and bureaucratic work, and insufficient available time for qualifications, orientations, and planning. These problems intensified in the pandemic.

Indeed, considering the time savings in commuting to work, professors/instructors/teachers had less time available due to the increased need to adjust content and classes to materials suitable for the virtual environment. In addition, several problems were intensified, for example, the necessity for more detailed descriptions of academic planning, the increase of evaluation activities, the less time available for individualized issues, and the difficulty of separating personal and professional routines (Sallaberry et al., 2020). Table 1 details the endogenous (internal and personal elements) and exogenous (external elements with causes not controlled) challenges experienced by professors/instructors/teachers arising from the adoption of the ERE.

Table 1: ERE's Challenges from the professors'/instructors'/teachers' point of view. Source: Adapted from Alves et al. (2021, p. 72)

Endogenous Factors		**Exogenous Factors**	
Professors'/Instructors'/Teachers' Personal Issues	**Methodology and Teaching Process**	**Technological Resources**	**Students' Behaviour**
– Organizing work time and reconciling personal life in the same environment. – Maintaining motivation to do the work. – Stimulating and engaging students. – Overcoming one's shyness. – Adopting a work routine in the home environment. – Adapting to an exhausting routine. – Coping with the agony of teaching to students with cameras off. – Having patience with parents and students that have doubts any time, regardless of the hour or day of the week.	– Promoting the student's learning. – Modelling the video lessons appropriately for an audience that does not participate in the recording process. – Reformulating the face-to-face curricular structure for the online (remote) model. – Inserting the new methodologies to maintain the teaching-learning process. – Teaching classes remotely and appropriately allows arousing the student's attention. – Creating broader proximity with students (silent). – Participating in online meetings. – Planning content for remote teaching. – Correcting online school assignments. – Adopting an appropriate language.	– Access to good quality internet and technological resources (equipment). – Training courses to clarify doubts about the virtual learning environment. – Support from the educational institution regarding technological infrastructure (e. g., internet and notebook). – Use of technology and new technical resources. – Time to learn how to use technological tools. – Recording and editing videos.	– Physical distance from and between students. – Feedback/performance of the proposed activities. – Lack of interest in online activities. – Lack of student commitment. – Contact with students through social media (e. g., WhatsApp, Instagram, etc.). – Student participation in live classes. – Lack of student concentration in online classes.

For the professors/instructors/teachers, other challenges related to lack of access or restricted access to the Internet, difficulty in using ICTs, and problems associated with the personal, familiar, and home contexts, which may variably occur among professors/instructors/teachers and pedagogical staff (also analysing the school context) (Souza et al., 2021). Therefore, the teaching and learning process during the pandemic requires proper management for all labour factors, more specifically regarding the workload (Barreto & Rocha, 2020; Saraiva et al., 2020).

In addition to students' and professors'/instructors'/teachers' perspectives, the following section provides a summary of how the ERE was implemented during the period under study and includes a summary of comparisons across educational levels and institution types.

4 School and Academic Daily Experiences

ERE was planned to operate in synchronous and asynchronous pedagogical moments to attend the theoretical and practical classes with the help of DICTs. Videoconferences that enable real-time digital interaction between professors/instructors/teachers and students represent synchronous moments. Sequentially, Virtual Learning Environments (VLE) organize the asynchronous moments, utilizing teaching materials, discussion forums, notices, schedules, besides providing spaces for sharing video lessons (Brito et al., 2021; Fernandes et al., 2021).

This sudden change compromised the planning of teaching activities and students' learning. Online education indicated the need for a systematic model to become effective. This untimely scenario implied many problems, such as the lack of access to the internet and technological equipment, beyond the usage capacity of DICTs. These problems also caused an increase in the workload (see Costa et al., 2021; Hodges et al., 2020; Nonato et al., 2021; Reis, 2021). Thus, the educational quality seems to tend to decrease, and the social inequalities seem to tend to increase (see Costa, 2020).

Given the contemporaneity of remote teaching in the context of the COVID-19 pandemic, professors/instructors/teachers experienced several happenings for learning adapted to the current reality, which completely changed the school and academic environment. Table 2 presents a comparative synthesis of the critical school and academic experiences, considering specific scenarios and education levels.

Table 2: Comparative synopsis of the critical school and academic experiences identified in the pandemic context of Brazilian education according to education levels, use of digital information and communication technologies, and types of institution. Brazil, 2021. Source: Research data. Notes: [1] Reis (2021); [2] Nonato et al. (2021); [3] Carvalho & Moura (2021); [4] Costa et al. (2021); [5] Fernandes et al. (2021); [6] Barros & Vieira (2021).

Experiences	**Educational Level**	**Used DICTs**	**Type of Institution**
The use of technological tools as the only means of communication with students caused insecurity, anxiety, and stress associated with the inexperience with the new teaching strategies[1,5,6]; Professors'/Instructors'/Teachers' difficulties in adhering to digital technologies due to lack of training, skills, and infrastructure[1,2,3,4,5,6]; Lack of internet connection and technical support for the use of DICTs[1,2,3,4,5,6]; Lack of institutional online platforms for the development of online teaching activities[2,5,6]; Lack of institutional definition/regulation for the development of ERE activities and guidelines for its implementation[2,6]; Professors'/Instructors'/Teachers' learning on the use of DICTs in their practice has expanded a new place for digital culture in school life, changing the way of understanding the potential of DICTs for optimizing educational processes[6]; Improper conditions for students to follow a study routine, often caused by greater social vulnerability and a learning deficit[3,5,6]; Lack of feedback from the students on the activities, which are difficult to achieve the expected objectives of the discipline, compromising the teaching effectiveness[3,4,5].	Basic education[1,2,3,4] Higher education[2,5]	Whatsapp[1,3,6] Google Meet[1,3,6] Google Classroom[1,3,6] YouTube Channel[3,6] Instagram[3,6] Non specified[2,4,5]	Public[1,2,3,4,5,6] Private[1,2,5,6]

To establish the minimum implementation conditions of the ERE, some public educational institutions employed their budget resources to implement extraordinary support measures for the students (e. g., Instituto Federal do Norte de Minas Gerais, 2020). In some cases, students received devices like tablets, smartphones, and computers to access remote activities. In other cases, students received monthly scholarships for them to hire an internet service. Nonetheless, even after several months from the pandemic's onset, many students remain without conditions to participate in the teaching-learning process (Castioni et al., 2021).

Besides the lack of access to the internet and adequate digital equipment, the so-called digital literacy was (and has been) another significant difficulty for Brazilian students and professors/instructors/teachers. Although different educational policies (e. g., the National Education Plan 2014–2024) promote connectivity expansion and digital technologies in the educational process, there are still several inequalities (Moreira et al., 2019).

Data from the survey *TIC Educação – 2020* (ICT Education) revealed that only 14% of public schools reported using some platform or virtual learning environment in 2019. The number reaches 64% in private schools, pointing to a significant difference between the teaching in public and private schools. In relation to professors/instructors/teachers, only 33% obtained some kind of training for computer and internet use in school activities (Centro Regional de Estudos para o Desenvolvimento da Sociedade da Informação, 2020; Macedo, 2021).

Specifically, on challenges experienced by Brazilian professors/instructors/teachers, studies (e. g., Barros & Vieira, 2021; Costa et al., 2021; Fernandes et al., 2021) highlight the adapting difficulty to the new teaching format, the low feedback from students, the increasing demand for personal assistance by students, the lack of training about the context, and the impediment of direct contact with students.

From this perspective, it has been uneasy for professors/teachers to reconcile both attention and care with family and work in the same environment. The professors'/teachers' residences became makeshift workshops for recording and editing video classes, with all kinds of household noises and interruptions that would be possible. Time management for home and family activities has additionally represented a current dilemma for these professionals. Predominantly, all aspects of professors'/instructors'/teachers' lives have been affected.

Beyond the changes in the work itself, the professors/instructors/teachers-maintained children out of school, suspended domestic assistants, stopped research and extension projects and qualification courses, and, indubitably, withdrew from the social environment. With the elevated rates of COVID-19 contagion and illness in Brazil, it was also inevitable that professors/instructors/teachers had to manage many situations, such as

students being affected by sickness and death in the family or close people, interfering in their academic performance or influencing the abandonment of studies.

Therefore, beyond being forced to undergo several adaptations and learning new abilities in their work, professors/teachers had to adapt and support the current problems of their personal lives. Notably, this scenario points out a worsening in the quality of life, health, and welfare. During the pandemic, Brazilian education became a challenge, and it needed family members, professors/instructors/teachers, and school managers to achieve creative and provisional solutions for education continuity.

5 Discussion

In this paper, we present a general analysis of the implementation of Emergency Remote Education (ERE) within the context of the COVID-19 pandemic and Brazilian education – from a qualitative analytical approach. The paper highlights two main perspectives on the ERE implementation process: the student and the professors/instructors/teachers. Thus, the study advances the perspectives regarding remote education, and additionally, it brings an analysis on institutional (government, universities, schools) actions for the implementation of the ERE and its implications for students and professors/instructors/teachers. Although we present a diversity of aspects that make up Brazilian education, especially the different approaches for public and private schools, the challenges for the implementation of the ERE were relatively similar in all cases. Because of this, we treat all these aspects within the same bias of analysis.

The paper reveals the pandemic highlighted several social problems that plague Brazil, whose impact on the educational field deeply affects the most vulnerable people. As evidenced in the previous sections, for professors/instructors/teachers and students, the lack of internet access and the absence of adequate infrastructure are experiences frequently pointed out at all educational levels in public or private schools (see Barros & Vieira, 2021; Costa et al., 2021; Fernandes et al., 2021; Hodges et al., 2020; Nonato et al., 2021; Reis, 2021).

Furthermore, the paper shows that a more accurate description of the pandemic's impact on education needs to be multifactorial, being understood through different perspectives, in which elements related to technology, socioeconomic conditions, psychosocial aspects, among others are treated within the same context.

Some discussion points focused on untimeliness related to the duration of the pandemic, due to the possibility of occurrence of more critical or milder periods of COVID-19 cases. For example, specifically for students, adapting to the new teaching format still represents an unsettling and transformative dilemma. At the pandemic's beginning, many students believed the effort of adaptation to the ERE was unnecessary given the belief that it would

be a short period. As a result, many students initially chose to suspend their studies, especially adults enrolled in higher education. Over time, as the pandemic worsened, the dropout rates were on the rise. The dropout rates in higher education were aggravated by rising unemployment and declining income for Brazilian families (see C. M. P. de Souza et al., 2020; Nunes, 2021).

Uncertainties related to the duration of the pandemic also affected the schedule of the National High School Exam or ENEM (in Portuguese, *Exame Nacional do Ensino Médio*), the second-largest entrance exam to higher education in the world (5,783,357 individuals registered in 2020). The ENEM takes place annually in November and remains a requirement for entry into most public higher education institutions in Brazil. The postponement of the exam date came after educational institutions requested to conform to health protocols and student representations that claimed, among other things, that they had not completed their studies for the 2020 school year. With this postponement, the 2020 exam took place in late January 2021, delaying the start of the 2021 school calendar in most public higher education institutions in Brazil.

The school calendar was equally affected. For many schools, the start of the ERE did not occur instantly after the interruption of classroom activities. For others, notwithstanding when they returned, the remote format was utilized as a test for some time, working with a pettier workload than planned. For these reasons, 2021 is marked by synchronization problems between the school calendar and the calendar year. In addition to adapting to the new educational format, students are still inserted in an accelerated context to fulfil the course workloads in a shorter period.

The abrupt change from the face-to-face classes to the ERE has generated elevated levels of stress and burnout. In addition to a crisis scenario, considered a stressful factor, many professors/instructors/teachers have been getting physically and mentally ill because of the self-requirement and the pressure to achieve the goals, the inadequate structure of educational institutions, and student dropout (Gomes et al., 2020; Santos et al., 2021). All these changes at work are traumatic situations that cause an overload, providing prolonged mental suffering, especially when added to domestic chores. Studies indicate a scenario of mental illness of professors/instructors/teachers and education workers with depressive disorder, bipolar affective disorder, generalized anxiety, adaptation disorder, and burnout syndrome (Miguel et al., 2021; Santos, 2020; Wang & Wang, 2020). However, we need to note that issues related to the mental health of professors/instructors/teachers are the focus of researches, even before the pandemic.

Teaching during the pandemic period brought several experiences, not all of them necessarily negative. We should consider that some of the studies conducted in 2020 and 2021 on ERE may record negative experiences, probably due to the timing of publications. In many cases, the researches were produced by education professionals emotionally involved in the abrupt changes imposed by the moment. The process of adaptation and maturation

are latent pains and, therefore, researchers publish more about the difficulties than about the advances. The hope is everyone is living a moment of exponential growth, and, in a few years, the publications will indicate the benefits of the experimentation of the DTICs, even if in an emergency way.

From this point of view, we highlight some evident advances, like the insertion of digital culture in school life. New ways of understanding the potential of DICTs for the optimization of educational processes arise. Beyond this, the actions to promote the use of DICTs were relevant attempts to include low-income students in the ERE. Although the measures have been insufficient to overcome the social and learning inequality, there was significant progress in access to the internet and technologies.

The ERE did not merely change from physical to virtual space, and it required tools to assist the teaching and learning process and to promote technological appropriation for professors/instructors/teachers and students. ERE involved proactivity, reflection, and current concepts, developing the students' autonomy.

We expected transformations would be absorbed in the post-pandemic practices. Conceivably we can count on all the abrupt experimentation with DICTs as an ally to its adherence by a more considerable number of students and professors/instructors/teachers when the full face-to-face classes return is possible. This scenario could generate gains for the education system (qualitative and quantitative), already extensively discussed before the pandemic. Pedagogical programs may foresee specific hours for technology-mediated activities, with the students gaining in the use and application of technologies, improving the use of the physical space. Besides this, the familiarity with virtual environments can provide institutional partnerships at a national and international level, increasing the quality of the possibilities of experience for the academic community.

The data presented here show that the teaching ways in the Brazilian context are wholly different from before the pandemic. Due to remote teaching and the utilization of the technologies, public schools, professors/instructors/teachers, governments, and managers accelerated the computerizing teaching process. Although it was an emergency path, this process merged with the expectation of the academic community and allowed, in many cases, experimentation and identification of numerous benefits to teaching and learning. This discussion does not end here. A fundamental question still needs to be answered: Will the school methods and practices of the pandemic period be incorporated into the everyday practice of educational institutions in the post-pandemic?

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The Effect of Open Learning Environments in Designing and Implementing Successful Distance Learning Programmes During School Closures

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Abstract

Large-scale evaluation studies across the globe indicate that the switch to distance learning as a result of the COVID-19 outbreak in spring 2020 had negative effects on students' study progress. Although the (negative) impact of school closures on students' learning have been intensely researched in recent months, little is known about (pre-COVID-19) instructional designs that are particularly conducive to the implementation of distance learning, i. e., designs that place students' self-regulated learning at the center. Drawing on results from existing studies, we argue that teachers' competencies, instructional quality (including feedback), and conducive features of students' learning (e. g., self-regulation skills, intrinsic motivation) represent central antecedents for students' academic achievement during periods of school closures. Thus, in the present study, we investigate the direct and indirect effects of perceived teacher competencies on students' self-rated academic achievement in distance education. Furthermore, to test the assumption that (pre-COVID-19) open learning environments are conducive to the implementation of distance learning, we analyse the moderating effect of COOL (COoperative Open Learning), an open learning format that is widely used in Austria's upper secondary schools. Results imply that students' self-regulation skills and intrinsic motivation are vital for effective learning during lockdown for all students, irrespective of the learning environment they experienced prior to school closures. Moreover, in both COOL classes and traditional classes, perceived teacher competencies are highly associated with students' self-regulation skills and intrinsic motivation. This highlights the importance of teacher competencies, irrespective of the instructional design used. Regarding the effect of the pre-COVID-19 instructional design, COOL students report significantly higher teacher competencies, feedback, and self-rated achievement. At the same time, our analyses did not reveal any significant differences between COOL students and regular students regarding the relation between our study variables. Hence, our findings broaden existing knowledge on student learning outcomes in distance learning programs and deepen un-

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derstanding of process indicators of teaching effectiveness that are of major importance in distance learning. Based on these findings, theoretical and practical implications can be derived to support distance learning and deep information processing by students.

Keywords

open learning environments, distance learning, teacher competencies, feedback, self-regulation, intrinsic motivation, learning outcomes

1 Introduction

The COVID-19 outbreak in March 2020 induced manifold changes in educational practice globally. School closures led to an ad-hoc shift to distance education and therefore to severe changes in schooling methods and experiences. Students had to deal with several challenges on their own, e. g., managing digital learning and organizing their learning as well as their daily activities (Eppler, 1990; Huber & Helm, 2020a; Steinmayr et al., 2021). Austria was one of the countries that implemented distance education soon after the first infections appeared, but the new situation found the education system to be completely unprepared. The first lockdown was imposed from March 16, 2020, to May 18, 2020. A second nationwide school closure took place from November 3 to December 4, 2020 (primary schools and lower secondary schools); and from November 14 to December 4, 2020 (upper secondary schools). Immediately after the Christmas vacation (January 7, 2021), the third period of school closures started, which lasted until the semester break (February 1 or 8, 2021, depending on the region) (see Altrichter & Helm, in press, for details). Thus, Austrian students – particularly in upper secondary education – missed significantly more days of schooling than their peers in Switzerland or Germany (OECD, 2021).

From the start of the lockdowns, school stakeholders (students, parents, teachers, school administrators and education policymakers) and society were highly interested in the consequences of the pandemic for the school system and, in particular, for students' learning. To satisfy this need, several surveys (see an overview in Helm et al., 2021a) and large-scale evaluations (see an overview in Helm et al., 2021b) were conducted. As a result, we already know a great deal about how the school situation was experienced by school stakeholders during the pandemic and about learning losses and educational inequities due to COVID-19-related school closures. In contrast, little scientific knowledge is available on the question of how (pre-COVID-19) instructional designs affected students' learning during school closures. In this paper, therefore, we attempt to address this research gap by investigating if open learning formats are conducive to enhanced learning outcomes in distance learning. While there is consensus in the relevant literature that open learning formats are neither significantly superior nor inferior to traditional instruction, it is not yet known whether open instruction can unleash its potential in COVID-19-related

distance learning. "Open teaching" has established itself as a collective term for various teaching-learning arrangements that are geared toward student-centeredness and action orientation (Gruschka, 2008). This includes, for example, daily schedule and weekly schedule lessons, station learning, free work, projects, but also certain forms of group work. However, open instruction should not be misunderstood as a specific method or methodological variation. Rather, it represents a pedagogical attitude that is intended to facilitate self-directed learning in a targeted manner (Helm, 2014; Helm 2016a; Hascher, 2010). Open instruction stands for individualizing, discovering-problem-solving as well as self-directed learning and thus for the total of instructional settings that are based on the self-activity of students (Hascher, 2010; Jürgens, 2018). COOL (COoperative Open Learning; see chapter 3) is an example of open teaching.

This study is significant in several ways. Not only is it the first to investigate the effects of different pre-COVID-19 instructional designs on learning during times of school closures, it also contributes to the limited number of studies examining predictors of students' learning success in such circumstances (Blume et al., 2020; Champeaux et al., 2020; Dietrich et al., 2020; Grätz & Lipps, 2021; Grewenig et al., 2020; Holzer et al., 2021a; Huber & Helm, 2020a, 2020b; Nusser et al., 2021; Pelikan et al., 2021; Steinmayr et al., 2021; Zaccoletti et al., 2020; Züchner & Jäkel, 2021). This study therefore aims to deepen our understanding of the mechanisms underlying distance learning during COVID-19-related school closures. In pursuing this aim, we analyse individual (i. e., self-regulation, intrinsic motivation) and contextual (i. e., teacher competencies, feedback) predictors of students' achievement in times of school closures using students' self-reports. This study also extends the research on school development processes, especially regarding characteristics of crisis-resilient schools. If it turns out that open instruction is conducive to enhanced distance learning, this would be a clear indicator for development towards more crisis-resilient schools. Regarding the practical relevance of the study, we have already indicated that knowledge about teaching formats conducive to distance learning (e. g., possible preventive and/or compensatory effects concerning the negative consequences of school closures) is particularly relevant to the field of educational policy. Educational policymakers would then have a tool in hand to better prepare for future school closures. Finally, the domain specificity of our study should be highlighted. Since most of our sample consists of students from various types of vocational schools, we shed light on a domain that, to our knowledge, has not yet been the subject of large-scale student surveys.

To address the questions of whether different pre-COVID-19 instructional designs affected students' learning during school closures, we draw on theories that focus on students' self-regulation skills and motivation (e. g., Deci & Ryan, 1993) and empirical findings that highlight the impact of instructional designs on students' self-regulation skills and motivation (Praetorius et al., 2018). Against that background, we assume that students who are accustomed to open, self-determined learning are in favor of distance learning.

In other words, we investigate whether students' experiences concerning open learning formats are beneficial in distance learning situations.

2 Educational Effectiveness in Distance Learning

Existing models of educational effectiveness such as the context, input, process, and output model (CIPO, e. g., Scheerens, 1990) emphasize various features of teachers, students and the context as being particularly important for students' learning in traditional education. However, these models cannot simply be transferred 'as is' to distance learning situations. Rather, it is necessary to focus on those aspects that are relevant for student learning in the new situation of enforced school closures (Huber & Helm, 2020a; Steinmayr et al., 2021). To guide the investigation of relevant dimensions of distance learning, we apply the logic underlying the CIPO model (Scheerens, 2017). Following the assumption of Scheerens (1990), process indicators (teachers' instructional quality, students' use of learning opportunities) transfer the input (teachers' competencies) to the output (students' academic achievement). This process is embedded in a context that may be conducive or detrimental, for example, students' socio-economic backgrounds. In the following sections, we use the logic of the CIPO model to describe the choice and justification of those aspects that we consider to be particularly relevant for distance learning, and that we subsequently analyse in our empirical study. Note, we do not provide a sub-section on "Output Indicators" in COVID-19-related distance learning as we focus on "self-rated achievement" only here; and as we argue the link between the process's indicators and the output indicators in sub-section 2.4.

2.1 Context Indicators

Social and ethnic disparities in students' academic achievement are often explained against the background of Bourdieu's (1983) concept of capital theory (see also Becker, 2017; Blossfeld, 2019). According to capital theory, parents from higher social classes have more resources at their disposal to create environments that are more conducive to their children's learning. The literature distinguishes between the following types of capital: *economic* capital (e. g., financial resources that allow tutoring, own room, own PC); *cultural* capital (e. g., competencies, cultural goods and practices such as books and reading); and *social* capital (e. g., friends, relatives). A growing number of recent surveys on various aspects of distance learning that may account for a widening achievement gap between students from different family backgrounds confirms the assumption that parents from higher social classes fared better in compensating for the loss of school structures due to school closures (see Helm et al., 2021a). There is ample evidence that the learning environment during school closures was less conducive for socio-economically disadvantaged students than it was for privileged students; and that the former group received less or insufficient parental support (Bonal & González, 2020; Ribeiro et al., 2021; Sari et al.,

2021) – or parental support that was of lower quality (Sander et al., 2021; Weber et al., 2021). Moreover, socio-economically disadvantaged students had limited access to learning resources at home (e. g., own study space, available computer or tablet). Finally, studies have shown that there was a socio-economic-status (SES) gap in learning time (Andrew et al., 2020; Grätz & Lipps, 2021; Grewenig et al., 2020; Pensiero et al., 2020; Reimer et al., 2021). The latest review of evaluation studies on learning losses due to the first lockdown in 2021 (Helm et al., 2021a) identifies 14 studies, mainly in the UK and US, that report increased social disparities due to COVID-19-related school closures in 2020.

Given the outlined theoretical and empirical support for the importance of students' socio-economic backgrounds, we incorporate these context indicators in our empirical model (see Fig. 1).

2.2 Input Indicators

In empirical educational research, teacher competencies have emerged as significant prerequisites for conducive learning environments and for high quality instruction (Hattie, 2010). While distance learning during the Covid-pandemic brought the home learning environment to the forefront, it did not diminish the importance of teacher expertise. If anything, it can be argued that teachers now require skills in additional areas, such as the implementation and sensible use of digital tools, while maintaining high quality teaching under adverse conditions (Dreer et al., 2020; Eickelmann & Drossel, 2020; forsa, 2020b, 2020a; Huber et al., 2020; Lorenz et al., 2020; Schwab et al., 2020; Schwerzmann & Frenzel, 2020; Spiel & Holzer, 2020; Tengler et al., 2020). Thus, teachers' motivation and competencies that are especially relevant in distance education include their *skills in using digital tools* and being able to provide a *conducive learning environment* from a distance.

Given the outlined theoretical and empirical support for the importance of teachers' competencies and motivation in distance education, we incorporate these variables in our empirical model as input indicators (see Fig. 1).

2.3 Process Indicators

In line with the 'offer and use' logic of Helmke (2009), we divide process indicators into teacher- and student-related ones.

Teachers' instructional quality in distance learning. Klieme (2020) and Voss and Wittwer (2020) made recent attempts to re-think the relevance of traditional dimensions of instructional quality (i. e., classroom management, cognitive activation, individual learning support) (Praetorius et al., 2018) for distance learning. These attempts resulted in a shift away from traditional classroom management toward a greater focus on cognitive activation and individual learning support as key features of instructional quality during distance learning. Cognitive activation is related to measures that support students in

acquiring a deep understanding of new concepts, such as providing helpful feedback on completed learning tasks (e. g., Praetorius et al., 2018). Individual learning support refers to the extent to which teachers accept an emotional and supportive relationship with their students, and provide adaptively and individualized advice and feedback (e. g., Praetorius et al., 2018). Due to the discontinuation of the class structure (towards individual learning at home) and the loss of face-to-face teacher-student contact, classroom management in the narrower sense suddenly became less relevant, or even irrelevant. Instead, cognitive activation and individual learning support came into sharper focus. By adopting measures such as cognitive activation and instructional motivation (i. e., frequent and supportive feedback on student assignments) teachers had to address goals that had previously been pursued through regular classroom management, namely, keeping the students actively learning, and ensuring a high proportion of learning time. From an empirical point of view, some studies confirm that feedback was particularly relevant for students' learning during school lockdowns (Steinmayr et al., 2021; Züchner & Jäkel, 2021). Moreover, further studies (Pelikan et al., 2021; Zaccoletti et al., 2020) argue that student engagement can be significantly enhanced by adequate teacher feedback. Hence, in the present paper, we focus on *teachers' feedback* as a measure of cognitive activation and individual learning support during distance education.

Students' use of learning opportunities in distance education. From the student's point of view, learning during school closures was associated with greater autonomy and increased responsibility. In particular, distance learning increased demands upon students' *self-organisation* and *self-regulation* skills (Blume et al., 2020). In line with this assumption, many studies have confirmed the strong relationship between self-organization/-regulation and desirable student outcomes, such as motivation, engagement, and self-rated achievement in distance learning situations (Blume et al., 2020; Grewenig et al., 2020; Holzer et al., 2021a; Holzer et al., 2021b; Huber & Helm, 2020; Korlat Ikanovic et al., 2021; Pelikan et al., 2021; Steinmayr et al., 2021). From a theoretical point of view, self-regulated learning skills can be defined as a student's ability to plan, monitor and evaluate their individual learning processes, and adjust them if necessary (Dignath & Veenman, 2021). Existing theories propose that learners with high self-regulation skills engage "actively and constructively in a process of meaning generation and that they adapt their thoughts, feelings, and actions as needed to affect their learning and motivation" (Boekaerts & Corno, 2005, p. 201). Empirical findings on the significance of students' self-regulation skills – particularly resource or time management – underpin their central role; especially in forms of digital learning (Broadbent & Poon, 2015). This is also true for distance learning during school closures. Findings by Blume et al. (2021) reveal that students with higher self-regulation skills are more likely to learn independently, and ask less frequently for assistance (from parents, peers, or teachers). Furthermore, they are more likely to communicate their needs precisely and thus to seek help in more effective ways (Blume et al., 2020).

Student motivation is another central aspect of distance learning as it is necessary to begin learning activities and to keep them going, even in demanding situations (Boekaerts & Corno, 2005; Pintrich, 1999). In particular, intrinsic motivation (that can be defined as internal striving for subjective meaningful tasks and goals) seems to be vital for self-regulation and positive affective experiences in learning (Ryan & Deci, 2002). Regarding distance learning during COVID-19-related school closures, various findings confirm the assumptions underlying self-determination theory in the context of distance learning, i. e., satisfying students' psychological needs for autonomy, competence, and social relatedness, which in turn, fosters their intrinsic motivation to learn independently (Holzer et al., 2021a; Korlat Ikanovic et al., 2021; Pelikan et al., 2021). In addition, indicators of student motivation, i. e., engagement and positive emotions, are related to their effort (time spent on learning) and learning progress in distance learning situations (Helm & Huber, 2022; Steinmayr et al., 2021).

Learning time. As school closures left students largely to their own devices (especially when parents could not support them), questions quickly arose about how many hours they spent studying at home, or whether they viewed school closures as "new vacations" (Huber et al., 2020). The review by Helm, Huber and Loisinger (2021) shows that the proportion of students who invested less than two hours a day on learning ranged from 25% to almost 60% between the surveys. Studies predicting students' learning time during the lockdown (Dietrich et al., 2020; Grätz & Lipps, 2021; Grewenig et al., 2020; Huber & Helm, 2020a, 2020b; Züchner & Jäkel, 2021), identify the following individual predictors (age, gender, performance, diligence, emotions) as well as contextual predictors (school type, teaching quality, teacher support, home learning resources). Few studies investigate the relationship between students' learning effort and their achievement during distance education. Student engagement (as reported by their parents) (Steinmayr et al., 2021) and their self-reported learning time invested (Huber et al., 2020) positively predicted learning success during COVID-19-related school closures.

Given the outlined theoretical and empirical support for the importance of teachers' feedback and students' self-regulation skills, intrinsic motivation, and learning time, we incorporate these process indicators in our empirical model (see Fig. 1).

2.4 On the Relations between Context, Input, Process and Output Indicators in Distance Learning

The CIPO model (e. g., Scheerens, 1990), as well as related models on instructional processes in regular school settings (e. g., the 'offer-use' model of Helmke, 2009), postulate indirect effects of teacher competencies via instructional quality and learning quality on student achievement. This postulate has been repeatedly confirmed empirically. More concretely, and regarding the present study, teachers' competencies are related to cognitive activation (Baumert et al., 2010; Förtsch et al., 2016) and thus to the quality of teachers'

feedback on student assignments and their promotion of students' self-regulation skills. Moreover, teachers' motivation tends to predict students' motivation (by means of supporting the development of competence and autonomy) (Frenzel et al., 2009; Holzberger et al., 2016; Warwas & Helm, 2017). Finally, there is ample evidence (feedback in this study; Praetorius et al., 2018) that instructional quality and students' motivation (Deci & Ryan, 1993) – as well as students' self-regulation – are related to students' academic achievement (Boekaerts & Corno, 2005; Schoor et al., 2015; Seidel & Shavelson, 2007).

Initial studies on distance learning during the pandemic show that student motivation and their self-regulated learning and self-organisation skills (Holzer, Lüftenegger, et al., 2021a; Huber & Helm, 2020a; Steinmayr et al., 2021; Züchner & Jäkel, 2021) are particularly predictive of self-assessed learning gains in distance learning. Such gains are also affected by the quantity and quality of feedback given by teachers in distance learning situations (Huber & Helm, 2020a; Steinmayr et al., 2021; Züchner & Jäkel, 2021). We are not aware of any empirical studies regarding the effect of teachers' competencies on instructional quality during COVID-19-related distance learning. However, we assume that teachers' digital competencies are a particularly important prerequisite for the quality of distance learning during school closures (Røkenes & Krumsvik, 2014).

In this section, we have detailed our assumptions and findings from empirical studies about how teaching and learning were affected during periods of COVID-19-related school closures. In doing so, we highlighted key predictors of student learning success in distance learning situations. In the following section, we use the COOL (COoperative Open Learning) format as an example to consider the impact of open learning environments on distance learning processes.

3 Open Learning Environments

The COoperative Open Learning (COOL) open learning format was launched in 1996 at an Upper Austrian commercial school by teachers who faced increasing heterogeneity in terms of age, ability, motivation and learning speed that made conventional teacher-centred instruction almost impracticable. The primary goal of COOL is to promote students' soft skills by supporting the development of independence and responsibility. The core elements of COOL are "open instructional time slots", in which students must decide for themselves which work assignment they work on, as well as when, where and how. These phases, in which the teacher takes on a coaching role, may constitute up to one third of the total instructional time. The COOL concept emphasises student-centred teaching and cooperative learning settings (i. e., teamwork), in order to promote students' self-regulated learning skills (e. g., metacognitive skills) and social skills (e. g., cooperative learning skills). Furthermore, teachers are also encouraged to work in teams (Neuhauser & Wittwer, 2002).

Schools that wish to implement the COOL concept must undergo regular certification processes. To date, there are almost 60 COOL-certified upper secondary schools in Austria and about 1600 teachers from 160 schools have obtained the COOL trainer certificate.

As the COOL concept and COVID-19-related distance education share several common features, we hypothesize that teaching and learning during periods of school closures differed between students from COOL schools and those from traditional schools. Specifically, we assume the following differences:

- *Input.* As COOL schools had already implemented digital platforms (e. g., Moodle) prior to the pandemic, and COOL is based on teacher collaboration, the transition from face-to-face to online instruction was less challenging for COOL teachers.
- *Process.* Already before school closures, COOL teachers were accustomed to providing feedback on completed student assignments to steer students' learning.
- *Process.* Because of the "open instructional time slots" that were part of COOL prior to the pandemic, COOL students were accustomed to working and learning through assignments. Moreover, they were also accustomed to working independently in a timely manner.

Based on these considerations, we assume that – not only before the pandemic (see Helm, 2016b) but also in distance learning during COVID-19-related school closures – COOL students rated teacher competencies, feedback, self-regulated learning, and learning motivation higher, compared to traditionally taught students. Regarding "treatment validity", of course, we expect that not all teachers will implement COOL with the same intensity or levels of openness. Conversely, it is also unrealistic to assume that traditional teaching is always implemented in a strictly teacher-centred and guided manner. Rather, we assume some highly guided instruction among COOL students, as well as some highly open instruction among traditionally taught students. However, the study by Helm (2014) shows that the COOL concept is a valid indicator of open learning environments in line with the ‚COOL core elements' (where are described above). Although open and traditional instruction are not fully distinct in practice, Helm's (2014) study found – by means of latent class analysis – that 69% of COOL students could be classified as open learning students, while only 27% of students from traditional classes were classified as open learning students. Hence, COOL seems to be a valid indicator of open learning environments in practice.

As to the question whether the relations described in Section 2.4 differ between COOL and traditional learning environments, it is difficult to argue clear differences. On the one hand, it is conceivable that the quality of instruction (here: feedback) and student learning (here: self-regulation, motivation, learning time) depend more strongly on teacher compe-

tencies in COOL classes, since open instruction is considered more presuppositional and challenging (Helm, 2016a). At the same time, it can be argued that in open instruction, students' self-regulation skills (including motivation and learning time) are of higher relevance for learning gains than in traditional instruction where students are more guided by teachers. However, on the contrary, since distance learning requires these skills from both COOL and traditionally taught students, the differences may be less likely.

4 Aims and Hypotheses

To date, studies have been concerned primarily with the consequences of distance learning on student outcomes (see the overview in Helm, Huber & Loisinger, 2021). Due to the recent need to implement distance learning for schools, deeper knowledge about conducive distance learning environments that foster students' self-regulation and intrinsic motivation is required.

Against the abovementioned theoretical background, this study investigates (1) if, and to what extent, various aspects of distance education (feedback received, students' self-regulation skills, students' intrinsic motivation, students' learning time) mediate the relation between perceived teacher competencies and students' self-rated academic achievement during distance learning. Moreover, we test (2) whether pre-COVID-19 instructional designs (COOL vs. traditional instruction) moderate the associations postulated in research question 1. Hence, our hypotheses are as follows:

H1: Students' self-regulation skills mediate the effect of teacher competencies on learning outcomes during distance learning.

H2: Students' self-reported intrinsic motivation mediates the ffect of teacher competencies on learning outcomes during distance learning.

H3: Students' perception of feedback mediates the effect of teacher competencies on learning outcomes during distance learning.

H4: Students' learning time mediates the effect of teacher competencies on learning outcomes during distance learning.

H5a: Students belonging to COOL classes report significantly higher values in all study variables compared to students belonging to traditional classes.

H5b: Mediation of the 'teacher competencies–student academic achievement' relationship by all study variables differs significantly between COOL students and traditional students.

5 Method

5.1 Study Design and Sample

The study aimed to investigate students' perceptions of distance learning during school closures, and was conducted from 14th April to 23rd July 2021. Data was collected by means of an online questionnaire distributed via contact lists provided by the COOL Impulse Centre and the Department for Educational Research at the Johannes Kepler University of Linz (JKU). The study was approved by the relevant Education Administration Offices of various Austrian federal states. Participation was voluntary for the students. Data protection guidelines and ethnic research guidelines of the JKU were strictly adhered to (e. g., anonymity of the data).

The data collection has resulted in a total sample of N = 2,290 students. A subsample of N = 1,539 students who were attending upper secondary schools in all Austrian federal states were analysed in the present study. The students were M = 16.58 (SD = 1.30) years old and 68.3% of the sample were female. The proportion of students who reported that a language other than German is predominantly spoken at home was 9.9%. After weighting the sample with respect to the proportion of students who do not speak German at home and the proportion of female students in upper secondary schools all over Austria, the sample reflected the frequencies in the population. Thus, 70.6% of the students were female and 21.8% of the students do not speak German at home. Weighting by gender and language spoken at home should not obscure the possibility that the sample may nevertheless be biased with respect to other characteristics relevant to the present research questions. For this reason, more information follows on the socio-economic background of students, as well as socio-economic-related challenges in distance learning.

Regarding the pre-COVID-19 instructional designs, 41.5% (N = 631) of the students (N = 898, 40.8% in the weighted sample) were taught in COOL classes. The students in both groups did not differ in any of the indicators of the socio-economic status (language spoken at home, technical equipment, educational background of the parents).

Educational background. 13.3% of the students come from families where the mother holds an academic degree, which is a slightly smaller proportion than in the Austrian population (17.2%) according to information by Statistik Austria.

Technical equipment. 78.1% of the students did not agree at all, that they had no technical equipment to study with. Further, 9.3% did not fully agree, while 6.9% partly agreed.

Internet connection. About one third (38.4%) of the students did not agree at all, that they could not attend lessons due to an insufficient internet connection. Nearly one quarter of the students reported that their internet connection was mostly sufficient, whereas 19.6% had to deal with poor internet connections.

Parental support. Slightly more than the half of the students (51.2%) did not agree at all, that it was a big challenge for them if parents could not provide help. Further, 19% mostly did not agree with this statement, while 14.2% found it partly challenging if their parents were not able to help them.

Regarding the last three challenges, findings from a non-representative but large-scale study in Austria (Schober et al., 2020; N = 8,349) reveal that 94% of upper secondary students from commercial colleges (N = 4,724) reported having their own PC/laptop. In that study, 19% of students stated that learning was particularly difficult because of technical problems (e. g., internet connection), and 35% indicated that they did not get the help they needed at home. Hence, our sample does not appear to be significantly different from larger studies with wider coverage. In addition, the high levels of digital equipment available do not necessarily refer to a selection bias, but may reflect the fact that upper secondary vocational schools in Austria have traditionally always been technically well equipped.

5.2 Instruments

The questionnaire comprised established scale-based constructs (Huber & Helm, 2020a) on several dimensions of distance learning: teacher competencies (4 items, e. g.: 'My teachers know how to learn digitally with us.', Cronbach's α = .71); feedback (6 items, e. g.: 'During the school closure, I could always ask my teachers if I got stuck.', Cronbach's α = .75); students' self-regulated learning (4 items, e. g.: 'While school was closed, I structured my days so that I was able to keep up with the assignments for school.', Cronbach's α = .68); students' intrinsic motivation (4 items, e. g.: 'I liked studying for school at home.', Cronbach's α = .76); students' time spent on learning activities (2 items, e. g.: 'My time for school and learning during school lockdown in hours was ....'); and students' self-rated academic achievement (2 items, e. g.: 'School closures have affected my grades.', Cronbach's α = .84). All variables represent students' perceptions of self-related and teacher-and-instruction-related aspects.

The mentioned constructs were measured using a 5-point-Likert scale (1 = does not apply at all, to 5 = applies). The self-rated effect of school closures on academic achievement ('School lockdown affected my test performance.') and grades ('School lockdown affected my grades.') was assessed using response options from 1 = very negative, to 5 = very positive. Learning time was collected in categories ranging from 0 to 40 hours. A mean value was calculated from both items to obtain an index of learning time during school closures.

To control for omitted variables, we included information on students' background (educational level of the parents, language spoken at home), and home learning resources (technical equipment, parental learning support) during the three periods of school closures in Austria. Home learning resources were captured by asking for aspects that had

been particularly challenging during school lockdown (technical equipment: 'It was especially challenging for me that I did not have a computer/laptop/tablet to learn with.'; parental support: 'It was especially challenging for me that my parents could not provide help.').

5.3 Analyses

Student weights were calculated using SPSS (Version 26). Further analyses were conducted using R (version 4.0.5), the package lavaan (version 0.6.8 – Rosseel, 2012), and the lavaan.survey tool (version 1.1.3.1 – Oberski, 2014).

To test our hypotheses, we made use of mediation and moderated mediation analyses. Prior to these analyses, we report descriptive statistics and bivariate correlations. We conducted a comparison of latent means of students taught in COOL classes and regular classes. The latent means of students in regular classes were fixed to zero so that the latent means of students in COOL classes represent the latent group differences of interest. Cohen's *d* was calculated in order to estimate the power of the statistical effects. According to Cohen (1988), we used the following rule of thumb to interpret *d*: < 0.5: small effect; 0.5-0.8: moderate effect; > 0.8 strong effect. The fit of the estimated models was evaluated using the cut-off values recommended by Hu and Bentler (1999): CFI ≥ .95/.90 and RMSEA ≤ .05/.08.

Since the moderated mediation analysis tests a mediation model for two distinct groups of students (students from COOL classes and students from traditional classes), measurement invariance was tested prior to the analyses. Testing measurement invariance (following table 2) provides information as to whether the collected data represents the same construct with the same metric for two or more distinct groups. Configural, metric, and strong measurement invariance – that are commonly distinguished in the literature (Cheung & Rensvold, 2002) – were tested using the MLR estimator which provides robust estimation standardised at mean and variance (Liu et al., 2017). Measurement invariance was calculated for all study variables with more than two indicators: 'teacher competencies', 'feedback', 'intrinsic motivation' and 'self-regulation skills'. The models were compared using χ^2-difference tests for nested models. In addition, measurement invariance was assessed using the rule of thumb according to Chen (2007), and Cheung & Rensvold (2002) for unequal sample sizes. Following cut-off criteria are defined according to Chen (2007): If the model fit of the more restricted model (representing higher levels of measurement invariance) does not drop too much (CFI does not decrease by more than .010; and RMSEA does not increase by more than .015), strong measurement invariance can be assumed.

In a subsequent step, structural equation models were calculated for both groups of students, based on direct and indirect paths following from teacher competencies via feedback, intrinsic motivation, self-regulations skills, and learning time of the students. So-

cio-economic indicators (educational level of the mother, language spoken at home) and home learning resources (technical equipment, parental learning support) were controlled within the analyses. Firstly, we estimated the direct effect of teacher competencies on student achievement (c-path, see Fig. 1). Secondly, the effects of teacher competencies on the mediating variables perceived feedback, self-regulation skills, intrinsic motivation, and learning time (a-paths) were calculated. Additionally, we specified effects from these mediators to student achievement (b-paths). Finally, paths from perceived feedback, self-regulation skills, and intrinsic motivation to learning time were specified (d-paths). The statistical significance of the indirect effects was tested using bootstrapping techniques (500 draws). Common method bias and discriminant validity were tested prior to the analyses (Tehseen et al., 2017; Zait & Bertea, 2011). Statistical power was analysed and interpreted according to Cohen (1988) with $d \geq 0.4$ indicating a small, $d \geq 0.7$ indicating a moderate and $d \geq 0.8$ indicating a high effect size.

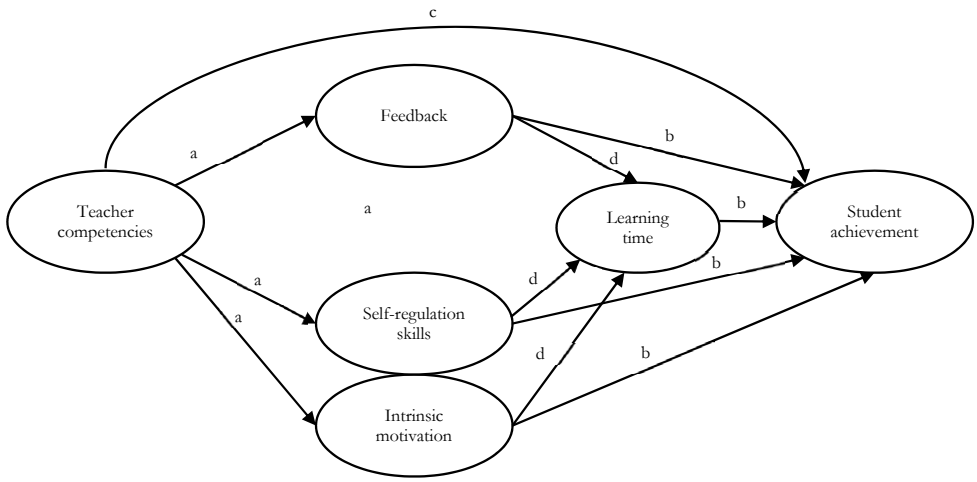

Figure 1: Schematic representation of the tested model

6 Results

6.1 Descriptive Statistics

Students' perceptions of teacher competencies ($M = 3.12$, $SD = 0.80$) and of the feedback provided by teachers was moderate ($M = 3.33$, $SD = 0.75$), as they were in the middle of the scale that ranged between 1 = does not apply, to 5 = applies. The mean values of students' self-regulation skills ($M = 3.24$, $SD = 0.88$) and intrinsic motivation ($M = 2.57$, $SD = 0.99$) in distance learning were also moderate. Time spent on learning activities averaged over all three school lockdowns was $M = 12.75$ ($SD = 5.50$) hours per week. The self-rated effect of distance learning on students' academic achievement (i. e., test results and grades) was rated neither particularly positive nor particularly negative by the students ($M = 2.84$, $SD = 0.99$). Notably, the amount of online lessons reported varied greatly between the students (min = 1 to max = 40 hours a week). Following table 1 provides correlation coefficients calculated for all investigated variables.

Table 1: Means, standard deviations, and correlations according to Pearson and Spearman

Variable	M	SD	1	2	3	4	5	6	7	8	9	10	11	12
1. Sex[a]	–	–	–											
2. Age	16.65	1.33	–.04**											
3. Language[a]	–	–	–.01**	–.14**										
4. Parental support[b]	2.02	1.29	.08**	.00**	–.18**									
5. Technical equipment[b]	1.42	0.93	.01**	-.00**	–.16**	–.18**								
6. Academic degree mother	–	–	–.10**	–.08**	.05**	–.07**	.03**							
7. COOL class[a]	–	–	–.03**	–.09**	.04**	–.04**	–.04**	.01						
8. Intrinsic motivation	2.57	0.99	.10**	.04**	.10**	–.22**	–.08**	–.05	.01**					
9. Self-regulation skills	3.24	0.88	.10**	.08**	.16**	–.23**	–.09**	–.03	.01**	.54**				
10. Feedback	3.33	0.75	.13**	–.11**	.02**	–.19**	–.14**	–.04	.13**	.30**	.24**			
11. Teacher competencies	3.12	0.80	.08**	–.11**	.02**	–.13**	–.10**	–.01	.13**	.31**	.24**	.63**		
12. Achievement	2.84	0.99	.03**	.01**	.08**	–.18**	–.06**	.02	–.02	.37**	.33**	.16**	.16**	
13. Time (learning)	12.75	5.50	.08**	.01**	.17**	–.06**	–.04**	.01	.09**	.07**	.17**	.11**	.11**	.03

Note: *M* and *SD* represent mean and standard deviation, respectively.

* indicates $p < .05$. ** indicates $p < .01$

[a] for dichotomous variables, coefficients according to Spearman were calculated

[b] High values indicate that it was a big challenge for students if parents could not provide help or technical resources were lacking at home

6.2 Measurement invariance

As the fit of the more restricted model does not drop too much strong measurement invariance can be assumed for all the study variables. For teacher competencies, the CFI dropped only slightly (Δ CFI = .001) from weak to strong measurement variance, while the RMSEA decreased steadily (Δ RMSEA = –.011). For feedback we observed a decrease of CFI (Δ CFI = –.009) and an increase of RMSEA (Δ RMSEA = .012) from weak to strong measurement invariance. The model fit of strong measurement invariance of self-regulation was a bit lower than the fit of the model that tested weak invariance (Δ CFI = –.011, Δ RMSEA = .013) but acceptable according to the cut-off criteria defined by Chen (2007). This also applied for the difference between weak and strong measurement invariance of intrinsic motivation, where CFI dropped with an Δ of –.007 and RMSEA inclined with an Δ of .001 (see Table 2).

Table 2: Measurement invariance test of the study variables for students in COOL classes and traditional classes

Invariance level	Model–Fit							χ^2–difference test		
Teacher competencies										
	χ^2	df	*p*	CFI	Δ CFI	RMSEA	Δ RMSEA	Δ χ^2	Δ df	p
Configural	30.19	4	.001	.976		.093				
Weak	34.79	7	.001	.975	–.001	.072	–.021	4.50	3	.212
Strong	38.58	10	.001	.974	–.001	.061	–.011	3.79	3	.285
Feedback										
	χ^2	df	*P*	CFI	Δ CFI	RMSEA	Δ RMSEA	Δ χ^2	Δ df	p
Configural	28.31	12	.005	.992		.042				
Weak	30.29	17	.024	.993	+.001	.032	–.010	1.98	5	.852
Strong	48.98	20	.001	.984	–.009	.044	+.012	24.90	5	.001
Self-regulation										
	χ^2	df	*p*	CFI	Δ CFI	RMSEA	Δ RMSEA	Δ χ^2	Δ df	*p*
Configural	11.37	4	.023	.993		.049				
Weak	14.98	7	.038	.993	.000	.038	–.011	3.51	3	.320
Strong	29.95	10	.001	.982	–.011	.051	+.013	15.08	3	.002
Intrinsic motivation										
	χ^2	df	*p*	CFI	Δ CFI	RMSEA	Δ RMSEA	Δ χ^2	Δ df	*p*
Configural	28.67	4	.001	.985		.090				
Weak	30.90	7	.001	.986	+.001	.067	–.023	2.23	3	.525
Strong	45.39	22	.001	.979	–.007	.068	+.001	14.49	3	.002

6.3 Mediation Analysis

To test our hypotheses 1 to 4, direct (*c-path*) and indirect effects of perceived teacher competencies on students' self-rated achievement during school closures were tested in the total sample. More precisely, indirect effects of teacher competencies mediated through students' perceived feedback, self-regulation skills, intrinsic motivation, and learning time were calculated (*a-paths*). Furthermore, the direct effects of these mediators on student achievement were estimated (*b-paths*). Additionally, double mediation through feedback, self-regulation skills, and intrinsic motivation via learning time (*d-paths*) was specified. The corresponding mediation model shows an adequate fit ($\chi^2(336) = 6865.38$, $p < .001$, CFI = .918, TLI = .906, RMSEA = .035, SRMR = .042). Coefficients of the several tested paths are provided within table 3. Common method bias and discriminant validity of the construct were tested by Herman's Single-Factor test (Tehseen et al., 2017) and by comparing the initial mediation model with a model that included a superordinate factor on which all items loaded. Herman's single-factor test did not confirm a single-factor solution. The factor-loadings (in the model with the superordinate factor) were higher on the different scales than the factor-loadings on the additional factor. Furthermore, χ^2-difference tests for comparison of a model with correlated and a model with non-correlated constructs revealed no significant difference ($\Delta \chi^2 = 1601$, Δ df = 9, $p < .001$). Hence, discriminant validity can be assumed (Zait & Bertea, 2011).

Table 3: Path coefficients of the initial mediation model (without moderation of the learning environment)

	b	*S.E.*	β	*p*	R^2
Student achievement on ... (c-path)					
Teacher competencies	.11	.14	.08	.42	
Student achievement on ... (b-paths)					.23
Feedback	-.08	.13	-.06	.53	
Motivation	**.26**	**.05**	**.29**	**.00**	
Self-regulation skills	**.21**	**.05**	**.22**	**.00**	
Learning time	-.01	.01	-.01	.15	
Sex	-.01	.06	-.00	.91	
Age	.01	.02	.01	.65	
Language	.03	.09	.03	.74	
Parental support	**-.06**	**.03**	**-.08**	**.02**	
Technical equipment	.01	.03	.01	.85	
Academic degree mother	-.07	.09	.02	.46	

Feedback on ... (a-path)					.69
Teacher competencies	**.92**	**.06**	**.84**	**.00**	
Intrinsic motivation on ... (a-path)					.12
Teacher competencies	**.62**	**.06**	**.40**	**.00**	
Self-regulation skills on ... (a-path)					.14
Teacher competencies	**.53**	**.06**	**.36**	**.00**	
Learning time on ... (d-paths)					.04
Teacher competencies	.31	.74	.04	.67	
Feedback	.59	.71	.08	.43	
Motivation	-.47	.25	-09	.06	
Self-regulation skills	**.98**	**.28**	**.18**	**.00**	

Note: Dependent variables are written in *italics*. Significant coefficients are **bold**.

c-path. After controlling for the mediating variables, teacher competencies no longer significantly affect students' achievement in distance learning.

a-paths. Teacher competencies significantly predict feedback ($\beta = .84$, $p < .001$), students' self-regulation skills ($\beta = .36$, $r = .41$, $d = .90$, $p < .001$), and students' intrinsic motivation ($\beta = .40$, $r = .45$, $d = 1.01$, $p < .001$). There is no significant effect on the mediating variable students' learning time.

b-paths. The mediators have a partial effect on students' academic achievement, which is predicted by self-regulations skills ($\beta = .22$, $r = .27$, $d = .56$, $p < .001$) and intrinsic motivation ($\beta = .29$, $r = .34$, $d = .72$, $p < .001$). Perceived feedback and students' learning time do not predict students' achievement.

d-paths. Learning time as an outcome is predicted by students' self-regulation skills ($\beta = .18$, $r = .23$, $d = .47$, $p < .001$) only.

Indirect effects. The results suggest a mediation of the 'teacher competencies–student academic achievement' relation via students' self-regulation skills ($\beta = .08$, $r = .13$, $d = .26$, $p < .001$) and students' intrinsic motivation ($\beta = .11$, $r = .16$, $d = .32$, $p < .001$), even if the effect size found is rather small. No significant effects were found with respect to the assumed indirect path between teacher competencies and students' achievement via perceived feedback ($\beta = -.05$, $p = .54$) or students' learning time ($\beta = -.00$, $p = .69$). The same applies to the indirect effect of teacher competencies mediated through self-regulation

skills and learning time (β = -.03, p = .20), or mediated through motivation and learning time (β = .00, p = .27). The indirect effect of teacher competencies mediated by perceived feedback and learning time is also not significant (β = -.00, p = .47).

Total effect. The total effect as sum of the direct effect of teacher competencies and the indirect effects of teacher competencies mediated by feedback received, self-regulation skills, intrinsic motivation and learning time is statistically significant and shows a moderate statistical power (β = .21, r = .26, d = .54, p < .001).

Effects of control variables. Parental support is related to students' achievement (β = -.08, r = .13, d = .26, p = .02). All other contextual variables do not predict student achievement in distance learning.

6.4 Moderated Mediation Analysis

Since we also aimed to investigate the moderation effect of COOL, further models that took into account student membership of COOL classes or regular classes were tested.

6.4.1 Hypothesis 5a –Differences of the Latent Means on Study Variables between COOL and Traditional Students

A comparison between students in COOL classes and in regular classes reveals differences in the manifest and latent mean values of the two groups. Regarding the input variable, students in COOL classes reported higher teacher competencies than students in regular classes (COOL students: M = 3.24, SD = 0.76; traditional students: M = 3.04, SD = 0.82). Comparison of the latent means of both groups reveals a statistically significant difference (*difference of the latent means* = 0.196, p < .001). Cohen's d indicates rather small effect sizes: d = .25 to d = .29. Regarding the mediating process variables, again, students in COOL classes rated feedback significantly higher than students in regular classes (COOL students: M = 3.45, SD = 0.71; traditional students: M = 3.25, SD = 0.77) (*difference of the latent means* = 0.201, p < .001).

Learning time is not significantly higher in COOL classes (COOL students: M = 13.36, SD = 5.56; traditional students: M = 12.38, SD = 5.39) (*difference of the latent means* = .080, p = .17). Regarding students' self-regulation and intrinsic motivation, no statistically significant differences could be observed (self-regulation skills: *difference of the latent means* = -.017, p = .78; intrinsic motivation: *difference of the latent means* = -.028, p = .66). Students' outcomes (self-rated academic achievement) during school closures were significantly higher among COOL students than regular students (*difference of the latent means* = -.077, p = .17). No significant differences were observed in the context variables. Thus, hypothesis 5a can be confirmed for the majority of the study variables. This is a clear indication that COOL students experienced a significantly more conducive learning environment during distance learning, compared to students in traditional classes.

Relations between input, process, and output variables. Manifest bivariate correlations (see Table 1) show that teacher competencies (as rated by students) are weakly, but highly significantly linked to students' academic achievement during school closures ($r = .16$, $p < .001$). Regarding the relation between teacher competencies and the mediating study variables, bivariate correlations yield the strongest association with perceived feedback ($r = .63$, $p < .001$). A lot weaker, but still statistically significant, are the correlations of perceived teacher competencies with self-regulated learning ($r = .24$, $p < .001$), intrinsic motivation ($r = .31$, $p < .000$), and learning time ($r = .11$, $p < .001$). Regarding the correlations between students' outcomes (i. e., academic achievement) and the mediating variables, the bivariate analysis points at moderate relations (feedback: $r = .16$, $p < .000$; self-regulation skills: $r = .33$, $p < .001$; intrinsic motivation: $r = .37$, $p < .001$; learning time .11, $p < .001$).

These observed bivariate correlations suggest not only direct, but also indirect effects of teacher competencies on students' academic achievement during school closures. However, since the mediating variables are substantially related to each other as well (up to $r = .54$, $p < .001$), it is unclear which of the process variables plays a mediating role. Moreover, there is a negative relation between students' academic achievement and background with regard to parental learning support ($r = -.18$, $p < .001$), that was not controlled for in the preceding bivariate analyses. Hence, a multivariate analysis as outlined in the next section was required.

6.4.2 Hypothesis 5b – Group Differences in Mediation through Perceived Feedback and Self-regulation Skills

The models ($\chi^2(629) = 1210.47$, $p < .001$, CFI = .912, TLI = .906, RMSEA = .035, SRMR = .062) reveal similar effects of the included independent and mediator variables on student self-rated academic achievement.

c-path. After controlling for the mediating variables, teacher competencies no longer significantly affect students' achievement in distance learning, neither in COOL classes (($\beta = .09$, $p = .36$) nor in traditional classes ($\beta = .09$, $p = .36$).

a-paths. Teacher competencies significantly predict feedback in both classes (COOL: $\beta = .86$, $p < .001$; traditional: $\beta = .83$, $p < .001$), students' self-regulation skills (COOL: $\beta = .38$, $p < .001$; traditional: $\beta = .36$, $p < .001$), and students' intrinsic motivation (COOL: $\beta = .40$, $p < .001$; traditional: $\beta = .40$, $p < .001$). There is no significant effect on the mediator variable students' learning in both groups (COOL: $\beta = .02$, $p = .85$; traditional: $\beta = .02$, $p = .85$).

b-paths. The mediators have a partial effect on students' academic achievement, which is predicted by self-regulations skills (COOL: $\beta = .22$; $r = .27$, $d = .56$, $p < .00$; traditional: $\beta = .23$, $p < .001$, $r = .28$, $d = .58$,) and intrinsic motivation (COOL: $\beta = .22$, $r = .27$, $d = .45$, $p < .001$; traditional: $\beta = .23$, $r = .28$, $d = .58$, $p < .001$). The effect power can be inter-

preted as moderate (Cohen, 1988). Perceived feedback and students' learning time do not predict students' achievement.

d-paths. Learning time as an outcome is predicted by students' self-regulation skills (COOL: β = .16, r = .21, d = .43, p < .001; traditional: β = .18, r = .23, d = .37, p < .001) with a rather low effect size.

Indirect effects. Testing of the indirect effect for both groups suggests the same mediation as in the initial model, without consideration of the moderation of the COOL concept described insection 6.2.

Total effect. The total effect is significant and of medium power for both groups (β = .22, r = .27, d = .56, p < .001).

Effects of control variables. With respect to control variables, we found significant differences between traditional and COOL students. The lack of parental support is significantly related to students' achievement in COOL classes (β = -.12, r = .17, d = .35, p = .010), but only with a small effect size. In traditional classes there is no significant relation between both aspects(β = -.05, p = .23). All other contextual variables do not predict student achievement in distance learning, neither in traditional classes nor in COOL classes.

Figure 2 illustrates the coefficients of the direct paths for the group of students taught in COOL classes, while Figure 3 depicts the coefficients of the students taught in regular classes.

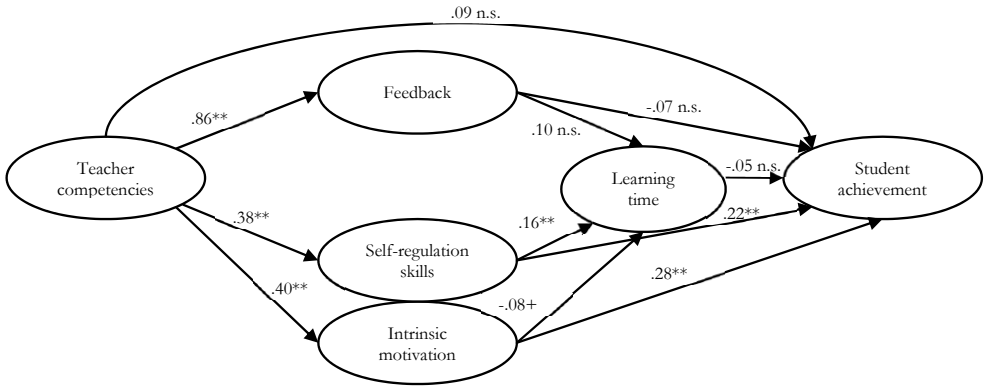

Figure 2: Initial moderated mediation model for students in COOL classes (N = 631)
Notes: + significant tendency (p ≤ .09), * significant (p < .05), ** significant (p < .01)

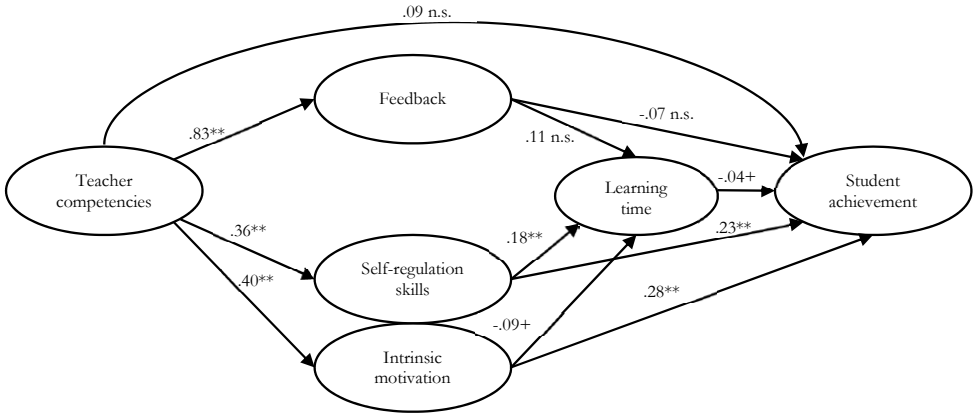

Figure 3: Initial moderated mediation model for students in regular classes (N = 898). Notes: + significant tendency ($p \leq .08$), * significant ($p < .05$), ** significant ($p < .01$).

7 Discussion

Motivated by the question of whether different instructional designs prior to the COVID-19 pandemic had an impact on teaching and learning during COVID-19-related school closures, we collected data from students in both open learning and traditional class situations, and performed moderated mediation analysis to investigate the potential effects of pre-COVID-19 instructional designs.

The findings show that students' self-regulation skills and intrinsic motivation are vital for the maintenance of self-rated academic achievement during school closures. Concerning our first research question, the findings underpin the importance of intrinsic motivation (Deci & Ryan, 1993) and self-regulation skills for learning (Boekaerts & Corno, 2005; Dignath & Veenman, 2021) in distance education. This is in line with previous empirical work on predictors of students' externally or self-rated achievement during school closures in spring 2020 (e. g., Huber & Helm, 2020a; Steinmayr et al., 2021; Züchner & Jäkel, 2021). With respect to theoretical assumptions regarding the major impact of teacher competencies on student motivation and self-regulation skills (e. g., Praetorius et al., 2018), our analyses confirm relations found in regular teaching also apply in distance learning situations, where the effects found are of moderate strength. Thus, hypotheses 1 and 2 can be confirmed. Other predictors of students' academic achievement during distance learning did not prove to be statistically significant. Neither time spent on tasks, nor technical equipment, sex, age, or students' background predicted students' academic outcomes. The only exception was the lack of parental support at home reported by students, which did negatively impact academic achievement.

However, in our study, the effect of feedback – which is of high importance for learning in regular schooling (e. g., Hattie & Timperley, 2007) – did not show any statistical significance. Thus hypothesis 3 cannot be confirmed. This unexpected finding could be due to difficulties for teachers in providing sufficient feedback during distance learning (e. g., Kirsch et al., 2021), or that distance learning leads to less interaction with peers and teachers, thus holding parents more accountable. As previous studies show (Helm & Huber, 2022; Holtgrewe et al., 2020), parents' abilities to cope with the situation influenced students' positive emotions during school closures in spring 2020. Hence, one reason for the missing effect of teachers' feedback on students' perceived achievement during school closures could be that in distance learning, students are more strongly affected by their direct social context (i. e., parents and siblings) rather than by teachers.

Hypothesis 5a regarding perceptions of relevant aspects of distance learning by students from different pre-COVID-19 instructional designs (i. e., COOL classes and regular classes) was (partially) confirmed, as students in COOL classes rated teacher competencies and perceived feedback significantly higher than students in traditional learning environments. This is in line with the findings of Helm (2016b), who showed that prior to the pandemic, COOL students perceived instruction differently (i. e., higher teacher competencies, feedback, motivation, self-regulation, ...) to their peers in regular classes.

Our hypothesis 5b regarding different structural relations of the CIPO model between students in regular classes and students in COOL classes was not confirmed. Again, this is in line with the study by Helm (2016b) who did not observe any differences in the relationships between dimensions relevant for students' self-regulated learning (i. e., teachers' support of basic psychological needs, students' intrinsic and extrinsic types of motivational regulation). In addition, this finding supports the research on open learning that concludes that open learning environments are neither significantly superior, nor inferior (with regard to students learning) compared to regular learning environments (Giaconia & Hedges, 1981; Hattie, 2010).

To sum up, the overall moderated mediation model revealed differences between students in COOL and traditional learning environments only in terms of their perception of various dimensions of distance learning (higher teacher competencies, higher feedback, higher learning time, higher academic achievement, parental support). However, no differences regarding the relations between these dimensions were observed across the two groups. Hence, while COOL students reported a more conducive learning environment during distance learning, these environmental and individual aspects were not of any higher or lower relevance (regarding students' achievement during school closures) for COOL students than for regular students.

7.1 Scientific Significance of the Study

The study extends existing knowledge on relevant predictors of students' learning success during times of school closures. In line with existing studies (e. g., Huber & Helm, 2020a; Steinmayr et al., 2021; Züchner & Jäkel, 2021), we identified contextual (teachers' feedback, parental learning support) as well as individual dimensions (students' self-regulation skills, students' intrinsic motivation) relevant for students' academic achievement during distance learning. Not only does our study confirm the importance of these predictors, but also showed that these predictors are central in another, yet not investigated domain (i. e., vocational schools). Moreover, by analysing indirect effects, we contribute to the sparse number of existing studies on mediating variables of context/input-output relationships in distance education (e. g., Weber et al., 2021). However, the analysis of the indirect effects of teacher competencies on student learning in distance education, represents only the first key novelty value of our study. What is really new, is the issue of differential effects of pre-COVID-19 instructional designs on various aspects of distance learning.

To the best of our knowledge, this is the first study to investigate the effects of different pre-COVID-19 instructional designs on students' learning during times of school closures. Until now, it was unclear whether open learning formats could unleash their potential in distance learning environments. We did assume that distance learning – just like open education – requires a high degree of students' self-regulation skills. In line with our assumption, we made new scientific knowledge available, showing that open education provides an environment that – from the students' perspective – is more conducive to distance learning. By providing insights into the positive effects of COOL on students' learning during distance education, we also extend the scientific knowledge on characteristics to support crisis-resilient schools. Hence, we have added significantly to the literature on school development, as we argue that although open education may not be a panacea for the many challenges associated with school closures, it may be a key piece of the puzzle in combating the negative effects of pandemic-related school closures. Thus, open learning formats should be given special attention in preparing for future school closures. In this regard, our study is particularly interesting and relevant for educational policymakers.

7.2 Strengths and Limitations

The following limitations should be considered when interpreting the findings of this study.

Firstly, the cross-sectional data collected from the sample limits the significance of the findings. The lack of longitudinal data does not allow to control for students' prior knowledge (i. e., students' academic achievement prior to school closures), or their self-concept and learning preferences prior to the pandemic. Thus, in addition to prior knowledge,

students' preference for or against self-directed learning and digital learning could play an important role in the success of distance learning. This should be addressed in further studies.

Secondly, the sample is an convenience one. Although we did adjust our sample to be more representative by means of post-stratification with respect to student gender and their home language – and by including a range of control variables into our models – we are aware that the sample might still not be representative regarding other central aspects (e. g., students' levels of conscientiousness). Moreover, to avoid extremely high weights that would ascribe too much importance to individuals for the analyses conducted, additional aspects (e. g., parents' educational background) were not included within the stratification procedure. Hence, despite the large sample, it is not possible to generalise the findings to the entire population of vocational students in Austria.

Thirdly, student achievement was assessed by means of self-rating, since using objective test instruments would have been almost impossible due to contact restrictions during lockdown. The use of self-ratings is especially critical, since a meta-analysis by Hansford and Hattie (1982) concluded that self-ratings and performance measures are hardly associated with each other or overlap only 4 to 7%. It is therefore unclear to what extent the predictors identified here are also predictive of objectively assessed student performance measures. In addition, students' achievement was measured in the light of their perceived impact of school closures on test performance and grades. Therefore, the variable does not clearly represent any actual changes in performance, but only student assumptions in this respect. However, this is also an important piece of information. We also relied on self-reported questionnaires to assess students' self-regulation skills. To some degree, this type of acquisition is susceptible to misconceptions and participants' lack of awareness of their own learning process (Boekaerts & Corno, 2005).

Fourthly, the hierarchical structure of the data (students nested in classes, nested in schools) was considered only regarding the school level. For reasons of anonymity, it was not possible to collect information on students' class membership. However, we argue that, to a certain extent, distance learning dissolved the classroom structure and put more focus on individual learning at home. In addition, the study does not focus on any particular subject, so students did not necessarily evaluate the same teachers. Hence, student judgments should be rather independent of their class, and thus the class level may be less relevant.

Finally, learning is always embedded in a subject domain (e. g., Mathematics). The interdisciplinary study presented here lacks domain-specific considerations and is therefore subject to limitations in terms of generalisability regarding specific subjects.

We call on researchers to perceive these limitations as an impetus for future studies.

7.3 Conclusion

Did different instructional designs prior to the COVID-19 pandemic have differential effects on teaching and learning during COVID-19-related school closures? Our study shows that in COVID-19-related school closures perceived teacher competencies were significantly associated with students' self-rated academic achievement. However, this association was fully mediated by students' self-regulation skills and intrinsic motivation. This finding brightens the interplay of teacher and student characteristics in distance education. Moreover, we found that students in COOL classes rated various dimensions of distance learning that are considered conducive to students' learning (i. e., teacher competencies, feedback received, learning time) higher than their peers in traditional classes. However, no differences regarding the relations between these dimensions and student achievement were observed across the two groups. Hence, we conclude that while COOL offers a learning environment that seems to be more conducive to distance learning, the mechanisms that underly teaching and learning (i. e., various mediating effects) do not differ between COOL students and regular students. However, as self-regulation skills and intrinsic motivation are vital for effective learning of all students in distance education, those aspects should be facilitated in the context of teaching i. e. by providing cognitive activating tasks and direct feedback (e. g., Blume et al., 2020; Hosler & Arend, 2012; Räisänen et al., 2020).

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Thinking about the Relationship between Distance Learning and Territories through the Study of Three Breton "Prépa Numérique" Training Systems: A Contribution to the Notion of Enabling Environment

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Abstract

The starting point for this research is the "Grande École du Numérique", a public interest grouping resulting from a government initiative in 2015, which aims to create a network of training courses in digital professions for people who are far from employment. We will focus on three vocational training schemes resulting from this initiative: the "Prépa numérique" scheme in Rennes (222,060 inhabitants), Brest (139,225 inhabitants) and Rostrenen (2,942 inhabitants), a small rural town in central Brittany. The three schemes were set up by a scientific organisation in partnership with an engineering school.

Launched on 20 January 2020, the three "Prépa Numérique" schemes had to switch all their training to distance learning from 17 March 2020, following the introduction of strict confinement, which greatly disrupted the training engineering. The originality of our research is that we will reflect on the way in which the relationships forged during this period between distance learning systems on the one hand and the local ecosystems of actors on the other, have helped to produce more or less enabling configurations. In short, the aim is to examine the way in which the three "Prépa Numérique" systems have mobilised territorial resources in order to promote the deployment of learners' capacities. In short, our ambition in this paper is to use this health crisis as an opportunity to question the pedagogical practices and organisational modalities of a distance vocational training system; in addition, it is to make a contribution to the work on enabling learning environments.

Keywords

Distance learning, enabling environment, digital training, training-region relationship, proximity

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1 Introduction

In 2015, under the Hollande presidency, the national Grande école du numérique scheme was launched. This is a public interest grouping that awards a label to training schemes for digital professions. Today, nearly 500 related schemes have been set up and offer people who are far from employment the opportunity to benefit from professional opportunities linked to the development of the information and communication technologies sector.

Our article focuses on the study of three of them; these are Breton vocational training schemes called 'Prépa Numérique' set up by an association for the popularisation of science in partnership with a large general engineering school. The investigations, led by David Puzos (co-author of this text), began on 20 January 2020, i. e. a little less than two months before the first confinement and the switch to remote learning. Indeed, in view of the health risks linked to the Covid 19 pandemic, the French government imposed a strict lockdown on 17 March 2020, obliging training organisations to carry out their educational missions in distance learning for several months. The literature on the impact of lockdowns on training engineering highlights the difficulties caused by such an upheaval. Villiot-Leclercq (2020), reveals that the teaching practices deployed by training organisations during this period often resembled an artisanal bricolage whose objective was essentially to ensure pedagogical continuity. It seems that this mode of operation was then limited to the dissemination of content, without any real questioning of the scripting and mediatisation of teaching resources (Villiot-Leclercq, 2020).

At a time when distance learning for the unemployed continues to develop, this health crisis seems to us to be an opportunity to reflect on the pedagogical modalities of distance learning in the context of vocational training. The particularity of our research is that we are going to be interested in the territorial dimension of vocational training; it is a question of questioning the potential of distance learning engineering to weave links with local ecosystems, with a view to encouraging the capacity to learn and to develop professionally. To our knowledge, few works have been interested in analysing the impact of distance learning on the training-employment relationship, which is precisely the interest of our research.

In order to carry out our analyses, we propose to rely on the notion of an enabling environment, which we will develop below.

2 Theoretical Framework: The Use of the Enabling Environment Concept

The notion of an enabling environment was initially formulated by Mahbub ul Haq[2], who participated with Amartya Sen in the drafting of the Human Development Report (Fernagu, 2018). According to this conception, the enabling environment contributes to human development; understood in the light of the capability approach developed within the work of Sen (1992, 2000). According to the capability approach, the challenge of development is to increase the space of opportunities for action, enabling each person to make choices, to express capabilities, in all aspects of their lives (Zimmermann, 2011). The analysis of capabilities then involves identifying factors that help individuals to appropriate resources to convert them into valuable functioning. These factors can be of different kinds: social, environmental, or individual (Robeyns, 2007, p. 46). In conclusion, an enabling environment can be defined as an environment that supports capabilities (Fernagu, 2018).

In France, the notion of an enabling environment has been popularised mainly within the field of constructive ergonomics. This field of research is interested in the way in which professional environments guarantee health and well-being at work. Falzon (2013), following an appropriation of Sen's work, states that the establishment of an enabling environment ensures a non-deleterious work environment. It encourages an increase in the possibilities for concrete action via the deployment of conversion factors and choices, and this from a developmental perspective. Therefore, in order to be enabling, an environment must ensure three essential functions:

- A preventive function: it preserves the capacity for action by preventing psychosocial risks (Villemain & Lémonie, 2014)
- A function of universality: it must take into consideration inter-individual differences in order to prevent situations of exclusion (Villemain & Lémonie, 2014)
- A developmental function: Finally, it must be a developmental space and encourage the development of skills, knowledge and, more generally, the agentivity of individuals (Villemain & Lémonie, 2014).

Ultimately, development is understood as a fact, an objective to be achieved and a means of action (Arnoud & Falzon, 2013).

More recently, in France, the notion of enabling environment has been significantly appropriated by the educational sciences (Fernagu, 2018; Grandval, 2019; Martin, 2021; Vidal-Gomel et al., 2012). The enabling environment adapted to the challenges of dis-

2 Pakistani economist, politician and banker (1934–1998)

tance learning does not consist of the simple provision of educational resources according to a "diffusionist" model. In this sense, research on distance learning for jobseekers generally agrees that the lack of autonomy support is the main factor explaining the abandonment or failure of distance learning (Albero & Charignon, 2008; Albero, 2010; Fernagu-Oudet, 2018). Thus, a few elements that can be likened to 'negative' conversion factors are pointed out, namely: the lack of training for trainers (Albero & Charignon, 2008), the lack of support for learning (Albero, 2010), or the difficulties in accessing and using the digital platforms that have been set up (Nagels, Tali and Abel, 2019) etc. As a result, Fernagu (2018) states that an enabling environment is one that supports learning, that encourages the accessibility and use of the resources made available. Furthermore, she points out that an enabling environment is not sufficient on its own and that it is necessary to raise the issue of engagement in training; therefore it is also an environment that gives the desire to learn (Fernagu, 2018). It is not enough to decree the autonomy of learners; it is necessary to put in place factors of conversions and choices that allow its realisation.

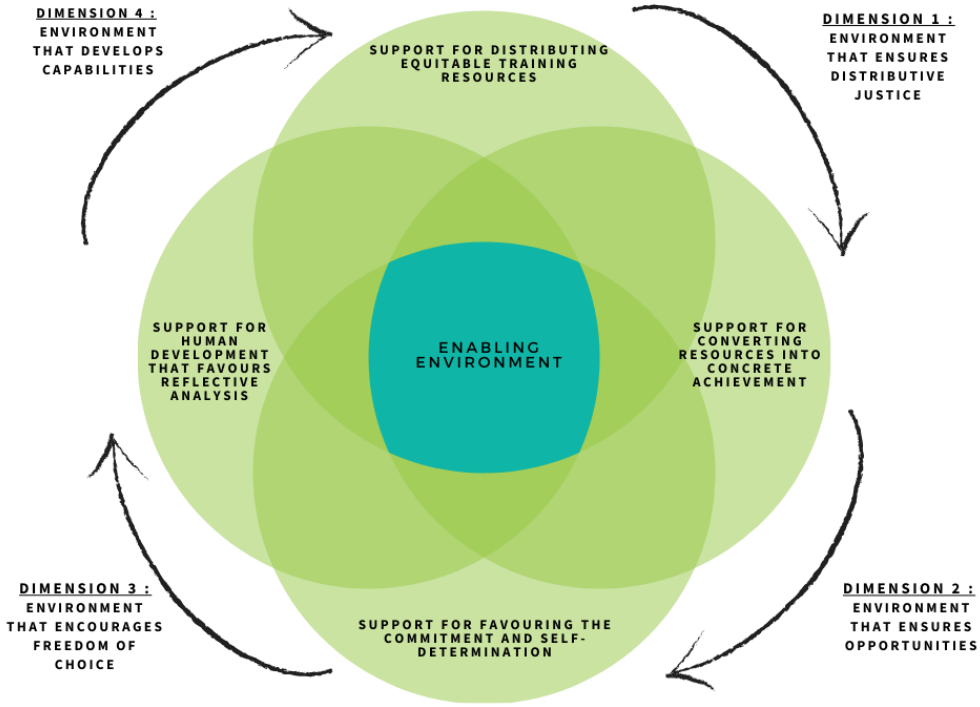

Figure 1: The functioning of an enabling environment (April, 2021). Author David Puzos based on Delgoulet & Vidal-Gomel (2013); Falzon et al. (2013); Fernagu-Oudet (2012, 2018); Le Morellec (2014)

As a synthesis of what we have just developed, the diagram *The functioning of an enabling environment*, constructed by David Puzos, highlights the processual aspect of an enabling environment. This diagram was drawn up based on a review of the literature on the concept of an enabling environment (Delgoulet & Vidal-Gomel, 2013; Falzon et al., 2013; Fernagu-Oudet, 2012, 2018; Le Morellec, 2014). It highlights four key dimensions from which a training environment can be described as truly enabling (Fig. 1).

First dimension: it is an environment that makes a few resources available. Even if the enabling environment cannot be summed up in this dimension alone, the question of distributive justice appears essential to guarantee, at least in principle, the success of everyone within a training system.

Second dimension: it is an environment that facilitates the conversion of the resources made available into concrete achievements. For the training system, it is a matter of putting in place and/or identifying a certain number of factors in the environment that encourage the use of resources (educational, institutional, economic, etc.).

Third dimension: it is an environment that encourages the commitment and self-determination of individuals within the training system by putting in place decision factors that act on three constituent dimensions of self-determination, the need for autonomy, the need for social belonging and the need for competence (Ryan & Deci, 2017).

Fourth dimension: In fine, it is an environment that increases autonomy and encourages the freedom of everyone to select, from a set of accessible opportunities, possibilities of functioning.

These different dimensions appear to be interrelated and dynamic, influencing each other. In short, an enabling environment occurs in a situation and according to the use that is made of it (Loquais, 2016).

Through this paper, we do not seek to identify indiscriminately all the elements of distance training engineering that have played the role of conversion and/or choice factors. The challenge is to identify what, in the distance learning environment, has enabled (or not) the opportunities offered by the development of the digital sector in Brittany to be converted into professional development.

3 Methodology and Fields

3.1 Context

The Prépa Numérique scheme has a dual objective. On the one hand, it aims to equip and acculturate people who are far from employment with digital skills; and on the other hand, to accompany them towards a return to training leading to qualifications in the digital field and/or towards employment. In other words, the aim is to help trainees develop professionally. The people targeted are more specifically people who are far from employment (for details of the cohorts, please refer to table 1 in the appendix). The training lasts for seven months and includes various introductory modules in web and mobile application programming, 3D printing, digital manufacturing, etc.

Three Breton training schemes were selected:

The "Prépa numérique" scheme in Rennes (222,060 inhabitants), Brest (139,225 inhabitants) and Rostrenen (2,942 inhabitants), a small rural town in central Brittany. These three training courses were developed from the same initial project, so they have the same content, the same teaching methods and the same training schedules. The three training courses investigated started on 20 January 2020 and ended on 20 July 2020. Following the announcement of the confinement on 17 March 2020, the pedagogical team of the generic "Prépa numérique" training switched the three devices to distance mode overnight. Three types of digital tools were deployed in each device to facilitate the remote monitoring of learners:

- A platform for exchange and communication (Discord for Rennes and Brest; Groups.io for Rostrenen). These platforms enabled learners and trainers to exchange information and organise voice chat rooms.
- Various video-conferencing tools (Skype, Zoom, Teams, etc.) mainly used by the trainers to carry out remote courses and workshops.
- A file storage and sharing platform: a Google Drive (set up only for Rennes and Brest) and a Groups.io (for Rostrenen), whose function was to be able to share digital files (educational resources, documentation, and all kinds of digital content).

3.2 Operationalising Our Research

It is important to stress that training environments do not exogenously generate capabilities (Fernagu-Oudet, 2018); an environment proves to be enabling according to how it is used (Loquais, 2016). In this sense, what is important is not only the individual characteristics or those of the environments, but the modalities of interaction between the two. Thus, the factors of conversions can only be apprehended in a situation (Nagels, Tali and Abel, 2019). Therefore, the research presented is based on observations and 19 interviews

carried out face-to-face and remotely over the entire training session. Among the latter, four interviews were conducted with trainers and managers of the Digital Preparatory course. In addition, 15 interviews were conducted with trainees from the Brest, Rennes and Rostrenen facilities (five interviews per site). The participants were chosen on a voluntary basis. All interviews, except one (at the request of the interviewee), were recorded and then transcribed. Of these 15 interviews, ten were men and five were women, which is relatively close to the ratio of men to women in the training courses. Only four were under 25 years of age and three were over 50; six had a baccalaureate or equivalent, and nine had a lower baccalaureate (for more details on the interviewees, see Table 2 in the appendix).

These data were cross-referenced with in situ observations. However, following the announcement of the confinement, the observations were carried out remotely, using digital tools (notably via presence on the distance learning platforms presented above). Thus, the data from these observations were analysed in order to correlate them with the trainees' discourses

The analysis of the data was carried out using the MAXQDA software. The MAXQDA software allows for discourse analysis and the extraction of units of meaning to develop categories. The challenge of the data analysis was to identify, inductively, the factors related to distance learning engineering, which allowed learners to appropriate territorial resources, with a view to gaining the capacity to learn and to develop professionally. The analysis of the content of the collected data has thus allowed us to identify three conversion factors, allowing us to respond to our research challenge:

- The first conversion factor refers to the need to adapt the content of distance training to the needs of the territory's businesses in terms of digital skills
- Secondly, we note the importance of putting in place distance training engineering, favouring information, guidance, and support for trainees in the development of a post-training project
- The last conversion factor that we highlight is of an organisational nature and is directly interconnected with the two previous ones. It is a question of encouraging the territorialisation of distance training systems through the implementation of various partnerships with the aim of increasing the proximity between learners on the one hand and the local ecosystems of digital actors on the other.

4 Results

The three conversion factors identified correspond respectively to didactic, pedagogical, and organisational dimensions. These interact and influence each other. Together, they help to build capacity to engage with the training system and encourage professional development.

4.1 A Didactic Conversion Factor: Adapting Training Content to Territorial Needs

The importance of linking the content of the training with the real possibilities of pursuing a career in the region was particularly important in Rostrenen insofar as professional opportunities in the digital sector are much less numerous than in large cities. Consequently, during the training, some of the trainees did not see the interest in tackling certain themes such as digital mediation or digital manufacturing because they did not understand how these skills could enable them to increase their professional opportunities. On the other hand, they seemed to be more interested in learning about computer tools and discovering office software that would enable them to pursue careers in the service sector and/or in personal services.

> I don't see why I should learn 3D printing, there's only one Fab Lab in Rostrenen, and it won't be able to hire us all. On the other hand, I was interested in learning about the Office package. I used to be a medical secretary, so maybe it will be useful for me in the future. (Anaïs, interview extract, June 2021)

The cases of Rennes and Brest seem, at first sight, different insofar as the employment pool in the digital sector is relatively large and varied. However, the same need emerged for training to be consistent with the realities of the employment areas. In other words, that training should focus on themes that really lead to business needs, but also and above all that these professions should be accessible to people with little or no higher education.

> Yes, there is work in web development in Brest, I'm sure! However, what I'm wondering is: are they recruiting people like us? People who don't even have a high school diploma! I, for example, dropped out of school in high school. Do you think that with this training I can find a job in the Web field? We're at the end of the course and I still don't know. (Maël, interview extract, June 2021)

Our survey reveals that there was no specific adaptation of the training content to the territorial contexts, these were thought and conceived in an a-spatial way. The trainers of the "Prépa Numérique" schemes justify this by the fact that the training was intended to be "generalist" and "pre-qualifying". From this point on, we observe that the training content turned out to produce ambivalent effects:

Some trainees (more precisely, people who were comfortable with digital technology and described themselves as self-taught), showed a great capacity to self-direct their learning. Indeed, during the lock-in, some learners took the initiative to follow only the courses

that interested them to be able to go deeper into particular areas and acquire enough knowledge to consolidate post-training projects. This freedom to follow only the modules that they felt were of interest to them was tolerated by the teaching staff insofar as these choices could be justified in terms of individual projects and helped to encourage the trainees' commitment to the distance learning system.

Other learners, on the other hand, testify to a perceived lack of meaning regarding the purpose of the skills developed during the training. Individuals undergoing training who express this type of discourse were then faced with an inability to project themselves professionally, which sometimes led them to disengage from the training.

The difference between these two groups of trainees seems to lie in the fact that the first group was able to develop a post-training project independently. Then, regarding their professional objectives, they were able to choose from among the training modules offered by the "Prépa Numérique" schemes those they considered relevant. Consequently, the interviews reveal that the generalist aspect of the content did not have a significant impact on their training path. On the other hand, the learners in the second group do not seem to have had the same capacity to design a post-training project. Thus, overall, they were more dependent on the training content of the "Prépa Numérique" schemes. Moreover, as the content made available was generalist, non-professional and sometimes not very much in line with the professional outlets available, this may have been a negative conversion factor limiting commitment and professional development. In short, it appears that adapting training to the needs of the territory is an essential condition for implementing situations where learning is meaningful and which broadens the socio-professional opportunities of all trainees, especially the less autonomous.

4.2 An Educational Conversion Factor: Informing, Guiding and Accompanying in the Discovery of Local Digital Ecosystems

In correlation with what we have just mentioned, our survey highlighted the need to have sufficient knowledge of the digital ecosystem of the territory to which one belongs (the actors who make it up, their specificities, their organisations, their needs in terms of skills, etc.).

> There is no awareness of what exists, and what may be possible professionally. We don't know what companies are looking for. Are they looking for developers? Community managers? We don't really know what exists in Brest. What is the reality of employment (Caroline, interview extract, July 2020)

It emerged from the interviews that the lack of information about the digital sector has a deleterious impact on the ability to commit to the scheme and to develop a career plan. In this sense, our survey revealed multiple obstacles related to access to information about digital employment in the territories:

It appears that the digital professions are changing, technologies, software and programming languages are evolving rapidly. Moreover, the needs of territories are constantly changing. For example, during the survey, we were unable to meet trainers from the three "Digital Prep" schemes who were able to indicate precisely which digital jobs were in demand. The studies and territorial diagnoses on the issue of digital employment therefore seem to be perceived by the training players as not very enlightening and sometimes contradictory.

However, for the past ten years or so, at national and European level, speeches have been made claiming that the tension in the digital field, and more particularly in the web field, is such that there is a possibility for people with few qualifications to be able to enter this sector of activity (Cap Digital, 2015; European Commission, 2014; Dares, 2015). The scientific literature on this subject shows that the reality is more complex than it seems (Vicente, 2018). Indeed, other studies (INSEE, 2016; report on "needs and supply of training for digital professions") indicate that the skills shortage in the digital sector essentially concerns individuals with an engineering level and not people with few qualifications (like the people initially targeted by the schemes investigated). In this sense, Régis Granarolo, president of the professional association MUNCI (Association professionnelle des informaticiens et métiers du numérique), in an interview concerning the supposed shortage of developers, states that:

> It should be noted that these recruitment difficulties essentially concern the stereotyped and tailor-made profiles that our employers are looking for, i. e. young "multi-skilled" graduates at moderate salaries. (Régis Granarolo, President of the professional association MUNCI, 2013)

Therefore, faced with contradictory discourses, the learners testify to a lack of visibility on the possibilities offered by the territory at the end of the training. This element is an uncertainty that hinders perseverance in the training system as well as decision making concerning the elaboration of a future project.

However, some digital resources were created and disseminated at the end of the training with the aim of facilitating the professional orientation of the trainees of the three schemes (digital document informing about the possibilities of pursuing a qualification, about the organisation of orientation fairs and open days of digital companies). However, for most of the people interviewed, this was not sufficient and seemed to have happened too late in the training. The interviews with the various trainees emphasised that the dissemination of these resources should have been supplemented by individual distance support to enable the design of a post-training professional project.

> You hear that this is a promising sector in terms of recruitment, particularly for the job of web developer, but well ... They tell you that, but then you have nothing concrete. It's just word of mouth. You hear it everywhere: web development is a job in demand. Yes, but where? Why and how can I get started? A trainer to guide me, that's what I was missing. (José, interview extract, July 2020)

In summary, we see how necessary it is to think of distance teaching modalities to accompany the trainees to access and process territorial information. The stake of this factor of conversion is to allow the learners of the devices of the "Digital Prep" to build a realistic individual professional project after training, source of perseverance and motivation.

4.3 An Organisational Conversion Factor: Strengthening Links between Digital Professionals and Learners

The third conversion factor that our survey reveals corresponds to an organisational dimension, closely linked to the two previous ones, and consists of territorialising distance learning by developing links with local players (companies, associations, specialised training bodies, etc.). However, in a context of national confinement, this was particularly complicated. The visits and meetings initially planned were cancelled, although a few exchanges (three to four) with professionals were organised at a distance, but this was probably not enough.

> Because of the confinement, you can't go out, you can't go to open days, you can't organise interviews with professionals, and you can't go out, so it's obviously complicated to meet professionals. For me, it's a pity that there weren't more meetings with developers, that they could explain their job, how much they are paid, that kind of thing ... (José, interview extract, July 2020)

The lack of internships, meetings with professionals and visits to companies has a negative impact on the trainees' ability to develop a career plan. As a result, many interviews point to the lack of partnership with local actors working in the digital sector. According to them, this is an obstacle to involvement in the training scheme.

> As I said, in fact, I think that we really need to spend more time meeting actors in the field, working on the professional project. We should do this, in fact as soon as people enter the training. Because their commitment will depend on it. How can you ask me to be motivated, knowing that when I finish the training I'll be out of work, you know what I mean? That's the reality! That's why for me it's essential to have partnerships with companies. You must set up partnerships with companies that will take people on, that will hire them outright! (Stéphane, interview extract, July 2020)

Thus, our analysis reveals the extent to which it is necessary to involve professionals in a distance learning system to increase the trainees' possibilities for concrete action, which may be partially reduced by the switch to distance learning. According to the trainees interviewed, it seems that the establishment of partnerships could have contributed to the two factors of conversion mentioned above. Indeed, the partner companies and professionals would have been able to orientate the training content regarding the realities on the ground. In addition, they would also have helped to inform the trainees about the specificities of the digital professions in Brittany (programming languages and software used, professional codes, professional opportunities, etc.), which would have been a valuable aid to orientation. Finally, the trainees indicate that the implementation of partnerships would have been relevant to have recruitment commitments from companies in the sector, right from the start of the training.

While the health crisis partly explains the lack of links with digital professionals, during our survey we were able to observe other elements on this subject:

Funded via a call for projects from the Brittany Region, the three "Prépa Numérique" schemes were set up in just a few months. Thus, the trainers were recruited barely a month before the start of the training courses; this time span was obviously not enough to establish solid links with companies in the sector. Moreover, this requires a specific work culture, however, it can be seen that of the 8 trainers of the three "Prépa Numérique" schemes only one came from the world of vocational training, the others belonged to the world of scientific animation, higher education and social support. Moreover, none of the trainers was a digital professional and had no knowledge of the local ecosystems of digital actors.

In the end, it seems to us that the "distances" between training and employment induced by distance learning can be relativised, through meetings with professionals, visits to companies or work placements. Thus, the establishment of partnerships is a lever for encouraging closer relations between learners and professionals in the sector. Our survey highlights that the strengthening of proximity is a constitutive element of "empowering" distance learning environments; it participates in the two conversion factors mentioned above: the adaptation of content to the realities of the sector and the information and guidance of learners. In short, it is a key element in increasing learning and professional development opportunities.

5 Discussion

In the spring of 2020, faced with the health risks caused by the Covid 19 global pandemic, the French government decided to introduce a generalized lockdown. As a result, in the space of a few days, all activities open to the public had to be switched to remote access, which had a strong impact on the three "Prépa Numérique" training programmes. Consequently, this research proposes to question the capacity of engineering companies that have gone through the health crisis to forge links with the digital employment ecosystems to encourage the capacity to learn and develop professionally.

The shift to distance learning appears to have resulted in an overall lack of autonomy support for trainees, particularly in accessing territorial opportunities for learning and professional development. We identify a link between the strengthening of proximities on the one hand (concerning learners and digital professionals) and the increase in opportunities and freedoms to act on the other.

The notion of proximity has been worked on through the current of proximities (Pecqueur & Zimmerman, 2004; Torre, 2009). This field of research aims to objectify the way in which proximities can play a positive role in the coordination of economic agents. The

proximity current is part of an interactionist approach to the economy and seeks to characterise the different forms of interaction between agents, which may be spatial, relational, cognitive, or symbolic in nature. Generally, two types of proximity are distinguished: geographical and organised proximity.

Presented succinctly, geographical proximity refers to objectivable elements such as the distance per kilometre between two entities, the travel time necessary to cover a certain distance per kilometre. The analysis of geographical proximity allows us to look at the location of activities (Paquelin, 2011). Organised proximity, on the other hand, is of a relational nature; the issue is to be interested in the organisation and coordination of activities (Paquelin, 2011). Understood in this sense, organised proximity is developed through two logics: the logic of similarity (individuals share values and group together around a common frame of reference) and that of belonging (individuals group together according to their interactions) (Bouba-Olga & Grossetti, 2008). Thus, to quote the observation made by Jézégou (2019), it seems that there are 'possible distances in physical proximity and possible proximities in geographical distance'.

We have indeed identified that the inadequacy of the content to the specificities and needs of the territory, the absence of a clear vision of digital in Brittany, the lack of links with digital actors have contributed to increase the distance between learners and digital actors, which has generated incapacitating effects clearly stated by the trainees. Conversely, we can see how important it is, according to them, to think of the training environment as a space of intermediation to reinforce the organised proximities and, by way of consequence, the professional opportunities. In this sense, the setting up of an "empowering" distance learning environment must be aimed at developing capacities, understood here as the power to act anchored in a territory (Brittany) and not only in a branch of activity (digital in the broad sense). This seems to be particularly important for the trainees with the most difficulties, the most autonomous ones having done well overall. Insofar as they had the internal conversion factors enabling them to carry out territorial studies themselves, to contact local players and to identify really accessible professional outlets. In short, the survey has made it possible to highlight the extent to which it is necessary to think about the territorialisation of distance learning systems to develop the space of possibilities. This point, which may appear to be a commonplace in relation to vocational training, is nevertheless an aspect often ignored in distance learning. The results of the action (three months after the end of the training) are also indicative of this need:

Brest (26 trainees completed the training): 5 trainees integrated a qualification training, 2 found a job (of which 1 moved outside Brittany), 8 signed an AAQ contract[3] (Accompaniment to Access to Qualification), all the other trainees were outside employment and training.

3 The Brittany Region's aid for support towards qualification is intended for people who have validated a professional project within the framework of a training course. It aims to secure access to a qualification.

Rennes (15 trainees completed the training): 2 trainees integrated a qualification training, 1 found a job as a data entry officer, 5 signed an AAQ contract (Accompagnement à l'Accès à la Qualification), all the other trainees were outside employment and training.

Rostrenen (10 trainees completed the training): 1 learner integrated a qualification training, 1 has a project to create a company, 1 found a permanent job (not related to digital), all the other trainees were outside employment and training.

In summary, the purpose of our article is to underline the importance of thinking about distance training engineering capable of ensuring an intermediation function, with a view to favouring the deployment of proximity and consequently participating in the increase of learning and professional development capacities. A research partnership has been set up with the investigated systems, and the work carried out has made it possible to feed this collaboration by providing avenues for improvement to the "Digital Prep" systems. Thus, among the adjustments made to the current action, many partnerships have been developed and implemented.

6 Annexes

Table 1: The audiences of the "Prépa Numérique en Bretagne" during the 2020 session (April, 2021)

Prépa Numérique Brest	Prépa Numérique Rennes	Prépa Numérique Rostrenen
29 trainees	15 trainees	17 trainees
33.33% under 26 years old	33.33% under 26 years old	55.55% under 26 years old
83.33% baccalaureate level or below	66.66% with a baccalaureate or below	94.4% baccalaureate level or below
26.66% from QPV[4]	26.66% of trainees live outside the agglomeration	100% from ZRR[5]
36.66% women	26.66% women	50% women
3 dropouts (for personal reasons or return to work)	No dropouts	7 dropouts (for personal reasons or return to work)

4 Priority neighbourhoods of the city policy.

5 Rural revitalisation zone.

Table 2: Trainees interviewed for the article (April, 2021)

Interviewees	Background information
José	45 years old, arrived in Spain at the age of 19, trained in wine-making and then did a series of "odd jobs" (Prépa Numérique de Rennes)
Stéphane	31 years old, BTS level in pastry (Prépa Numérique de Rennes)
Caroline	37 years old, third level of education, long-term job seeker (Prépa Numérique de Brest)
Maël	22 years old, holder of a baccalaureate in customer relations (Prépa Numérique de Brest)
Anaïs	22 years old, third year level, worked for a few months in the food industry (Prépa Numérique de Rostrenen)
Jean	46 years old, baccalaureate level, worked several years in Ireland (Prépa Numérique de Rostrenen)

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II Teachers (From Teaching Younger to Teaching Older)

How the COVID-19 Pandemic Changed Swiss Primary School Teachers' Perceptions of Job Stress, Emotional Exhaustion, and Personal Resources – Insights from a Longitudinal Study

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Abstract

As in other countries around the world, teachers in Switzerland have been under great strain since the COVID-19 pandemic, which led to teaching in Switzerland being conducted entirely in distance learning mode for two months, followed by a phase with a hybrid form of teaching and half-class settings. In this context, teachers experienced numerous challenges and the need for constant adaptations. This study investigates changes in pre-primary and primary teachers' perceived stress and personal resources in the distance and hybrid learning phase compared to before the pandemic. Data from 91 teachers in the canton of Zurich were analysed longitudinally using four measurement points before and after the distance education phase.

The results of the analysis of variance with repeated measures show a decrease in job satisfaction and teacher self-efficacy in distance education compared to the previous time points. In contrast, teachers assessed their self-regulation more positively than before the pandemic, while their work overload and emotional exhaustion did not change during the distance education phase. However, our analysis revealed differential trajectories of work overload during distance education. Teachers with a high work overload and emotional exhaustion two years before the pandemic perceived a decrease in work overload while those with low work overload and emotional exhaustion showed an increase respectively. Using latent profile analysis, we identified two profiles, each with a different change in work overload during the distance education phase: teachers with higher resources before the pandemic again showed an increase, whereas the second low resource class showed a decrease in work overload. We conclude that the same job characteristics can be perceived as a demand or as a resource, depending on teachers' personal resources and personality.

Keywords

Job stress, teacher self-efficacy, self-regulation, emotional exhaustion, Job Demands-Resources model

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1 Introduction

As in other countries around the world (for a review, see García-Carmona et al., 2019), teachers in Switzerland had been found to be vulnerable to high levels of stress even before the COVID-19 pandemic (Sandmeier et al., 2017). Nevertheless, the majority of teachers report a high level of job satisfaction (Sandmeier et al., 2017). Stress can result in positive or negative stress reactions (e. g., cognitive activation, joy, monotony, strain), depending on whether the requirements for coping with it exceed an individual's adaptability (Lazarus & Launier, 1981; Rudow, 1994). High levels of stress over a long time, beyond the career entry phase, are considered to affect emotional exhaustion and professional development (Hobfoll, 1989). Whether and to what extent job demands are experienced as stressful and how teachers subsequently deal with them depends on their perception and evaluation of the demands (Rudow, 1994) as well as on their appraisal of coping resources or strategies (Lazarus & Launier, 1981). Such resources can be job resources or also personal resources (e. g., Demerouti & Nachreiner, 2018; Skaalvik & Skaalvik, 2016). Self-regulation and self-efficacy as modifiable personal resources are considered crucial for coping with stress (Klusmann et al., 2009; Mattern & Bauer, 2014; Skaalvik & Skaalvik, 2007). In addition, personality traits (McCrae & Costa, 2008) seem to have an important impact on teachers' well-being, affecting their experiences of stress (Mayr & Neuweg, 2006; Krause & Dorsemagen, 2007; Spinath, 2012).

As a reaction to the COVID-19 pandemic in Switzerland, teaching in kindergarten, primary and middle schools was conducted entirely through distance learning for a two-month period from mid-March to mid-May 2020. During the first opening phase, lessons in primary and middle schools in the canton of Zurich were held in a hybrid form or a half-class setting before classroom lessons were possible again with the whole class. In this context, teachers experienced numerous challenges and constant adaptations in the form of distance learning, half-class teaching, teaching students from absent fellow teachers' classes, and increasingly individualized (online) learning support. The aim of our study was to investigate changes in (pre-)primary teachers' perceived stress in the phase of distance learning compared to teaching before the pandemic. We analysed changes in the amount of stress, emotional exhaustion, and job satisfaction, as well as in personal resources and sources of stress.

1.1 Job Demands-Resources Model

The Job Demands-Resources (JD-R) model proposes that working conditions can be categorized into job demands and job resources (see Figure 1). The model further proposes two relatively independent processes that predict exhaustion, work-engagement and subsequent health and job-related outcomes (Bakker & Demerouti, 2017; Demerouti & Nachreiner, 2019). The first is a health impairment process which derives from a high level of job demands and emotional exhaustion, leading to ill health and occupational

strain. The second process, in contrast, is motivational and begins with good personal and professional resources that result in a high commitment to work and high professional engagement, leading to professional satisfaction and high professional quality (Bakker & Demerouti, 2017). Job resources refer to physical, psychological, social, and organizational aspects of work that help achieve work goals, reduce job demands or the consequences of job demands, and promote professional development (Demerouti et al., 2001). The model emphasizes the importance of workplace characteristics for the development of exhaustion and job satisfaction. More recent versions of the model (Bakker & Demerouti, 2017) also include personal resources in terms of personal beliefs regarding the ability to control one's activities in the work environment (e. g., optimism, self-efficacy) which are proposed to play a similar role as job resources. However, the role of these personal resources has not yet been sufficiently clarified within the JD-R model. We refer to the JD-R model as a framework for considering various aspects of teachers' experience of stress in the COVID-19 pandemic. In the following sections, the different components of the model relevant to our study are described in more detail.

1.2 Job Demands

According to Demerouti et al. (2001), job demands relate to physical, social, and organizational aspects of work that require sustained effort. Teachers are confronted with a variety of tasks and challenges that may be stressful (Neuber & Lipowsky, 2014; Skaalvik & Skaalvik, 2018). The classroom is a place where people with different preferences, abilities, heritage, and perspectives interact. This makes it a highly demanding and stressful work environment for teachers (Smylie, 1999). Risk factors generating chronic stress and provoking burnout syndrome among teachers include "work overload, complementary administrative work, overcrowded classrooms, role stressors, class discipline problems, conflicts with superiors, co-workers and parents, continual education reforms, deficits in training, promotion and professional development, low wages, disruptive attitudes and behaviour by students, deficient school and classroom facilities, poor timetabling and time pressures" (García-Carmona et al., 2019, p. 190). In our sample of teachers at the end of the career entry phase, results from the first survey revealed that they were most strongly affected by the different learning abilities of their students, as well as by a lack of students' motivation and concentration and discipline problems in the classroom (Berweger et al., 2019). Various studies suggest that discipline problems in the classroom and dealing with students who are perceived as difficult are particularly important predictors of teachers' stress (Baeriswyl et al., 2014; Berweger et al., 2019; Schaarschmidt, 2005) and the development of burnout (Krause & Dorsemagen, 2014).

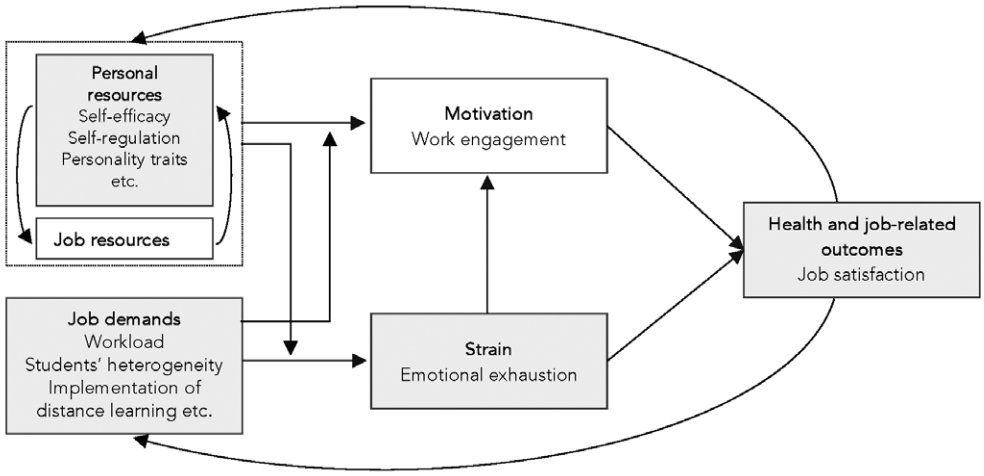

Figure 1: Job demands-resources model adapted from Bakker & Demerouti, 2017.
Note: Aspects addressed in the study are indicated by gray boxes

Due to the pandemic, teachers all over the world faced challenging working conditions, modified tasks and responsibilities, and the introduction of new working methods that increased job demands. For distance teaching, teachers had to learn in very short time how to prepare teaching materials for self-directed learning outside the classroom, how to use digital media in designing learning arrangements, and how to apply new hybrid teaching models without adequate resources or time to prepare themselves. In addition, teachers had to find effective ways to engage and motivate students during online education. A key challenge for teachers was to overcome the distance that had arisen between them and their students and to use digital tools for this purpose (Huber et al., 2020). According to a review of studies during the lockdown, about 10% to 38% of teachers felt insufficiently competent to provide adequate learning opportunities in distance education (Helm et al., 2021). About half of the teachers indicated that distance education caused them major challenges (Helm et al., 2021). In a survey in North Rhine-Westphalia (NRW, a federal state of Germany), 84% of the teachers surveyed reported a subjective impression of an increased workload due to the pandemic (Hansen et al., 2020). Teachers in Switzerland also reported a greater workload due to distance teaching (Garrote et al., 2021). Maintaining communication with students who had insufficient access to technical equipment (Gold et al., 2020; Dreer & Kracke, 2021) and problems with students' ability and motivation for self-regulated learning as key challenges in the pandemic were also identified as major stress factors (Dreer & Kracke, 2021; Garrote et al., 2021). In our study, we examined both, stress due to requirements specifically relevant for the distance education and stress caused by general professional characteristics.

1.3 Personal Resources

In the JD-R theory, personal resources refer to beliefs and attitudes people have regarding the sense of controllability of their environment, for example optimism or self-efficacy beliefs (Bakker & Demerouti, 2017). Personal resources play an important role in the development and management of negative strain, with personality traits also having both a direct and indirect effect on the experience of strain (Affolter, 2019). Neuroticism is considered an important predictor of stress experience and job satisfaction (Affolter, 2019; Keller-Schneider, 2009; Klusmann et al., 2012) and contributes to the explanation of differences in emotional exhaustion (Klusmann et al., 2012). In contrast, high extraversion tends to be associated with a more favourable perception of demands (Keller -Schneider, 2009) and a lower risk of burnout (Cramer & Binder, 2015).

Self-efficacy, according to Zimmerman and Cleary (2006), can be defined as a belief about what a person can do and achieve in a given situation, and how well he or she will succeed in these accomplishments. In the teaching profession, self-efficacy refers to "individual teachers' beliefs in their own ability to plan, organize, and carry out activities that are required to attain given educational goals" (Skaalvik & Skaalvik, 2007, p. 612). Self-efficacy is fed by an individual's own earlier experiences of success and failure in accomplishing their tasks (Bandura, 2006). It also determines how environmental opportunities and impediments are perceived, and therefore influences people's goals, values, and behavior (Bandura, 2006). Thus, strong self-efficacy beliefs may diminish the experience of teacher stress (Klusmann et al., 2009; Skaalvik & Skaalvik, 2007). In accordance with this, studies have found that teacher self-efficacy influenced teachers' perceptions of stressors in school (Collie et al., 2012; Klassen & Chiu, 2010, 2011). Conversely, emotional exhaustion as a result of prolonged high stress also negatively predicts teacher self-efficacy (Kim & Buric, 2020). The positive influence of teacher self-efficacy on teachers' job satisfaction is well-established (Caprara et al., 2006; Klassen et al., 2009).

A longitudinal study among German teachers in May 2020 showed an increase in teacher self-efficacy compared to before the pandemic (Weißenfels et al., 2021). Other studies, concentrating on self-efficacy factors related to the distance learning situation, found lower values for teacher self-efficacy (Cataudella et al., 2021), engagement efficacy, and instructional efficacy during COVID-19 compared with normative samples before the COVID-19 pandemic (Pressley & Ha, 2021). The findings of a study of Chinese teachers indicate that teacher self-efficacy significantly improved for the application of technology, but not for online instruction during the COVID-19-pandemic (Ma et al., 2021). Finally, general self-efficacy was found to mediate teachers' difficulties with the new job demands of organizing distance learning and the associated perceptions of stress (Rabaglietti et al., 2021).

Self-regulation is assumed to be another important personal resource for teachers in dealing with stress (Mattern & Bauer, 2014). It is defined as the ability to control one's own thoughts, emotions, and behaviour in the pursuit of short- or long-term goals (Zimmerman, 2000). It is also aimed at maximizing the individual's long-term interest, which leads people to control their impulses and pay attention to their well-being (Sitzmann & Ely, 2011). Self-regulation indicates the ability to engage oneself while simultaneously monitoring one's own behaviour and, in stressful situations, find ways to cope adaptively (Kunter et al., 2013). The ability to self-regulate is a competence rather than a stable behavioural disposition, but it is influenced by personality traits. Depending on an individual's personality, more or less self-regulation is required to balance personal needs and work demands (Spinath, 2012). From a social-cognitive perspective, self-efficacy plays a prominent role in self-regulatory processes because it controls the perception and assessment of demands (Bandura, 1986, 2001). Confidence in one's own efficacy is of fundamental importance for successful self-regulation. Thus, while the two personal resources of self-efficacy and self-regulation interact with each other, their interplay has so far received little attention (Affolter, 2019). On the other hand, teachers' self-regulation has been found to predict lower levels of emotional exhaustion (Schaarschmidt & Fischer, 2013; Mattern & Bauer, 2014). To our knowledge, there has been no study examining changes in teacher self-regulation during the COVID-19 pandemic. We use our longitudinal sample to analyse the development of teacher self-efficacy, as well as self-assessed self-regulatory competence, during the challenging period of the pandemic on which our study focused.

1.4 Strain and Emotional Exhaustion

According to Rudow (1994; 1999), strain, based on Lazarus's transactional model of stress and coping (1966), is a reaction to high demands or stress that cannot be adequately coped with over a long time. Prolonged negative strain, in turn, increases the risk of negative strain consequences for mental and physical health. Emotional exhaustion as the key dimension of burnout is often seen as such a health consequence (e. g., Demerouti et al., 2001; Schaufeli & Enzmann, 1998). Emotional exhaustion refers to a negative, job-related (subclinical) psychological quality of experience that occurs when job demands exceed available resources over time (Hobfoll, 1989). Emotional exhaustion is manifested by low energy and chronic fatigue (Maslach et al., 1996; Skaalvik & Skaalvik, 2015). Research shows that teachers' emotional exhaustion is strongly related to their working conditions (job demands) and, can be predicted by workload, for example (Pogere et al., 2019; Skaalvik & Skaalvik, 2015).

In a study conducted among German primary school teachers, 60% experienced teaching to be significantly more strenuous during the COVID-19 pandemic compared to before, primarily due to the enforcement of corona protection measures for students (Hansen et al., 2020). In the same study, a majority of teachers (78%) reported having subjectively experienced an increase in emotional exhaustion especially those, who were already severely exhausted at the onset of the pandemic (Hansen et al., 2020). In contrast, a longitudinal

study found that teachers' emotional exhaustion, different than the other dimensions of burnout, did not increase during the period of distance learning (Weißenfels et al., 2021).

1.5 Job Satisfaction

Teachers' job satisfaction refers to their "affective reactions to their work or to their teaching role" (Skaalvik & Skaalvik, 2011a, p. 1030). Despite the high stresses and demands, most teachers are very satisfied with their profession (Schult et al., 2014). Job satisfaction can be primarily attributed to aspects of work content (Sandmeier et al., 2017). Furthermore, not only job resources, including positive social relations with colleagues and supervisory support, but also the experience of congruence of the prevailing goals and values of the school with the personal values of the teachers, have a positive impact on job satisfaction (Skaalvik & Skaalvik, 2011a, 2011b). In addition, and in line with the JD-R theory (Bakker & Demerouti, 2017), job satisfaction can also be explained by the absence of stress factors, or with a good ability to cope with stress and correspondingly low levels of emotional exhaustion. Good personal resources, such as self-efficacy and self-regulation, also contribute to high job satisfaction (e. g., Klassen & Chiu, 2010).

To date, relatively little is known about teachers' job satisfaction during COVID-19. However, according to Hansen and colleagues (2020), teachers in NRW had high job satisfaction during the COVID-19 pandemic. The vast majority (87%) experienced no subjective change in their job satisfaction due to the pandemic, with only 12% perceiving a decline. In our study, we not only describe subjectively experienced changes in teachers' job satisfaction, but also examine changes compared to previous measurement time points.

1.6 The Present Study

The present study aims to determine the job demands teachers experienced as particularly stressful in distance learning during the lockdown. It further contributes to a better understanding of whether the experience of work overload, emotional exhaustion, and job satisfaction as well as teacher self-efficacy and self-regulation have been altered by the impact of the first lockdown of the COVID-19 pandemic. The current state of research does not allow us to draw hypotheses about changes in teachers' self-efficacy and self-regulation during the lockdown. Based on previous findings on teachers' workload during the lockdown (Garrote et al., 2021; Hansen et al., 2020), we expect a) work overload to be higher at measurement time point t4 than at the earlier time points (t1, t2, t3). We do b) not expect changes in emotional exhaustion at t4 compared to t1, t2, and t3. On the one hand, this hypothesis is theoretically justified, since the development of emotional exhaustion is considered to be a long-term process (Rudow, 1994; 1999). On the other hand, it is also in line with a recent result on the trajectory of emotional exhaustion during the first lockdown of the COVID-19 pandemic (Weißenfels et al., 2021). Although teachers' workload during the lockdown was particularly high, only about half of the teachers perceived distance learning as a major challenge and thus potentially as work overload (Helm et al., 2021).

This leads us to hypothesise that c) there are interindividual differences and corresponding differential effects in work overload in response to the COVID-19 pandemic at t4. To examine such differential effects, we test if the development of work overload between t4 and the earlier the measurement time points (t2 and t3) differs depending on teachers' work overload, emotional exhaustion, self-regulation skills or teacher self-efficacy at t1 before the pandemic. Moreover, we explore if there were specific profiles in personal preconditions based on which teachers reacted differently to the demands of the lockdown.

2 Methods

This study is part of a larger research project on early-career teachers' self-management, including self-regulation and goal pursuit, in the context of a professional development programme. The project was designed as an experimental field study and aims to compare intervention settings designed to promote self-management skills and goal pursuit, and to examine the extent to which they affect teachers' experience of stress, self-efficacy, and self-regulation. The implementation of the training took place in January 2018, embedded in a three-week in-service training course for teachers at the Zurich University of Teacher Education at the end of the induction phase of teachers in the canton of Zurich. Teachers completed a comprehensive online questionnaire at several time points: before the training in December 2017 (t1) and after the training in June 2018 (t2), December 2018 (t3) and June 2020 (t4). The last measurement time point (t4), after the first lockdown of the COVID-19 pandemic, was specifically designed and conducted to examine the impact of the pandemic on teachers' perception of job stress, emotional exhaustion and job satisfaction, as well as on their personal resources.

2.1 Sample

Our longitudinal sample with additional t4-data on the lockdown phase ("lockdown-sample") consisted of 91 teachers in the canton of Zurich, of whom 67 were primary/middle school teachers and 24 kindergarten/pre-school teachers. We only included those teachers in the analysis who had participated in all four, including the t4 surveys (33.3% of the total sample). At the time of the initial survey, the teachers were between 23 and 53 years old with a mean age of 28 years. They had completed their teacher training between 2013 and 2016. About 40% (n = 38) of the participants had been part of the intervention group in the self-management training course. At the time of the last survey (t4), they had had between five and seven years of professional experience.

2.2 Instruments

Teacher self-efficacy was measured using five items from Schwarzer and Schmitz's (1999) scale. For example, "I am confident that I can make good contact with problematic students if I make an effort to do so". Responses were given on a 4-point Likert-scale from

"disagree" (1) to "agree" (4). Cronbach's alpha for the scale was between $\alpha = .614$ (t1) and $\alpha = .738$ (t2).

Self-regulation was assessed using the instrument developed by Mattern and Bauer (2014). Their scale focuses on cognitive aspects of self-regulation. It includes 11 items from three subscales: *action plan* (e. g. "Before I start an extensive task, I determine how I will proceed"), *performance control* (e. g. "In a difficult activity, I can specifically look at the positive sides"), and *attention control* (e. g. "I can keep my mind from constantly wandering from the task at hand"). Participants were asked to rate the items about their work behaviour on a 4-point Likert-scale from "disagree" (1) to "agree" (4). Cronbach's alpha was between $\alpha = .754$ (t1) and $\alpha = .860$ (t4).

Job satisfaction was assessed using three items of the German translation of the LAKS-DOC (Sann, 2003). The items were "I really enjoy my job" and two items which were slightly adjusted for survey t4: "I found my profession really interesting during distance learning", and "If I could choose again, I would become a teacher again – also against the background of my experiences during the lockdown". Responses were given on a 5-point scale from "does not apply" (1) to "applies" (5). Cronbach's alpha for job satisfaction was between $\alpha = .628$ (t3) and $\alpha = .789$ (t1).

Work overload was measured with the work overload subscale of the job stress inventory of Enzmann and Kleiber (1989). The measure contained five items for stress regarding responsibility, time pressure, overload, and bad conscience towards the students. One item was slightly adjusted for the fourth measurement point: "Being responsible for the children's successful learning put a lot of stress on me." Responses were given on a 5-point scale from "does not apply" (1) to "applies" (5). Cronbach's alpha was between $\alpha = .627$ (t4) and $\alpha = .764$ (t2).

Emotional exhaustion was assessed using three items of the Maslach Burnout Inventory (in the German version of Baumert et al., 2008). The participants rated statements indicating that their work made them feel emotionally drained or exhausted. The items were "I often felt exhausted at school (t4 "at work")"; "I noticed more often in school (t4 "at work") how listless I was"; "Sometimes I felt really depressed at the end of a school day (t4 "workday")". Responses were given on a 4-point scale from "does not apply" (1) to "applies" (4). Cronbach's alpha was between $\alpha = .631$(t4) and $\alpha = .740$ (t2).

Stress factors were measured using 11 items from the questionnaire developed by van Dick (2006). The items describe the experience of stress due to working conditions inside and outside the classroom. Different areas of job demands were rated by teachers according to how stressful they experienced them as being. The teachers subjectively assessed the extent of their stress for learning and teaching-related characteristics, for example: "lack of motivation or ability to concentrate on the part of the students", as well as for working

conditions outside the classroom, for example "problems with parents". Responses were given on a 6-point scale from "not at all stressful" (1) to "very stressful" (6).

The personality factors *neuroticism and extraversion* were assessed only in the baseline questionnaire at t1 with four items from the short version of the Big Five Inventory (Rammstedt & John, 2005). The questions for neuroticism capture aspects of a person's emotional instability, such as anxiety: "I worry a lot". Cronbach's alpha for the neuroticism scale was α =.772. The items measuring extraversion refer to how sociable or, conversely, how reserved people are in social interactions: "I am outgoing, I am sociable"; or "I am more of a taciturn, silent type". Responses on all items measuring personality were given on a 5-point scale from "very inaccurate" (1) to "very accurate" (5). Cronbach's alpha for this subscale was α = .838.

These instruments were supplemented by *four open questions*: Two questions capture the main individual challenges of distance learning in terms of learning and development, and in terms of teamwork and parent collaboration. A third, open-ended question concerned the period after the lockdown, and a fourth question covered challenges and areas where teachers perceived a lack of support.

2.3 Data Analysis

The quantitative data were analysed using the statistical software package SPSS (version 27; IBM) and Mplus8 (version 1.6). Since only 33% of the teachers participated in the t4 survey on stress in the first lockdown of the COVID-19 pandemic, the first step was to check whether the longitudinal lockdown-sample differed systemically from the reference sample without t4 data. For this purpose, the mean values of all relevant scales of the measurement time point t1 of the lockdown-sample were compared with those of the reference sample using t-tests. To describe which job demands were experienced as stressful by the teachers in the lockdown, the items relating to the stress factors in distance education were evaluated descriptively in the next step. Changes in stress factors from t3 to t4 were analysed using repeated measures ANOVAs for stress factors of which t3 data were available. To supplement these quantitative analyses of stress due to working conditions, the responses to the open-ended questions were analysed using content analysis. The answers were coded using deductively created categories. To test whether teacher self-efficacy, self-regulation, job satisfaction, work overload, and emotional exhaustion differed between the four measurement time points across all individuals, analysis of variance with repeated measures was performed for all variables. In these analyses, we controlled for the influence of participation in the self-management training.

To examine whether the work overload has developed differently between the measurement time points (t3 and t4) depending on the previous (t1) level of teachers work overload, emotional exhaustion, self-regulation skills or teacher self-efficacy the t1 values were z-standardized and converted into dichotomized variables (with the median as the cut-off

value). The dichotomous variables were added as between subject factors to repeated measures ANOVAs with participation in self-management training (yes/no) as a covariate. In the next step we conducted a latent class analysis (LPA) in Mplus (Muthén & Muthén, 1998–2018) to identify different types of personal preconditions for coping with stress. The aim of LPA (Vermunt & Magidson, 2002) is to generate a categorical variable to explain the associations between continuous observed indicators. We classified teachers based on in-person variable at t1 known to affect teachers' coping with stress: neuroticism, extraversion, teacher self-efficacy and self-regulation. All grouping variables for the LPA were normalized in advance by a z-score transformation. Two outliers with extreme values in the variables concerned were removed from the analysis. For model selection the sample-adjusted Bayesian Information Criterion (BIC) indicating goodness of fit, with smaller values indicating better fit (Nylund et al., 2007) and Entropy (Celeux & Soromenho, 1996), indicating the certainty in the estimation, with values above 0.7 considered sufficient (Nylund et al., 2007; Geiser, 2009) were taken into account. As the BIC tends to lead to an overextraction of classes however, additional classes should be considered only if they represent more than variations of types already present in solutions with fewer classes, additional criteria were considered as well (Specht et al., 2014). We decided for the final LPA model based on a mix of statistical indicators and theoretical considerations (Nylund et al., 2007).

3 Results

The longitudinal lockdown-sample (t4) did not differ from the rest of the samples in terms of any of the following variables used in the study: neuroticism, extraversion, self-regulation, teacher self-efficacy, work overload, emotional exhaustion, and job satisfaction at t1. There were no significant differences in the lockdown-sample compared to the rest of the sample according to t-tests[2].

These results of the descriptive analysis indicated that during the lockdown the teachers perceived the heterogeneity of the students concerning their different learning preconditions, as well as the students' migration backgrounds as particularly stressful (see Table 1).

2 The lockdown-sample did not differ from the reference sample in any of the variables: neuroticism of lockdown-sample (M = 2.33 SD = .74), reference sample (M = 2.39, SD = .78), t(265) = .57, p = .57; extraversion of the lockdown-sample (M = 3.99 SD = .84), reference sample (M = 4.11, SD = .78), t(265) = 1.08, p = .27; teacher self-efficacy of the lockdown-sample (M = 3.29 SD = .37), reference sample (M = 3.31, SD = .37), t(265) = 1.13, p = .27; their self-regulation of the lockdown-sample (M = 3.08 SD = .41), reference sample (M = 3.10, SD = .40), t(265) = 1.06, p = .29; job satisfaction of the lockdown-sample (M = 4.48 SD = .59), reference sample (M = 4.49, SD = .61), t(265) = .77, p = .77; work overload of the lockdown-sample (M = 2.29 SD = .65), reference sample (M = 2.28, SD = .65), t(265) = -.36, p = .72; exhaustion of the lockdown-sample (M = 2.08 SD = .70), reference sample (M = 1.81 SD = .58), t(265) = .77, p = .50.

Table 1: Means, Standard Deviations, and Repeated Measures ANOVA Statistics
Note. *p <.05 **p <.01 ***p <.001

Stress Factors for Teachers in (Distance) Education	Lockdown (t4)		Pre-lockdown (t3)		ANOVA		
I feel stressed by...	M	SD	M	SD	F(df1, df2)	f	n
Different learning preconditions of students	4.27	1.52	4.12	1.40	0.64 (1, 84)	0.09	85
Difficulties with migration background of students	3.51	1.66	2.31	1.38	32.81 (1, 85)***	0.62	86
Preparation and follow-up of [distance] learning	3.54	1.27	2.81	1.24	25.10 (1, 85)***	0.54	86
Implementation of distance learning	3.41	1.38					88
Difficulties with accessibility of individual students	3.38	1.57					87
Difficulties with IT equipment of individual students	2.76	1.73					87
Difficulties with parents	2.63	1.45	3.12	1.64	4.14 (1, 83)*	0.22	84
Difficulties with the software/digital media	2.54	1.47					87
Difficulties with school IT	2.22	1.50					88
Difficulties with the IT infrastructure in the home office	1.89	1.33					88

The analysis of variance with repeated measures revealed, that compared to t3 teachers felt more stressed by difficulties due to the migration backgrounds of students and by the preparation and follow-up of distance learning compared with the preparation and follow-up of lessons at school. In contrast, the stress caused by problems with parents decreased in the distance mode (t4) compared to t3. The descriptive distribution of the frequencies showed that most teachers (74%) found the students' diverse learning prerequisites to be (very) stressful. About half of the teachers in the survey considered the preparation (49%) and follow-up (53%), as well as the implementation (52%) of distance education, problems in connection with students' migration backgrounds (57%), or the accessibility of students (51%) as stressful. In contrast, the majority of teachers experienced problems with parents (72%), problems with the IT equipment of the students (64%), the school (77%) and the home office (86%), as well as with software or digital media (74%) as not stressful.

The qualitative analysis of the open-ended questions revealed that the most frequently mentioned challenges in distance learning were the heterogeneity of the learners and their corresponding adaptation to different individual learning modes, as well as providing sufficient support to weaker students to avoid widening the achievement gap. The second

most frequently cited challenge of distance education was the lack of support for some children in the non-formal learning setting at home. Many teachers mentioned the lack of social contact and exchange among colleagues as a challenge. Likewise, some of the teachers found it a challenge to create appropriate and motivating learning assignments for independent learning at home that supported and promoted self-directed and self-organized work. Many teachers experienced good and not particularly challenging cooperation with parents. However, difficulties in reaching some parents/families or the fact that some parents were very dissatisfied with the situation were also mentioned. Finally, some teachers also found the team collaboration and coordination challenging, especially because there was no preparation time for joint planning and arrangements before the lockdown. The teachers mentioned the following challenges in the transition phase after the lockdown: great uncertainty and a high workload due to catching up on learning deficits, and adjustments to constantly changing requirements, for example, in half-class teaching.

3.1 Changes in Strain, Job Satisfaction, and Personal Resources

Analysis of the longitudinal data revealed changes at the time point after the first lockdown of the COVID-19 pandemic (t4) compared to earlier time points in teacher self-efficacy, self-regulation, and job satisfaction (see Table 2). For work overload and emotional exhaustion, the analysis revealed no effect of time, indicating that both variables did not change significantly across the four time points.[3]

Table 2: Means, Standard Deviations, and Repeated Measures ANOVA Statistics with Greenhouse-Geisser Correction

Variable	t1		t2		t3		t4		ANOVA			
	M	SD	M	SD	M	SD	M	SD	F(df1, df2)		f	n
Teacher self-efficacy	3.29[a]	.37	3.28	.42	3.26	.42	3.12	.43	3.45	(2.49, 186.77)[*]	.22	76
Self-regulation	3.05[a]	.43	3.06[a]	.40	3.12	.39	3.21	.42	8.53	(2.60, 205.71)[***]	.29	81
Job satisfaction	4.51[a]	.46	4.42[a]	.52	4.42[a]	.55	3.82	.74	16.95	(1.97, 147.49)[***]	.71	77
Work overload	2.29	.65	2.20	.69	2.28	.67	2.37	.70	1.40	(2.81, 208.27)	.14	76
Emotional exhaustion	2.08	.70	2.04	.71	2.10	.70	2.06	.79	1.27	(2.23, 167.22)	.13	74

Note: ANOVA = analysis of variance; f = effect size f according to Cohen (1988); SMT self-management training was included as covariate to the analysis to control for.
a = differs from t4 according to Bonferroni-corrected pairwise comparisons. In between the other measurement time points, variables did not differ.
[*]p < .05 [**]p < .01 [***]p < .001

3 Regression analyses identified no significant predictors of work overload, emotional exhaustion, and job satisfaction at t4.

Analysis of variance with repeated measures and dichotomous variables of self-regulation, teacher self-efficacy, work overload and emotional exhaustion (t1) as between subject factors and self-management training as covariate were used to test individual differences in the development of work overload between before (t3) and after the first lockdown of the COVID-19 pandemic (t4). The results showed no effect of time but a significant moderation effect of previous level of work overload (t1) on the development of work overload from t3 to t4 ($F(1) = 5.06$, $p = .027$, $\eta p^2 = .058$, $n = 86$). The effect size f, in accordance with Cohen (1988), was .25 and corresponds to a medium effect. For teachers with a low work overload at t1 work overload increased between t3 and t4. For teachers with a high work overload at t1, work overload decreased between t3 and t4. Similarly the analysis for a moderation effect of previous emotional exhaustion (t1) on the development of work overload between t3 and t4 revealed a trend ($F(1) = 3.97$, $p = .050$, $\eta p^2 = .046$, $n = 86$, $f = .22$). Teachers with high emotional exhaustion at t1 showed a tendency for work overload to increase from t3 to t4, whereas for teachers with low emotional exhaustion at t1, work overload tended to decrease between t3 and 4. No moderation effects were found for self-regulation and teacher self-efficacy (t1).

As a next analytical step, we applied a LPA to group teachers into distinct classes according to personality factors and personal resources related to teachers' coping with stress. A latent profile class model consisting of two patterns was selected because the BIC adjusted score for two classes (939) was only slightly higher compared with the solutions with three (927) and four classes (916), which suggested weak evidence (Raftery, 1995). Moreover, the solution with two classes had a higher entropy (.798) compared to the solutions with three (.744) and four classes (.784). The average latent class probabilities for most likely latent class memberships were the highest for the solution with two classes (class 1= .918, class 2 = .954). Another argument in favour of the solution with two classes was that the additional classes each represented only variations of the two-class solution, not qualitatively different types of personal preconditions. Finally, the two-class solution was chosen as the final model for reasons of ease of class interpretability.

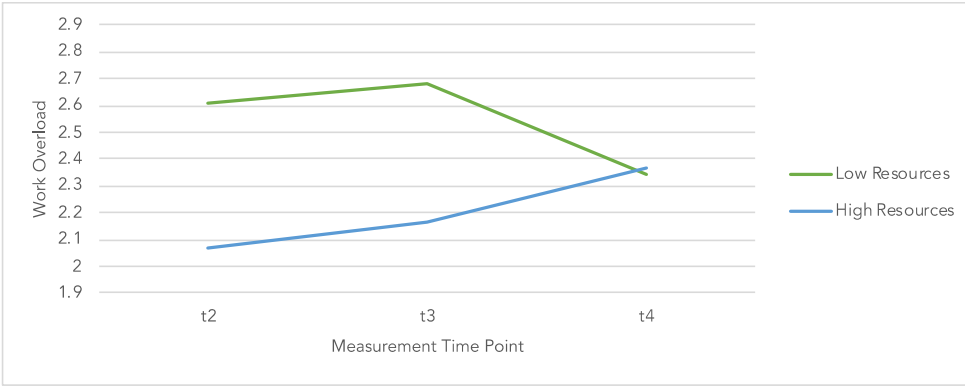

Figure 2: Work Overload of the 'High Resources' and 'Low Resources' Classes Before (t2, t3) and After the Lockdown (t4)

The first class ('high resources') characterized 69% of the participants (n = 62). This group showed high teacher self-efficacy (M = 3.34, SD = .34) and self-regulation (M = 3.13, SD = .33), low neuroticism (M = 2.10, SD = .62), and high extraversion (M = 4.46, SD = .46). Thus, it comprised those teachers who reported good personal resources before the pandemic. The second class ('low resources') included 30% of the participants (n = 27). Teachers in this group showed low teacher self-efficacy (M = 3.06, SD = .32) and self-regulation (M = 2.96, SD = .33), combined with relatively high scores on neuroticism (M = 2.76, SD = .69), and low scores on extraversion (M = 2.98, SD = .50).

First, we compared the groups in terms of demographic characteristics (age and school level). The results from chi-square tests showed that the two groups did not differ in terms of school level (kindergarten vs. primary and middle school) χ^2 (1) = .29, p =.59. The results from the t-test showed that the groups also did not differ in terms of age, t(87) = .74, p = .63. The comparison of development in work overload between the 'high resources' and 'low resources' groups, using ANOVA with repeated measures, class as between subject factor and self-management training as covariate showed that the classes differed in the development of work overload between measurement time points t3 and t4 (F(1) = 7.45, p = .008, ηp^2 = .084, n = 81). The effect size f .30, indicated a medium effect according to Cohen (1992). While teachers in the 'high resources' class perceived an increase in work overload during the lockdown, work overload of those in the 'low resources' class decreased in the same period (see Figure 2).

4 Discussion

Our longitudinal sample provided a unique opportunity to investigate the trajectories of teachers' stress and personal resources during the challenging time of the first lockdown of the COVID-19 pandemic.

4.1 Job Demands and Stress

The first objective of our study was to describe which requirements of distance education teachers experienced as being stressful. By far the most stressful aspect for teachers during distance education was students' different learning abilities. This is not only reflected in the quantitative analysis, but also in the analysis of the open questions. This finding is consistent with the survey two years before the pandemic. However, the results of the current survey were more accentuated. Presumably, differing abilities to self-regulated learning, a factor which has been shown to be particularly stressful in distance learning (Dreer & Kracke, 2021; Garrote et al., 2021), may have exacerbated the strain of heterogeneity. In addition, the majority of teachers perceived problems related to students' migration backgrounds to be a cause of stress. However, it remains undetermined what exactly the issues were which teachers perceived as stressful. Possible explanations might include language problems, language-related difficulties in parental support for learning, culturally different expectations of school, or problems related to socioeconomic status (e. g., availability of equipment, IT-infrastructure), or educational resources of the parents which are linked with the migration backgrounds of the students (Federal Statistical Office, 2021), which may have led to a loss of support for the children in distance learning (Bremm, 2021). It is not possible to assess with the available data if the reported problems were actually caused by the migration backgrounds of the students or if problems were simply attributed to the migration backgrounds by the teachers (Chamakalayil et al., 2022). The challenge of reaching students, partly due to poor technical equipment, which has been highlighted in other studies (Dreer & Kracke, 2021; Gold et al., 2020; Huber et al., 2020), was only partially reflected in our survey. About half of the teachers felt stressed by the difficulties in reaching students. However, only about one third perceived IT problems as a source of stress. Problems in reaching students seemed to be more dominant at higher school levels than at kindergarten, primary, and middle school level. The latter were less dependent on functioning technology for their distance learning than teachers at higher school levels. Moreover, students in Switzerland are comparatively well-equipped with IT (Reimers & Schleicher, 2020). It has also been found that the learning difficulties of students from educationally disadvantaged families were less due to a lack of technical equipment than to difficulties in self-regulated learning and lack of parental support (Huber & Helm, 2020). Slightly more than half of the teachers experienced the preparation, follow-up, and implementation of distance learning as rather or very stressful and as more stressful than preparation and follow-up of lessons at school. This might be due to the great challenge

of the new didactic forms in distance learning for which, according to Helm et al. (2021), some teachers felt poorly prepared.

4.2 Changes in Job Strain, Job Satisfaction and Personal Resources

Teachers had significantly lower job satisfaction in the distance education phase during the COVID-19 pandemic, whereas their work overload and emotional exhaustion did not change compared to the measurement time points during the period of 2.5 years before the pandemic. Regarding personal resources, our analysis showed a significant increase in teachers' perceptions of their own self-regulation compared to previous measures (t1 and t2), and yet a significant decline compared to t1 in teacher self-efficacy in distance education. Thus, hypothesis a) according to which work overload increases on average across the entire sample, must therefore be rejected. This contradicts the finding of an overall self-assessed increase in workload and strain by Hansen et al. (2020). Hypothesis b) that emotional exhaustion did not change during the lockdown, can be confirmed. This is consistent with the result of the study of Weißenfels and colleagues (2021), who found that the burnout components depersonalization and lack of accomplishment significantly increased from the pre- to the post-lockdown survey, whereas emotional exhaustion did not change longitudinally. The result also aligns with the theoretical assumption that emotional exhaustion only occurs when work demands exceed available resources over an extended period (Hobfoll, 1989). Apparently, teachers were able to cope with the increase in workload, or the strain caused by the challenge of distance learning, for that short period during the first lockdown possibly by increasing their self-regulation (Sitzmann & Ely, 2011). The increase in self-regulation at t4 could be interpreted as an indication that teachers strengthen their efforts to self-regulate in response to more demanding conditions. In addition, it seems important to distinguish the strain of distance learning during the lockdown from that in the post-lockdown period. The teachers in Hansen and colleagues' study (2020) felt particularly exhausted by the enforcement of protective measures at school. In contrast, our survey, as well as that of Weißenfels and colleagues (2021), referred explicitly to the lockdown situation.

The decline in teacher self-efficacy due to the distance learning is consistent with the theoretical assumption that self-efficacy changes steadily based on experiences of success and failure (Bandura, 1986; Kim & Buric, 2020). In addition, it is also consistent with the findings of other studies on the effects of the COVID-19 pandemic on teacher self-efficacy (Cataudella et al., 2021; Pressley & Ha, 2021). It can be assumed that the lockdown presented many new challenges for teachers. As at least some teachers did not consider themselves capable of meeting these demands (Huber et al., 2020; Helm et al., 2021), it seems plausible that they experienced more professional failures than before the COVID-19 pandemic. More specifically, our qualitative analyses show that some of the teachers felt that they were not able to reach certain students during the lockdown. Many of the teachers failed to motivate some of their students to learn independently and were

not able to support their self-regulated learning adequately. They sometimes felt helpless when they found that the learning deficits of some students were increasing. This loss of control and the partial impossibility to succeed in dealing with heterogeneity, which is a core task of the profession, is a probable reason for the decreased self-efficacy. In addition, the great uncertainty of the situation, with constantly changing regulations in the transition phase after the lockdown, also represented a loss of control and a stressful situation for the teachers, as the analysis of the qualitative questions clearly showed. Accordingly, teacher self-efficacy should return to its original level once regular on-site teaching returns to normal. However, there are also studies on the impact of COVID-19 pandemic that found a positive change in teacher self-efficacy (Ma et al., 2021; Weißenfels et al., 2021). There may have been improvements in specific aspects of teacher self-efficacy, such as self-efficacy in technological applications for teaching (Ma et al., 2021). In this area, in contrast to the difficulties described above, many teachers had the opportunity for mastery experiences.

As a result of the COVID-19 pandemic, the working conditions of teachers have changed significantly. While distance education met the new requirements in terms of handling the technology, adapting didactics, and maintaining contact with students from a distance (Helm et al., 2021), important job resources, such as direct social contact, were missing during the phase of distance learning. If we take this into account, it is not surprising that teachers' job satisfaction worsened in the survey carried out during the lockdown compared to the earlier time points. This is in contrast with results from other studies, revealing that most teachers had not perceived a deterioration in their job satisfaction (Hansen et al., 2020).

4.3 Interindividual Differences in Changes of Job Strain and Job Satisfaction

We found support for hypothesis c) regarding interindividual differences in the development of work overload due to the demands of the lockdown, depending on teachers' characteristics, using two different analytical strategies. Firstly, using median splits of variables measuring personal resources, work overload, and emotional exhaustion at t1, we tested different trajectories of work overload from t3 to t4. This showed that teachers who had exhibited high work overload and emotional exhaustion at t1 showed a decrease in work overload from t3 to t4, whereas those with low work overload and emotional exhaustion at t1 showed an increase in work overload after the lockdown compared to t3. Thus, unlike Hansen and colleagues (2020), the lockdown did not show a reinforcing effect on the strain of already exhausted teachers in our study. This reinforcing effect does not yet seem to manifest in the lockdown in spring 2020. Rather, it possibly occurred only after the lockdown due to the great uncertainty and the constantly changing protective measures that had to be implemented, maintained, and enforced and that required a great deal of flexibility. It is conceivable that the distance mode was also used in part by highly

exhausted teachers to reduce their effort for work. However, we do not have data on working hours to test this hypothesis.

Second, we conducted LPA to identify different teacher classes with self-regulation, teacher self-efficacy, neuroticism, and extraversion (t1), which were found to be relevant predictors of teachers' coping with work stress. We identified two classes of teachers with different profiles of personal resources. The first, 'high resources' class showed high teacher self-efficacy and self-regulation, low neuroticism, and particularly high extraversion. Conversely, the second, 'low resources' class was characterized by low teacher self-efficacy and self-regulation, high neuroticism, and low extraversion. The two profiles showed a different development of strain between pre- to post-lockdown surveys: while work overload increased in the 'high resources' class, it decreased in the 'low resources' group during the lockdown. Possibly, more introverted, and neurotic teachers, with lower self-regulation competencies and a lower teacher self-efficacy, experience the variety of personal social contacts on a normal working day at school (class, students, colleagues, pedagogical staff, parents, day care centre, school management) more as a job demand. The removal of this demand during the lockdown of the COVID-19 pandemic might be the reason for the decrease in work overload for this 'low resources' teachers. In contrast, extroverted, little neurotic teachers with high self-efficacy and self-regulation might experience personal contact and interaction with their students and colleagues more as a job resource than a demand and therefore have experienced a temporary loss of resources in distance education. Under normal conditions this resource can buffer negative effects of job demands. The loss of this job resource accordingly has led to an increase of work-overload for the 'high resources' teachers. This very different individual experience of the lockdown situation may also explain why the work overload did not change on average. This finding expands the focus on an unresolved issue regarding the distinction between challenges and resources in the JD-R model. The perception of job characteristics as demands or as resources seems to depend on the one hand on the work context (Bakker & Demerouti, 2017), but also on attributes of the person. In turn the same working conditions can be beneficial (resource) or harmful (demand) in dealing with job requirements depending on individual preconditions. Accordingly, it could be beneficial for schools to offer teachers individual support opportunities depending on their personal needs.

4.4 Limitations, Conclusions, Further Questions

Our study does not contain a fully representative sample. It includes teachers at the end of their career entry phase, who voluntarily attended a professional development program for teachers in the canton of Zurich, Switzerland, in January 2018. In addition, our sample is limited to teachers of the kindergarten and primary/middle school levels.

The typological approaches we used to examine differential change profiles have several weaknesses. Both, grouping by median-split and LPA represent a simplification of reality.

Profile analyses moreover have some inherent limitations. There is no suitable indicator for absolute model fit and the determination of the optimal number of types based on quantitative criteria is limited, so the decision for a solution is not solely based on objective criteria (Specht et al., 2014).

Nevertheless, our study investigates different trajectories of work overload, emotional exhaustion, job satisfaction, self-efficacy, and self-regulation among teachers before and after the lockdown of the COVID-19 pandemic in Switzerland. However, explanations for individual changes in stress and stress reactions could only partly be addressed. We would therefore recommend further clarification of the processes that have led to the deterioration of self-efficacy and job satisfaction and, at the same time, to improved self-regulation.

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GOOD LACK – (Good) Lessons Learnt from Distance Learning During the COVID-19 Pandemic in Styrian Schools

Harald Burgsteiner[1]

Abstract

The COVID-19 pandemic caused turmoil in the entire social and economic life worldwide since 2020. As a result, the pandemic changed teaching as we knew it (at least temporarily). We tried to find out what teachers experienced during the distance learning in the past lockdowns. We therefore designed a mixed methods study in the form of an online survey in which 1,519 teachers from primary, middle, and high schools completed a questionnaire consisting of closed and open questions. We analysed the results using quantitative and qualitative methods. Based on this, the situation during the lockdown in Styrian schools is described, but also lessons learned for the future of teaching are presented. The most negative aspects mentioned included the lack of social contacts, an immense additional time needed for preparation, missing financial support, technical issues, and health related problems. Still, many positive conclusions were also drawn by the participants ranging from more intensive contact with students and their parents, increase collegial cooperation, many new inspirations for the personal future teaching coming from the digital media used during distance learning, to hopes, that not everything introduced during the lockdown like online meetings, online collaboration and partially distance learning should be forgotten after all restrictions seize. Finally, we can draw some didactic conclusions coming from the answers to the open questions that include a transformation of classic classroom methods to formats that include digital media like e. g., flipped classroom that gives more time for social exchange and discussion in future classes.

Keywords

COVID-19, distance learning, survey results, school, lessons learnt

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1 Introduction and Background

The COVID-19 pandemic caused changes in the entire social and economic life worldwide in 2020 and 2021. Nearly 1.6 billion learners (94% of the world's student population) were affected by the closure of educational institutions at the peak of the COVID-19 crisis (UNESCO, 2020). As of June 2020, this number still was at a high 1 billion. Due to the imposed lockdowns, schools and universities were forced to digitise conventional teaching in a very short time and to convert teaching and learning formats partially or completely to distance learning. In Austria, the first COVID-19 case was reported on February 25, 2020. As of March 16th, 2020, the first national lockdown lasting several weeks including all schools took place. In autumn 2020 the measures were tightened again and on November 17th, 2020, a second hard lockdown went into effect lasting until December 6th. Only about three weeks later, on December 26th, a third hard lockdown until January 24th, 2021, went into effect. Distance learning was ordered during all the lockdowns mentioned above. The duration varied for different types of school, e. g., primary school pupils were allowed to return earlier than those of the secondary school level 1. Today, although vaccination programs are in place in many countries, temporal or regional lockdowns still occasionally take place. For how much longer it will be, we currently do not know.

As a result, the pandemic definitely changed the teaching as we knew it (at least temporarily). Classroom teaching with blackboard, teaching with partner work and in large and small groups on site was no longer possible. Teachers, even those who had previously rejected digital media and especially categorically rejected distance learning, were forced to convert, and digitalise their own teaching. One could assume that such a transfer should be fairly easy, since for some years now, the teaching of digital skills of various kinds has been a part of the public educational mandate of schools in many countries, e.g., in Germany (KMK, 2016) or in Austria (BMBWF, 2018). Supporting this content in school education, consequently, further training courses for teachers exist, that are increasingly dealing with the topic of digitalisation. School textbooks from various publishers are also becoming increasingly digital, contain digital supplementary products or are offered purely digital.

Nevertheless, digitalisation in schools does not seem to keep pace with developments in society: before the pandemic the use of digital technologies in the classroom was often limited to maintaining traditional teaching methods, in which teachers, e. g., digitise or create individual presentation media instead of using an overhead projector, replace the classic blackboard with an interactive board like (Higgins et al., 2007) or gamifying education within the classroom (Wang et al., 2016). A change in teaching from purely analogue to purely digital or also hybrid teaching naturally requires a lot of work (if one wants to implement the teaching in a high-quality way): (Partially) new content must be created, new methods that are also suitable for distance learning must be planned and tried out, and new technologies, some of which have never been used before for teaching in schools,

must be examined and tested for their suitability for teaching. Although the equipment of schools and the hardware and software possibilities are becoming more powerful, there is a lack of concrete subject-didactically reflected possibilities for using digital media. In order to exploit the full potential of digitalisation and to successfully teach with digital tools, teachers must have the appropriate qualifications.

The changes in everyday teaching brought by distance learning were felt worldwide (Edirisingha, 2021). According to first studies, these changes were received very differently in many countries. Differences presumably arose, among other things, from the different preconditions with regard to the respective

- National social structure and existing educational inequality.
- (Previous) Training of teachers and university lecturers.
- Degree of digitalisation in the field of education.
- Speed, content and scope of the reactions of governments and competent authorities.
- Monitoring of the challenge by school and university administrations.

The current literature like e. g., Niemi and Kousa (2020), Basilaia and Kvavadze (2020), Joshi et al. (2021), Rasmitadila et al. (2020) or Carrillo and Flores (2020) just to name a few, report partially overlapping but also very different aspects of teaching during the COVID-19 pandemic. We also looked at publications that evaluated teaching and learning especially in several specific countries like in Bokayev et al. (2021), Shahin (2021), Semionova & Tokareva (2021) and Nilsson (2021). Many focus on regional specialities, evaluate different technologies being used for distance learning, investigate suitable pedagogical methods, general barriers of teachers and students under home environment settings, financial restrictions, lack of usable technological infrastructure at home or in school, commitment, and collaboration among students, or (additional) time invested in the preparation of lessons or time needed to solve homework. Others investigate the (negative) effects of prolonged school closures and home quarantine on children's physical and mental health that can be substantial and long-lasting (Brooks et al., 2020). Finally, the image of teachers in public might have changed due to the pandemic and the distance learning in different ways (Asbury & Kim, 2020).

Similar studies have been published in German speaking countries like Germany, Switzerland and Austria, too. Helm et al. (2021) in their analysis provide a systematic overview of the state of quantitative research on teaching and learning during school closures during the COVID-19. A first presentation about findings from a project is available by Schwab et al. (2020), where they investigate the experiences of students, teachers and also parents during the implementation of home schooling in Austrian schools. The Styrian directorate of education was especially interested whether any specific experiences were

made during the first lockdown and additionally investigated lessons learnt that can be transferred into future personal teaching. Hence, we wanted to investigate in how far these topics were an issue also in regional schools here in Austria, especially in Styria.

2 Methods

In order to wait for the first experiences of the teachers, we decided to conduct the study only after the end of the (first) lockdown. In addition, experience has shown that neither the summer holidays nor the month of the start of school are good times to hope for numerous cooperation from teachers. We also hoped that this would not unnecessarily increase the burden already placed on teachers and that a later start would increase the response rate. So, the planned start of the study was set for November 2020. Unfortunately, we were too optimistic about the end of the pandemic and so the survey fell exactly into the period of the second (partial) lockdown at Austrian schools.

2.1 Research Design

Hence, it quickly became clear that personal interviews would not be effective in times of contact avoidance and tight time budgets. The choice therefore fell on a principally anonymous survey with a mixed-methods approach (i. e., closed and open questions) by means of an online questionnaire, with the possibility to indicate a contact option for possible questions or inclusion in further studies with personal interviews.

The design of the questionnaire was partly based on the studies already mentioned above, in order to be able to draw possible comparisons with other international studies. Statements about "distance learning", "digital tools", "the role of teachers", "ways of working in distance learning", "technical and other problems" and the "state of students and teachers" etc. were extracted from these scientific articles and additionally from various newspaper and media reports and formulated as hypotheses, from which questions were then generated to test them. The instruments for this study were developed by the authors. Although some published international studies did not give details about the concrete questions they used, we used the results of them as a guidance to develop our questions.

The online questionnaire contained a total of 33 questions including questions about demographic data and the optional question about a contact option. We divided the main survey into a part with questions on more technical and didactic/methodological content and a second part with questions from the sociological and psychological area. Finally, general demographic data was collected in order to be able to assign the participants to certain groups of teachers. All closed questions had to be answered compulsorily. Without an answer, there was no possibility to get further in the questionnaire.

Some of our hypotheses were generated from the results of the literature reported above in order to test the reported results for "our" local teachers as well, others were constructed from personal experiences and observations in media and helpdesk requests. They are just implicitly given in this paper to avoid repetitions: for all questions (except for statistical ones) the hypothesis can be read in the question text, e. g., the item "Distance learning has led to an increased exchange with my colleagues about didactic methods" results from the underlying hypothesis that teachers might have asked their colleagues more than before how to didactically deal with certain contents or technologies.

As one can see from the overview of questions in Table 1, the planned topics from the hypotheses to be tested resulted in a very extensive questionnaire, which was additionally evaluated by a small test group beforehand. Based on their feedback, some final changes were made, and the order of the questions was adjusted accordingly. The feedback from the test group suggested that the questionnaire takes about 25 minutes to complete. Participants also later reported that it took them about 25 minutes to completely fill out the questionnaire, although some also reported that it took them 1 hour, presumably due to very detailed information entered in the optional open free-text questions.

The final questions from the survey can be found in Table 1. A PDF version of the complete (German) questionnaire can be obtained from the author of the article upon request.

Table 1: Overview of all questions from the questionnaire used including the corresponding question type or answer possibilities

Question number and question text	Question type / Answers
A1 What experience can you draw on that you already had before the COVID-19 regulation?	4 areas with a 4-point Likert scale each
B1 Which of the following digital formats did you already use in your teaching **before** the COVID-19 regulation?	Multiple selection of 22 tools including 'none' and 'others'
C1 Which of the following digital formats did you use in your teaching **during** the COVID-19 regulation?	Multiple selection of 22 tools including 'none' and 'others'
D1 From where do you mainly know the digital tools you use?	7 options including 'others'
E1 Which of the following digital formats would you like to **continue using** in your teaching in the future, regardless of any COVID-19 regulations?	Multiple selection of 22 tools including 'none' and 'others'
F1 Which tools do you use for synchronous, virtual teaching („live teaching"‘)?	Multiple selection from 10 options including 'others'
G1 Which learning platforms do you use for asynchronous, virtual teaching („offline teaching"‘)?	Multiple selection from 6 options including 'others'
H1 What strengths and weaknesses do you see in the use of digital technologies for the following areas of application?	4 areas with a 4-point Likert scale each

I1 How much do you agree with the following statements?	19 statements from the technical and methodological areas with a 6-point Likert scale each (+ 'I don't know')
I2 You have stated that you would like to see further training in the area of distance learning. What topics should these trainings mainly cover?	Open question
J1 How did you find the changeover to virtual teaching („distance learning") last semester?	Single choice from 3 options
K1 How much time do you estimate you personally spent per week during the COVID-19 regulations last semester?	Single choice from 7 options
K2 What caused the change in the time commitment?	Open question
L1 After the experiences of the last semester: if you were to regularly use digital elements in your teaching from now on, how do you estimate your time commitment would change (compared to the classic „purely analogue" teaching)?	5 options with a 3-point Likert scale
M1 How do you assess the impact of virtual teaching on the following aspects for the majority of students?	10 competencies of students with a 4-point Likert scale
M2 Have you noticed any effects of virtual teaching on other aspects for your students?	Open question
N1 For what percentage of your students do you see the following obstacles to the use of virtual learning environments?	11 possible technical or organisational difficulties rated from 0% to 100% in 10% increments
N2 Are there any other obstacles to the use of virtual learning environments on the part of your students?	Open questions
O1 What obstacles do you see yourself in the use of virtual learning environments in your own teaching?	Multiple selection from 17 options including 'none' and 'others'
P1 What do you think about the impact of using virtual learning environments in relation to the following criteria?	7 areas with a 3-point Likert scale
P2 Are there any other effects and changes you have observed through the use of virtual learning environments?	Open question
Q1 For approximately what percentage of your students are each of the following statements true?	9 statements of social and psychological concern rated from 0% to 100% in 10% increments
R1 How much do you agree with each of the following statements?	14 statements from the social and psychological area with a 6-point Likert scale each (+ 'I don't know')
S1 What support do you personally still need for smooth online teaching?	Open question
S2 What support do you need to better support students in online teaching?	Open question

S3 Looking back at the time of lockdown and distance learning, what positives or negatives can you take away?	Open question
T1 Your gender?	3 options
T2 How much teaching experience do you have?	Single choice from 4 options
T3 What age groups do you teach?	Multiple choice from 4 options including 'others'
T4 What type of school do you teach at?	Multiple choice from 5 options including 'others'
T5 What subject areas do you teach?	Multiple choice from 12 options including 'others'
T6 How many people live in the municipality where your school is located?	Single choice from 5 options
U1 Optional possibility to leave your eMail address.	Open question

Note: The Likert Scale for question H1 consisted of the options "clear strengths", "strengths", "weaknesses" and "clear weaknesses", question M1 had the options "very negative", "negative", "positive" and "very positive", I1 had "strong approval", "approval", "rather agree", "rather disagree", "rejection", "strong rejection" and "don't know", L1 had "will increase", "remains constant" and "will decrease", M1 comprises "very negative", "negative", "positive" and "very positive", P1 consisted of "increase/improvement", "no change" and "decrease/worsening", R1 had the same answering options like question I1, T1 included the possible choices "male", "female", "diverse" and finally the municipality sizes could be chosen from "< 1,000", "1,001 – 5,000", "5,001 – 10,000", "10,001 – 50,000" and "> 50,000".

2.2 Implementation

We used the software packages LimeSurvey[2] hosted on our own server at the university to ensure data protection for all participants. We used the eMail addresses of all teachers who enlisted themselves for further training in the last years. This way we were able to send out an anonymised invitation link to a total of 11.365 regional teachers, including primary, secondary and vocational education. Participation was not obligatory to any of the selected teachers. The first invitation was sent out on November 5th 2020 and a friendly reminder was sent out additionally on November 20th 2020. The online survey was finally closed on November 30th 2020. The answers of some participants had to be removed due to obvious false answers (e. g., selection of extreme values like 0% or 100% for all answers).

The IBM SPSS Statistics software package (version 26) was used for statistical analysis of the closed questions and any possible correlations. Some figures were additionally generated with MS Excel. The data analysis of the open questions was carried out using the qualitative content analysis according to Mayring (2015) using the MAXQDA 2020 software

2 The software can be found on its homepage located at https://community.limesurvey.org/

tool. Therefore, a coding scheme was developed and applied in the qualitative analysis of all question with an open question format. This procedure enables a reduction of a big number of verbal data coming from open questions in a questionnaire to a comprehensible amount and to obtain concise statements and contents from the source material (Mayring, 2015). Inter-coder agreements or inter-rater reliability measures cannot be reported in our context, since the coding of the qualitative answers had either been done by a single person or (in most cases) by two persons working together and instantly discussing possible interpretations of the answers given.

For reliability analysis, Cronbach's alpha for standardised items was calculated to assess the internal consistency of the constructed items. The internal consistency of the questions with Likert-scales (58 items) is satisfying, with Cronbach's alpha of 0.866. When considering all items with Likert-scales and additionally those with a percentage scale (e. g., see questions N1 and Q1 in Table 1) the Cronbach Alpha for standardised items yielded a satisfying value of 0.812 for the 83 items. Some individual Cronbach Alpha values are reported with the corresponding Figures 4, 5 and 6.

3 Results

After closing the survey, the numbers showed an impressive response rate which can be found in Table 2. Also, the rate of participants who entered text in optional open questions was relatively high with 55%. This gave us a first hint that the topic and problems dealt with in our survey were of very high concern to the participating teachers, which was also proved later during the analysis of the data collected. Due to space limitations, it is unfortunately not possible to go into the answers to all questions. However, we will report about the results for what we consider to be the most important or interesting questions of the survey. All data with missing values have been excluded from the sample before analysis. The data used consisted solely of the 1,519 fully completed questionnaires.

Table 2: Absolute and relative numbers of participation and completely filled out questionnaires for our online survey after sending out an invitation, a friendly reminder after closing the survey

	Absolute numbers	**Relative numbers**
Invitation received	11,365	100%
Total participants	2,530	22.26%
Completely filled out questionnaires	1,519	13.37%

3.1 Evaluation of the demographic data

Table 3 shows that the participants were spread quite evenly among the different types of schools, which results in a valid picture for statements about teaching during distance learning phases. For the analysis of the data, we split the answers according to the type of school for some questions, which will be indicated later on in this section for specific questions.

Table 3: Relative share of participants among the different school types

Type of school	Primary	Middle (Secondary I)	High (Secondary II)	Vocational	Others
Relative share	26.9%	26.3%	22.9%	21.7%	7.5%

This is also true for the distribution of participants among rural and urban areas, which can be seen in Table 4. We observed no concentration of participants on e. g., larger towns. Hence, we see results that include statements and opinions for students coming from the countryside, where e. g., access to the internet might not be as good as in urban areas, as well as from teachers with classrooms in towns with a much more diverse composition of students and more potential social problems among their families.

Table 4: Relative share of the participants among the population size of the district of their corresponding school

Population	< 1,000	1,001 - 5,000	5,001 – 10,000	10,001-50,000	> 50,001
Relative share	2.07%	28.60%	22.97%	16.62%	29.74%

Figure 1 indicates that the participants also teach very different subject areas resulting in very diverse shared insights. There is no obvious concentration of subject areas that can be seen in some studies that investigate the use of technologies in teaching in schools or universities, where e. g., digital media is primarily used in topics like natural sciences.

Finally, two thirds of our participants stated that they had more than 10 years of teaching experience. Another quarter had 4–9 years of experience and the rest had up to 3 years of teaching experience. Nearly 80% of the participants were female.

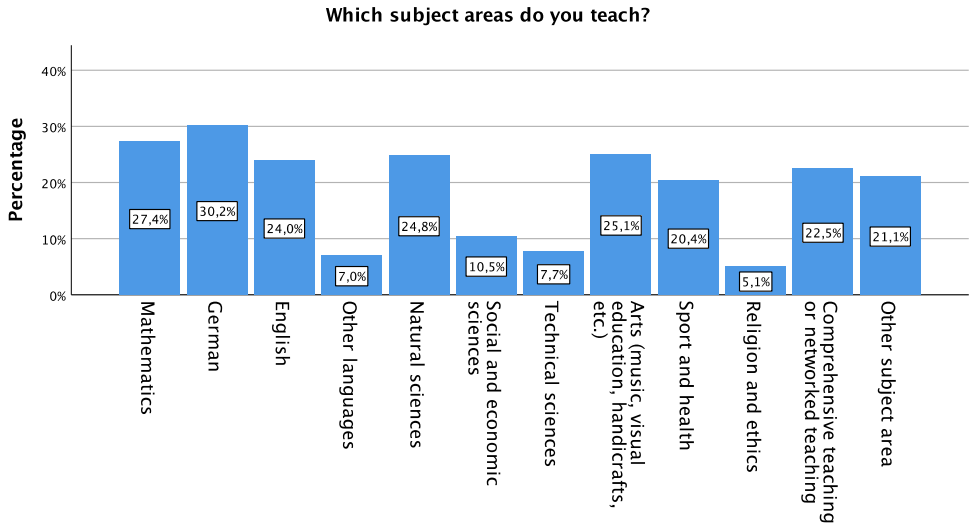

Figure 1: Relative share of the participants among the subjects they are teaching

3.2 *Interpretation of the technological/methodological answers*

Regarding the first question about whether or not participants have experiences with digital technologies in teaching, about ¾ of all participating teachers answered that they do have previous experiences with digital teaching materials (selected "applicable" or "rather applicable"), while the rest checked the answers "rather not applicable" or "not applicable". The same tendency can be seen in the question about experiences with the successful use of digital tools in the classroom and experiences with digital communication with students. In both questions, values of about ⅔ were on the affirmative side. Only when it came to the use of digital collaborative methods in the classroom, only 50% stated that they had already used them.

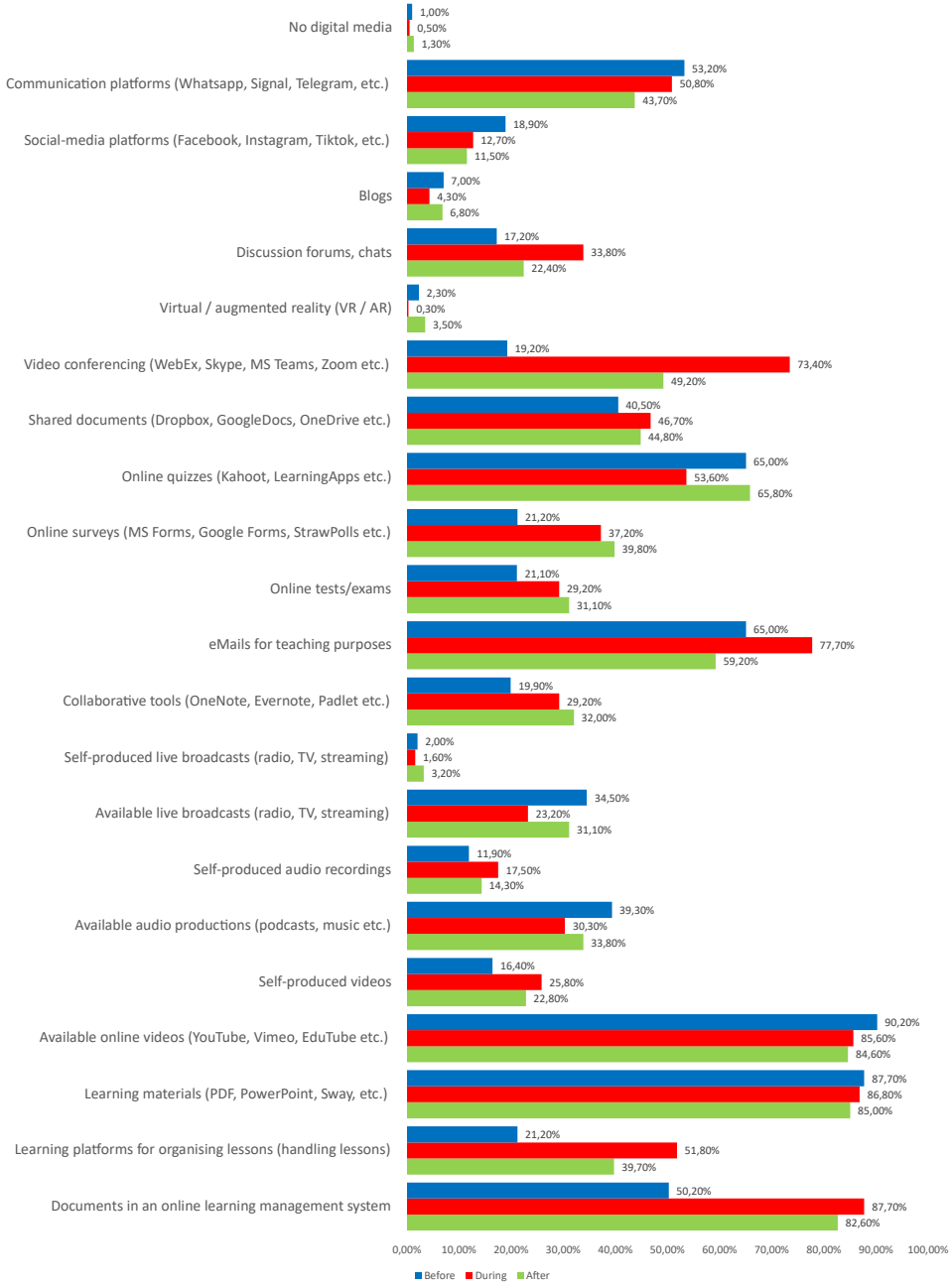

Figure 2: Usage of different kind of tools in teaching before (blue) and during (red) the COVID-regulations, compared to which tools will be used after (green) all restrictions are lifted again. Data shown without primary schools.

Figure 2 gives an overview about which tools and forms of teaching with digital material can be expected in schools. We asked in three consecutive questions about certain tools and methods of teaching about whether or not a specific form of a digital tool has been used in the past already, was being used during lockdowns and which ones the participants will be using even after all regulations and restrictions will be lifted again. While some digital media show very high usage before and after COVID-restrictions (like e. g., shared documents, online quizzes, available online videos, digital learning material and communication platforms), the most interesting changes are those forms of digital media for which teachers say they will continue to be used, because they seem to somehow add value in comparison to the previous teaching methods. These digital media include video conferencing, online surveys, collaborative tools and handling courses and learning materials in learning management systems. Note, that the data shown is not including participants from primary schools to get a clearer picture about the other school types, because our data showed that primary school teachers tended to use digital material far less, even during the COVID-19 lockdowns.

Unsurprisingly, MS Teams together with MS Office 365 was the most used (about 60%) toolset for synchronous and asynchronous virtual lessons, because both were suggested to teachers and offered for free by the Austrian ministry for education. A little less than 10% used Zoom or Cisco Webex for their synchronous teaching. Moodle was used by about 15% of the teachers for asynchronous teaching activities.

When asked about strengths and weaknesses of digital technologies in several application areas, the participants saw "clear strengths" and "strengths" in the areas of distribution of teaching materials (about 90%) and organisation and coordination of spreading out and handing in homework etc. (70%). No clear advantages or labour saving could be seen for communication (~50%) or cooperation among students (~45%).

In the next question we asked the participants with a 6-point Likert scale ("strong approval", "approval", "rather agree", "rather disagree", "rejection", "strong rejection") about several statements. More than 70% at least agreed to the following statements (in descending order upon agreement):

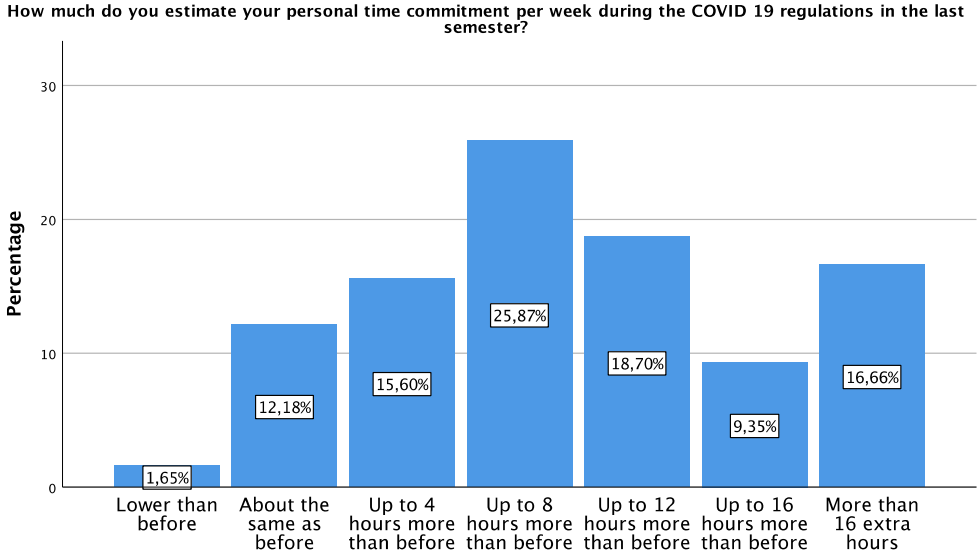

Figure 3: Estimation of the additional personal time commitment per week during the COVID-19 regulations in the last semester

- I give appropriate breaks during the online sessions so that students have time to reflect on the topic and formulate their questions (~93%)
- In distance learning there is a lack of direct contact with the students (~92%)
- Distance learning can only be effective if all students use a microphone (~89%)
- The online environment simply takes more time than face-to-face teaching to work effectively (~88%)
- I have sufficient computer, media and IT skills to carry out my distance learning (~87%)
- It is better to keep distance learning short or as a series of short sessions (~86%)
- It is more difficult online to get immediate feedback on what has been taught (~85%)
- The times for distance learning were very flexible in the last semester (~78%)
- Distance learning can only be effective if all students use a video camera (~77%)
- Online tools are easy to use when delivering lessons (~74%)
- I would like to have further training in the implementation of distance learning (~72%)

The three statements the participants agreed least upon were:

- I would like to have central guidelines for the preparation of online materials (~43%)
- Distance learning and the tools used allow for better differentiation of learning scenarios for students (~42%)
- Distance learning is more effective than traditional classroom teaching (~7%)

Even though many teachers said to like to have a further training in distance learning and digital media, the answers show a positive picture about the actual implementation of distance learning, agreeing that the time schedule they had was very flexible, allowing students breaks and time to reflect on the topics and offering adapted lesson structures with rather short sessions in comparison to conventional classroom teaching. Among the topics that teachers said to like to have a further education, the top ranked were: IT foundations (hardware and software troubleshooting, computer networks, software installation and configuration), working with learning management systems and online teaching, methodology and didactics with electronic media, online collaboration and media production (podcasts, videos, YouTube channel).

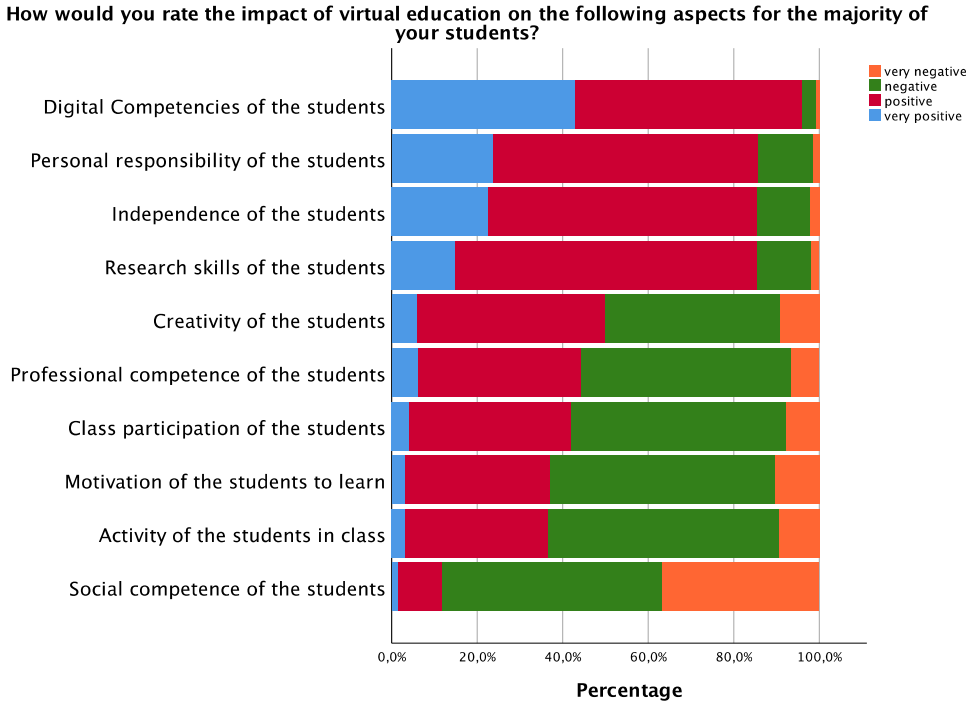

Figure 4: Development of the students' competencies during the COVID-19 distance learning (Cronbach Alpha 0.854).

The price invested in the reconfiguration of the previous teaching methods was very high. According to Figure 3, the typical workload of most of the teachers increased dramatically. More than 70% of the participants said to have worked up to 8 hours more per week than before and 16% needed more than 16 hours of additional work to cope with the increased workload during the COVID-19 regulations. This shows us that teachers also count to those groups of workers (like e. g., nurses, doctors etc.) whose workload increased more than those of others due to the pandemic. While for many others "only" the way of working or the place of work changed from e. g., an office at the company to home office, most of the teachers were not able to simply reuse their previously created learning materials in an online setting. In many cases, the pedagogical method and the material had to be completely reworked and additional digital media like self-produced videos had to be created.

The reasons for the additional working time needed were (according to our qualitative analysis of the open answers) basically "more individual feedback" (~⅓), "adapting or creating teaching materials" (~27%), "getting used to new technologies and tools" (~10%), but also many observed that they needed much time for "giving advice for colleagues" or "assistance with technical problems of colleagues and students". Many also felt that due to the working at home, "you feel like you are constantly in work mode – the distinction between work and free time becomes blurred and working hours increase significantly".

The answers to the next question surprised. We asked if even after the experiences of the COVID-19 lockdowns and regulations when the teachers were to regularly use digital elements in their lessons from now on, how would they estimate the time commitment would change (compared to the classic "purely analogue" lessons). About ¾ of the teachers responded that they think the time needed to incorporate digital elements in their teaching will still be higher than without digital media. This contrasts with expectations that the time needed for preparation will decrease, especially when considering that digital media can be reused with very little effort once they are created.

Still, our participants saw some positive aspects of the distance learning as well. Figure 4 shows the change in personal competencies among the majority of their students due to the teaching in virtual classrooms. They see "very positive" and "positive" changes in students' digital competencies, personal responsibility, independence and their research competencies and a rather neutral development among the students' creativity, subject competence, participation in class, motivation to learn and their activity in class, each with about 40% to 50% respectively. The only very negative attribution had development of the students' social competencies: only about 10% said they saw a positive tendency.

When asked about what obstacles the teachers see in using virtual learning environments in their own teaching, the most common answers were:

- not having a direct, immediate response through gestures and facial expressions (~73%)
- difficulties in recognising the support needs of individual learners (~55%)
- technical problems e. g., computer crashes, WLAN connections, software errors (~54%)
- uncertainties in the assessment of students' overall performance (~52%)
- changed didactic-methodical challenges (~48%)
- difficulties of keeping track of the individual performances of the students (~47%).

The answers in the field "others" revealed several more obstacles that the teachers felt. By far the most frequently mentioned problem was the lack of personal technical equipment at home, which had to be financed entirely by the teachers themselves. This was followed by a missing personal further education in the area of digital media, eDidactics and methods for online teaching. Another factor that should not be overlooked according to the participating teachers was the plethora of constantly changing requirements from the Ministry of Education and the respective local school authorities. A reason for frustration was also the timing of the publication of these requirements. The teachers did not have a head start on the parents and thus were not able to answer the questions and problems of the parents that arose immediately, because they themselves were not yet prepared.

Looking on the bright side, impact of the use of virtual learning environments also saw an increase of personal technical competencies, the quality of the personal technical equipment and also the quality of the technical equipment in schools. But a majority thinks that the quality of their lessons, the transparency of the performance assessments, the amount of the content that can be taught und the sustainability of the content learnt decreased. Especially the supposed decline in transparency is surprising, since the praised use of learning management systems – if applied correctly – makes all performances and their evaluations constantly visible and therefore maximally comprehensible.

3.3 *Interpretation of the social/psychological answers*

The second section of questionnaire dealt with questions regarding social, emotional, and psychological background. We tried to figure out whether and if so which social and/or mental difficulties could be observed by the teachers in their classes and with themselves.

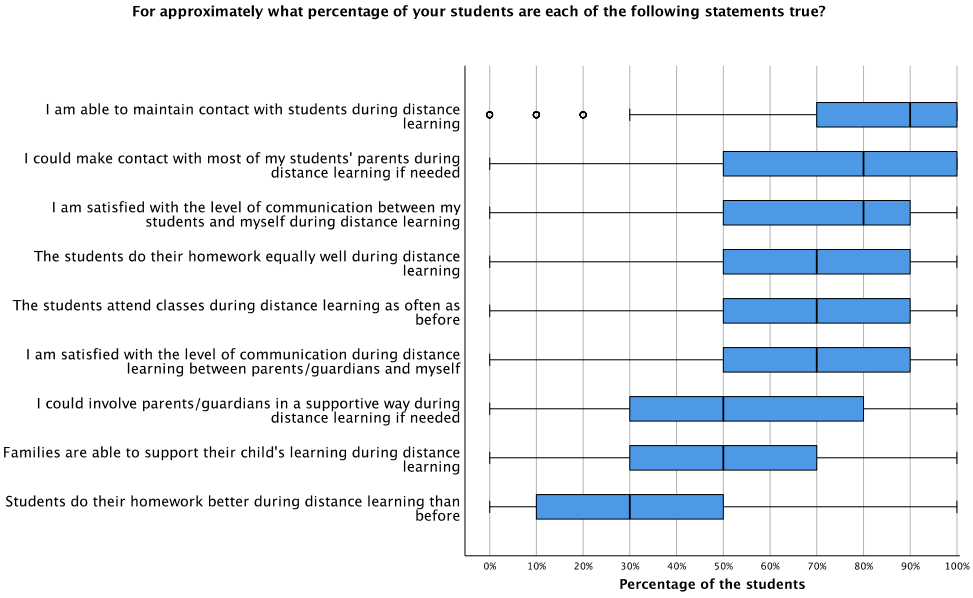

Figure 5: Teachers' assessment of the percentage of students for whom the following statements apply (Cronbach Alpha 0.813).

First, the participants were asked to give an estimation for which percentage of their students several statements do apply. The answers can be seen in the boxplot in Figure 5. The very broad range of answers from 0% to 100% can be interpreted as some participants did not want to answer this question, so they set the value to either one of the limits. The median together with the box range of about ±20% yields a good estimation about the opinion of the majority of the participating teachers. Most of them seemed to cope quite well during the times of distance learning in terms of communication, participation and homework. They are quite satisfied with the communication with the students (median at 90%) and their parents (80%). But only 70% of the students did their homework as good as during normal classes and participated as much as then. And only about half of the families were thought to be able to support their kids at tasks for the school.

Figure 6 gives hints about some of the true reasons why many of the participants in this study became teachers. Through the absence of standard classroom teaching during the times of the COVID-19 lockdown in schools, many teachers came to think about their usual doing in class and what they are missing in distance learning sessions. The answers combined with statements from the open question show that most of the teachers think about their profession as a very social labour. We sorted the answers in Figure 6 in a descending order according to the strongest agreement to the various statements. In this order the statement strongest agreed upon is that the teachers are worried about the mental health and the well-being of their students during the times of lockdowns.

The statement that had overall the strongest agreement (rather agree, agree plus strong agreement) was that the teachers enjoyed the interaction with their students in online sessions, especially when we combine this answer with those that said that online teaching is best when all participants use microphones and cameras. In the top range of the statements that most of the teachers agreed overall were the worries that the students might not get everything they need to be successful during distance learning. Still, most of the students do ask questions and clear up ambiguities during distance learning sessions (70% agreement overall).

A second part of these statements included questions about the possibly changed relationships between the teachers and their colleagues. A majority of the participants agreed that the distance learning has led to an increased exchange with their colleagues about electronic teaching tools (~75%) and that distance learning also led to an increased exchange about didactic methods between the colleagues (~55%). For more than half of the teachers, distance learning has also increased collegiality and cooperation. But not even a quarter has actually participated in a lesson of a colleague to e. g., be able to exchange some ideas about didactic methods or give feedback on their lessons, although collegial hospitations and observations proved to be a very valuable tool to reflect on one's own teaching competence (Burgsteiner, 2014).

About 41% said that they were also concerned about their own mental health and wellbeing during the lockdown. Only about 37% said, that they would also like to teach online more often after the COVID-19 pandemic. A very strong agreement also received the statement, that access to technologies and learning materials is an obstacle to equitable quality in public education.

3.4 Discussion and interpretation of the answers to the open questions

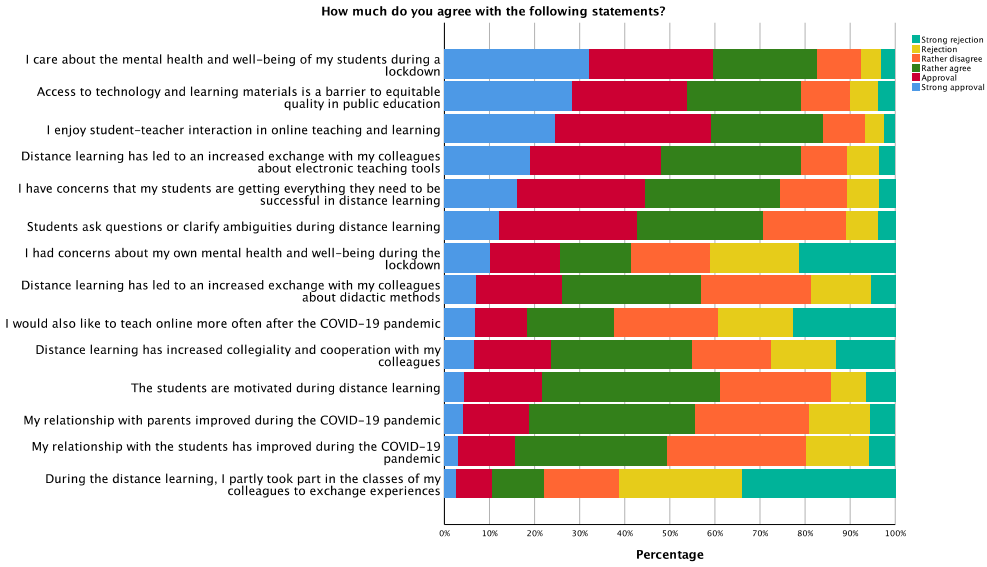

Figure 6: Level of agreement with several social and psychological statements using a 6-point Likert scale ranging from strong rejection to strong acceptance (Cronbach Alpha 0.714).

A conglomerate of opinions, personal insights and suggestions were revealed by the last question: "Looking back on the time of the lockdown and distance learning, what positive or negative things can you take away?", which is also a good starting point for conclusions and discussions of lessons learnt from the distance learning during the COVID-19 lockdown. The large number of responses to this question, some of them very long, shows the great concern during the lockdown, but also that not everything was seen in a negative light. On the contrary, we did not observe a general "bashing" of online teaching here (like one could have suspected), but a very differentiated view on the experiences of the last few months on the side of the teachers participating in this survey.

One thing we saw was that distance learning in the primary schools looked very different from those in secondary or higher education. Although this questionnaire was intended to be for teachers of children of every age, we had to filter out the answers of those from primary school teachers to some questions, because they would have distorted the overall picture of distance learning. Many primary school teachers stated that virtual teaching is not suitable for children of that age because of technical difficulties or because the basic content like learning to write with pencils cannot be done exclusively online. In many cases, they therefore reverted to printed worksheets, which parents collected from school

every day and then brought when the children (or the parents themselves like many teachers suspected) were finished with them. At least communication tools with parents (e. g., Schoolfox) are seen positively, also some valuable learning applications were discovered (e. g., Anton) that the teachers said they will continue to use in the future.

The overall most common named negative aspect was the missing social contact that is lost in pure distance learning (223 mentions). Many teachers were "feeling alone" because microphones and cameras of the students were switched off. Learning and teaching has a lot to do with interpersonal relationships. School is seen as a place of encounter and personal interactions.

Online teaching and distance learning is often seen as a deficient form of teaching (109 nominations), because e. g., learning and motivation curve falls after some time and the content being learnt is not sustainable (41). But there is apparent connection of motivation and sustainability with the form of teaching (e. g., pure distribution of worksheets vs. interactive live teaching). In many schools the elimination of all non-binding exercises and optional subjects was problematic because this is what the students normally do voluntarily and with pleasure. And the assessment becomes more difficult too because it is not clear who has done what (e. g., parents or grandparents), with sometimes unfair positive marking due to these circumstances.

The insufficient equipment, both in the private sphere and in schools, was criticised just as strongly (297). This was also associated with the own living situation (e. g., several people in the household and only one PC, no separate workrooms available, too weak an internet connection for so many parallel virtual meetings) of teachers and students as well. In some cases, high investments in hardware and software were necessary, for which, however, there were no substitutes, borrowed equipment or training by the employers. There was also little support felt from the ministry, the education directorates (e. g., too many and sometimes not very comprehensible decrees, hardly any support) or the school administrations in case of difficulties. Distance Learning revealed the partly poor equipment at Austrian schools (too few PCs with webcams and microphones in the classroom and too slow internet connection).

The increased time commitment on the part of the teachers mentioned above (142 mentions) also meant that a lot of time was spent in front of the PC – with all the negative physical and psychological effects on health (47). In particular, back and digestive problems were mentioned, as well as psychological stress and depression. Teachers also stated several times that these effects were also observed in pupils. The unaccustomed role and work in the home office instead of in the classroom as before also led to the boundaries between private and professional life becoming blurred for many (40 mentions). This often resulted in the danger of overwork and too little self-delimitation due to the changed work situation. Working in a home office – as some said – also has to be learnt first, such

as not always being available. What contributed to this was that there was little collegial exchange and even less organised supervision or intervision.

One aspect that has rarely been pursued in the literature on COVID-19 and teaching (but e. g., Asbury & Kim, 2020 did) is that of public media representation of teachers (19 mentions here). According to our participants, the image of teachers in the media was not portrayed very well, especially in the beginning. The lockdown was partly perceived as "no teaching" because "the parents were teaching". The initial image was more of parents as victims, teachers as refusers of work. Later, as our participants said, perceptions changed and over time parents recognised the difficulties and challenges of teaching and increasingly acknowledged teachers' achievements.

An important and relatively frequently mentioned aspect of distance learning is that of equal opportunities, which is often not given and a lack of it is more noticeable (47 mentions). Online lessons were perceived as "very difficult" especially for children with increased special educational needs (mostly with a form of disability), in so-called "hotspot schools" where an increased proportion of foreigners meets a low social status and low educational level of the parents, as well as generally for children with a migration background without a German mother tongue. Here, effects are particularly evident due to e. g., living in socially precarious conditions (few separate rooms and poor technical equipment) or single parents who of course find it particularly difficult to provide additional support for their children at home. Especially children with non-German mother tongues were attested by the participating teachers to have regressed linguistically in part due to the lack of German-speaking peers and the sole mother tongue at home. In general, a difference in the children's development was observed when comparing the academic performance of children who were supported at home, e. g., by parents, and children who were not supported.

As mentioned before, there was not only a list of negative impressions. The participating teachers also recognised many positive things that they got to know during the lockdowns. Most of the positive mentions were related to their own new experiences in dealing with digital media and the possibilities that arise from their use (376 mentions). Many fears, especially of a technical nature, have also disappeared and the teachers say that they are now more courageous in using the new media in the classroom. In particular, some see significant advantages for some settings, especially for small group teaching. Advantages are also recognised in the area of administration, especially because by participating in online meetings, for example, these can be planned and held more flexibly in the future (80). Many hope for time savings as meetings can be held from home and recognise online teaching as a complementary form of teaching in the future.

132 Participants in the study found increased motivation among students compared to face-to-face teaching and increased independence in their work. Presumably because children were able to work at their own pace and were not pushed or disturbed by other

classmates. It was also observed by some, that students who were often absent in regular classes were sometimes more productive in virtual classes and delivered homework more regularly. Some students who were rather shy in face-to-face classes really blossomed in the distance learning phase. However, the gap between good and bad students often widened, especially the gap between children who were supported at home and those who were not became more visible.

Many (38) also said that the relationship and contact with the children and also with the parents improved. Due to the above-mentioned labour-intensive but more individualised support of the students, the teacher, the students, and their families got to know each other better. The relationship with students and parents was greatly intensified. Later, increased gratitude and great appreciation from the parents was also perceived. Parents and students appreciate the teachers' work now more than before (100).

Positive changes in the relationships between teachers were also perceived. Specifically, that it has been shown that there is strong cohesion in exceptional situations (47 mentions). Cooperation among colleagues was mentioned as particularly positive. The climate has improved. A self-image was drawn that teachers are incredibly flexible and solution-oriented, which is only clouded by some "black sheep" who sometimes refuse to work and ruin the otherwise good reputation of teachers. From the answers we can also conclude that for many teachers the meaning and role of "school" in society became clearer and its importance was recognised again. Students were looking forward to "school" again.

4 Discussion and Outlook

4.1 Possible limitations of this study

Since we used a bulk eMail sent out to most of the teachers of our area, we basically created a self-selecting sample of participants. We did not filter or limit the answers according to e. g. official government statistics about gender, school types or subject areas taught. This of course can lead to sample biases. When comparing our sample with the official statistics from the government (Statistik Austria, 2016), we can see differences for some selection criteria. Interestingly, the various types of schools are represented quite well. When comparing our statistics to the official one, we can see that there is nearly no difference for primary schools (26.9% in our data vs. officially 26.4%), middle schools (26.3% vs. 26.15%) and vocational schools (21.7% vs. 22.4%). A slight difference can be observed for the high schools (22.9% vs. 18.9%), although this might also be explained by different methods to count: For the official statistics, teachers from some middle schools count as high school teachers, because the organisational type of the school belongs to a high school (although they are in fact teaching at a middle school). The overall gender distribution is also in the range of the official data. While about 78.5% of the participants in

our study were female, there are officially 71.9% of all teachers in Styria female as well. However, we did not check whether the gender distribution is also valid for all school types in this study. We have a small surplus of female participants, but this does not affect the overall results of this study.

We used Cronbach's alpha for standardised items for the reliability analysis and to assess the internal consistency of the constructed items. While the internal consistency of the questions with Likert-scales (58 items) with Cronbach's alpha of 0.866 is satisfying, the value drops to a value of 0.812 when considering all items with Likert-scales and additionally those with a percentage scale. This is probably due to the fact that the questions of this type are quite extensive, and participants may have tended to fill in those questions rather superficially, as they are very tedious and demanding, leading to a lower Cronbach Alpha.

One also must keep in mind, that we have presented findings that stem from opinions and experiences of teachers only (although some participants noted, that they found themselves in the double role of being teacher and being a parent at the same time). Helm and Postlbauer (2021) for example focus on students and parents during the third school closure in Austria. Interestingly, their findings correspond to those of our study, e. g., that they think that students have learnt less during distance learning in comparison to conventional lessons or that the motivation of students to learn dropped during the school closures. Hence, the views and experiences of these three groups seem to be consistent.

4.2 (Good) Lessons learnt – implications of the findings for school practice and educational policy

What else can we take away from the teachers' answers as "lessons learnt" and what should be taken into account in order not to simply return to a status quo like before the lockdown? There has been a massive increase in digital literacy on the part of teachers and students. This must not be lost again and must therefore also be used in the future. Right now, there is an opportunity to break up old structures in the school system and to think about a change in forms of teaching, a rethinking and restructuring of the current material and the implementation of teaching. This would be an important step into the digital future of teaching, which holds many new didactic possibilities and could improve the quality of teaching in some places. The data show a statistical correlation between "good knowledge of digital media in online learning" and "positive experiences with students (motivation, activity, collaboration, etc.)". Further training in the area of teaching with digital media should be increasingly offered and used by teachers. In this way, their own didactic methodological diversity can be further expanded, and the possibilities of digital teaching can be demonstrated.

Other positive changes experienced should also be maintained after the end of all COVID-19 restrictions, according to many teachers. These include, above all, various meetings, conferences, and some further training, which should also be held online in

the future. Likewise, individual digital elements, hybrid teaching or a weekday of online teaching could be introduced where possible, e. g., in high schools or evening schools.

Positive didactic aspects should also be retained, such as the digital submission and collection of homework, additional digital communication channels and feedback on students' work. Further didactic "lessons learned" from the data collected include that purely asynchronous lessons are mostly experienced negatively ("passive") and that live lessons increase motivation on both sides. Students appreciate the mix of live lessons (e. g., using a web conferencing tool with compulsory attendance) and free time allocation for offline tasks (project and plan work). Time investments in digital teaching materials pay off in the following years, e. g., when creating own learning videos that can be reused as often as desired later on. In addition, these videos have other effects that have been mentioned as well: especially the weaker students benefit from them because they can watch the videos again as often as they want. Videos can also be used very well for repeating and refreshing material, too. Additionally, they allow for a didactic transformation ("flipped classroom"), where additional time can be used for more intensive social interaction and exchange in class, instead of using it for pure frontal explanations.

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Teaching Practices in the Covid-19 Emergency The Italian Teachers' Perspective

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Abstract

Due to the global pandemic, schools around the world were forced to adopt Distance Teaching (DT) as an emergency solution to give continuity to the teaching-learning process, permitting learners to go on being taught during the lockdown.

The forced closure of schools caused an organizational, personal and professional shock in all the actors involved. The digital issue represents only the tip of the iceberg of a much deeper challenge that spans across all the components of the educational spectrum which pertain more to the value and cultural sphere than to the technical one.

The paper shows results of a multitarget pilot research, carried out during the Italian lockdown, aiming at animating the debate around schools from a multi-actor perspective and at supporting policies.

Here, we focus in particular on the implications of DT for Italian teachers, paying specific attention to their professional and emotional experience and the teaching practices they applied during the emergency. The main research questions addressed are: a) what were the main critical issues and solutions adopted by teachers during the first lockdown? b) what teaching model has the experience of DT allowed to emerge?

This analysis is confronted with a double challenge: a) to interpret what emerged from the teacher's questionnaire, in relation to the theme of the digitization of teaching and the professionalization of teachers; b) look at the strengths and criticalities of the experience, with the aim to learn in an organizational, educational and didactic perspective, how to conduct organizational and social learning processes in the post-pandemic school.

Keywords

distance teaching, teaching practices, Italian school, covid-19

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1 Introduction

The arrival of the COVID-19 pandemic in Italy, as in most countries of the world, caused lockdown, with the related introduction of the Distance Teaching (DT) for schools and higher education. The country's schools were plunged into a series of changes which radically redesigned all their previous internal and external organisational processes.

During the last two years, DT was the main response of the Italian educational system to the problems created by the evolution of the pandemic and by health security measures, particularly for the upper secondary school. UNESCO data about the number of weeks of school closure in the EU shows that Italy is a sad example. Among European countries, Italy adopted one of the most lasting closure strategies, from March to August 2020 (UNESCO, 2020).

Furthermore, the introduction of DT has highlighted the teaching practices and organizational models implemented in schools even before the pandemic. Among these emerge in particular:

a) traditional teaching based on frontal lessons, homework and tests, without a rethinking of time, activities and tools based on the new digital setting (Fondazione Agnelli, 2021; Indire, 2020; Landri et al., 2021; OECD, 2019b, 2020; Capogna et al., 2017; 2020);

b) a low participation in professional development activities related to the use of digital technologies in teaching associated with a decrease in the need for such participation (Palmerio & Caponera, 2020).

Starting from these previous studies on the topic, our main research questions addressed are "what were the main critical issues and solutions adopted by teachers during the first lockdown?" What teaching model has the experience of DT allowed to emerge? How should organizational and social learning processes be accompanied in the post-pandemic school?

Our pilot research explores the transitional process of teachers transferring from a traditional, frontal and synchronous work in the classroom, to an online mode of work, characterized by numerous unexpected difficulties and operated under emergency conditions.

The teacher survey collects data regarding their professional and emotional experiences and explores the teaching practices they applied during the emergency. With this dual purpose in mind, the concrete solutions devised to ensure didactic continuity, the training needs emerging as a result of the digitalisation of teaching, and the strengths and weaknesses of the experience were investigated.

The paper is organized as follows: Section 2 discusses the methodological approach highlighting both the literature used to elaborate the investigative tool and the statistical model chosen to address the research question. Section 3 presents the solutions the interviewees adopted during the pandemic. Section 4 shows the results of an explorative factor analysis in order to reflect, ultimately, upon the state of the art in digital innovation in teaching practices in Italy. The conclusion and discussion are addressed in Section 5.

2 Methodological Approach and Sampling

The phenomenon under examination is a multi-perspective issue involving many stakeholders with different roles: school principals, teachers, students and parents. For this reason, we developed four separate questionnaires, with target specific items and some parallel items. Here the discussion regards the results of the teachers' web survey.[2]

The research plan was built stressing the impact of distance learning upon teaching and organizational processes. In other words, which factors permitted the teachers to test their "resilience" against the "capability of a system to maintain its function and structure in the face of internal and external changes and to degrade gracefully when it must" (Weick at al., 2005). The main questions posed by the survey were:

- What were the main criticalities identified, and the relevant strategies adopted by teachers during the emergency?
- What were the key issues experienced by the teachers during the pandemic?

The questionnaire was divided into five sections. The first section of the questionnaire sought to outline the respondents' profiles and glean professional information. The second section investigated the aspects of organisation (Barnard, 1968; Mintzberg, 1983) and design activated to respond to the challenges imposed by remote teaching during the emergency. The third explored the digital divide (Hargittai, 2010; Jackson et al., 2008; Thompson, 2004), considered a major topic which foregrounds a deep, though renewed, type of cultural and social inequality. The fourth section examined the overall satisfaction of the various actors involved in the process, paying particular attention to internal organisational processes, in a logic of self-evaluation based on a SWOT analysis. The last section of the questionnaire consisted of a series of answers to open questions used to analyse more deeply the transformations taking place, in particular their repercussions upon teaching practices and on relationships between teachers, students and families.

2 For an in-depth analysis about the overall results emerging from all four parallel surveys, see Capogna et al. (2021).

The following paragraphs analyse the main data collected concerning the DT experience which involved school teachers (preschool, primary, lower/upper secondary) during the first wave of the pandemic.

Even though the self-selected sample does not allow for an inference process to be activated or render the sample representative of Italian teaching staff, the information collected and the high number of complete cases analysed (2,015) allows us to formulate ideas and useful indications for further reflection and in-depth study.

Of the respondents, 85.6% were women, with the remaining 14.4% men. This confirmed that the gender distribution of teachers at national level in Italy is only three points higher than the official national figure for 2019 of 82.7% for women, 17% for men (MIUR, 2019).

Thirty-one-point two percent (31.2%) of the sample were aged between 41 and 50, with 53.9% over 50. This distribution based on age confirmed OECD data, according to which more than half of Italy's primary- and secondary-school teachers are over 50, against a European average of around 36%, confirming Italy's teaching staff as the oldest among the OECD countries (OECD, 2019a).

Twenty-five percent (25%) of the sample came from Central Italy, 38% from Northern Italy and the remaining 37% from the South and the Islands. These figures diverge only slightly from the 2019 ministerial report which sees the Centre with 20.4%, Northern Italy with 40.9% and the South and Islands with 38.8% (MIUR, 2019).

The regions represented most by our sample were Lazio (17.3%), followed by Lombardy (13.8%), the region affected most by the pandemic, Campania (13.3%) and Sicily (7.1%), accounting for half of the sample interviewed. This bias is linked to the self-selected nature of the sample and the greater coverage of Central Italy by the researchers involved in the survey.

Almost 50% of preschool teachers came from Southern Italy and the Islands (49.7%), where there was also a consistent response from teachers of working in the lower secondary school (42.1%); the 42.6% of the upper secondary school teachers were from Northern Italy.

The ninety-eight-point five (98.5%) percent of those who compiled the questionnaire came from state schools, the remaining 1.5% from approved private schools. Sixty-one percent (61%) of the sample were employed in lower and upper secondary schools, the remaining 30.4% worked in primary schools, the rest were in preschool (8.6%), reflecting data for the teaching population provided in 2019 by the Ministry for Education (MIUR, 2019). Of the teachers who responded, 63.4% taught Literature, History and Geography; 30.7% were teachers of Mathematics and Sciences; 12.8% taught Art and 13.3% were special-needs teachers.

3 The Resulting Questionnaire: Teaching Practices during the Covid Emergency

The response of the schools to the emergency was immediate. Only 10.3% of teachers declared that their schools activated DT later than two weeks after the beginning of the emergency. Seventy-one percent (71%) of the teachers said that their schools responded in a very short time, ranging from a few days to a week.

As was to be expected, when it came to the entire school system, preschools and primary schools needed more time to activate DT at organizational and educational levels. Respectively, 41.7% and 35.7% of the teachers of these two levels reported activation times ranging from two weeks to more than two weeks. The implementation of DT, as 85.5% of the teachers contacted stated, involved all subjects. Only 5.3% declared being unaware of this information.

The manner the institutes used to direct their teaching staff towards online teaching was deemed fair to completely clear by 85.7% of the teachers. This fact denotes a resilient system, adaptable to changing situations, capable of restructuring itself in a short time, and guaranteeing didactic continuity.

The contribution of families towards the initiation of videoconferences, as is easy to imagine, was prevalent in the case of the lower school cycles, as was the support required for pupils at this level, so that they might make use of distance learning environments such as Classroom (G-Suite), Moodle, or Edmodo.

The interviewees organised their DT by availing themselves of videoconferences with their learners (81%), by transmitting didactic materials uploaded to digital platforms (82.3%), and by using all the communicative functions and teaching support provided by the digital class roll book (66.7%). Primary school teachers more than those teaching at other levels preferred to record and send video lessons to students (40.4%).

In the lower and upper secondary schools, on the other hand, real-time lessons were the mode preferred by most teachers who used available platforms for videoconferencing, the transmission of teaching material via digital platforms and the use of the electronic roll book.

However, between the lower and upper secondary school, there was a significant gap when it came to the engagement of students in group work and project tasks. Of the teachers who claimed to have used this methodology, 52.8% came from the upper secondary school, with only 27.2% from the lower secondary school.

The gender and age of teachers, as well as the subjects taught, did not significantly affect the choice of the activities carried out during DT. These data give us a rather homoge-

neous sample of the practices implemented during the lockdown, where no relevant differences emerge, except those strictly related to the order of the school where the teachers were employed (Figure 1).

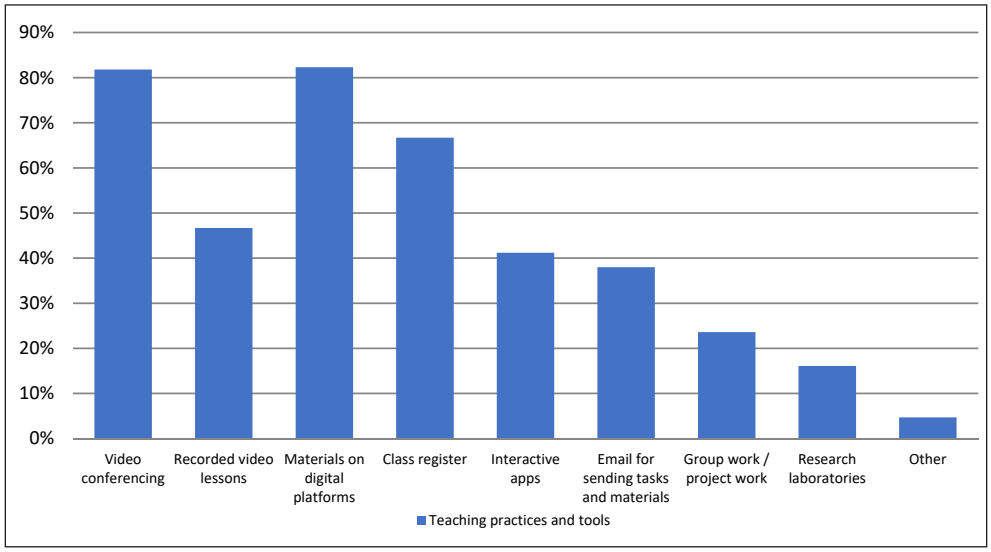

Figure 1: Teaching practices and tools during the pandemic

Observing these data, one can reasonably assert that what was implemented was an emergency form of teaching where the traditional teacher-led, in-class lesson, albeit mediated by digital technology, prevailed (60%) over constructivist and workshop teaching styles, which scored less than 40%.

Although the findings are the expression of what is deemed an emergency teaching method, the research data do not differ from what was described in other studies conducted a few months before the Covid-19 pandemic regarding the use of digital technology in teaching (Capogna et al., 2017, 2020).

This still assumes a predominantly transmissive character, which bends digital technology to limited and instrumental use, not grasping its potential for methodological innovation in the teaching-learning process (Cortoni & Lo Presti, 2018; Pitzalis et al., 2016; Gui, 2019).

The spread of innovative teaching methodologies, supported by the use of digital technology, is still a patchy reality in Italy and the pandemic has simply brought to the fore consolidated practices and processes, together with the strengths and areas requiring attention, already characterised within the school system before the pandemic.

More than half of our sample expressed a critical attitude towards the true worth of DT if we consider the degree of attention paid by the students, their levels of participation and the amount of work required of teachers.

Fifty-nine-point three percent (59.3%) of the teachers believed that the students' attention threshold during online lessons was no higher than during traditional lessons; while 52.3% of them strongly disagreed with the statement that student involvement and participation might be facilitated by DT.

Seventy percent (70%) of the sample noted how much DT increased teachers' workload. The virtual classroom requires greater commitment to the preparation of materials to be shared, the preparation of online spaces for shared and collaborative work and the preparation of adequate tools for assessment.

The absence of physical proximity also required a greater effort on the part of teachers to engage their learners in the teaching/learning process. This was exacerbated further by the digital divide, which, in some cases, made it difficult, if not impossible, for students to access online teaching.

Although the highest percentage of the teachers reported having transmitted lessons remotely and not fully exploiting the methodological possibilities provided by the digital system, 42% said that distance learning changed their didactics, with comments ranging between a lot and completely, while only 15% declared that DT had changed their mode of teaching little or not at all. As was to be expected, this change in modes of teaching was acknowledged particularly by teachers working in preschools (58.3%) and primary schools (49.3%).

This gap between the activities implemented and the perception of change in approaches to teaching may be due, understandably, to a significant bias between the pervasive use of IT tools in teaching, and teachers' actual expertise in the use of educational technology.

This gap between what was achieved and individual's perception of their teaching experience underlines the need to document practices and experiences systematically through self-assessment and peer comparison to feed a meta-reflective circuit that, in the long run, enhances the system, impacting positively even on contexts most resistant to change.

Almost half of our self-selected sample (43.7%) declared being rather satisfied with the long-distance relationship established with their students. On the contrary, 32.8% stated not being really satisfied or not satisfied at all. Only a little over 2 out of 10 teachers (23.5%) declared being very or completely satisfied with the relationship mediated by DT.

On the basis of the data collected, the areas that suffered most as far as the teacher-student relationship is concerned were music, the social sciences, physical education and the teaching resources and teaching of those with special educational needs.

In particular, the condition of dissatisfaction expressed by the special-needs teachers is also reflected in the experiences of the families. This vulnerability is widely represented by the teachers themselves when questioned on the critical points of the DT experience.

The report of the Italian statistics agency (ISTAT) on the educational inclusion of pupils with disabilities confirms this, as well as the concern expressed by the teachers and families for the coming months (ISTAT, 2020). The activation of DT has made a sensitive process like school inclusion more complex and has highlighted the structural deficiencies of the system in terms of a lack of specialised teachers and assistants trained to facilitate the autonomy and communicative ability of their special-needs pupils, foster their face-to-face relationships with their peers, organise the adequate provision of spaces and the use of specific digital technology, which are all mandatory if truly inclusive teaching is to be guaranteed.

3.1 Innovation and Emerging Training Needs

The attitude of teachers regarding innovation is rather positive, in particular when acknowledging the need to ensure adequate future training for students and teachers to promote their digital skills. Forty-eight percent declared that they strongly desired integrating their face-to-face teaching with online teaching and believe that schools should encourage the use of online learning platforms in addition to lectures.

The teachers who seemed most favourable to the introduction of mixed teaching were those who were also able to combine available technology with innovative teaching methods. These, therefore, are those who, in addition to the use of Apps for videoconferencing and the exploitation of all the functions of the digital class roll book, also used interactive apps for teaching, promoted group work and workshops. They are innovative teachers who are proactive, and continue to be so online.

The areas of expertise that teachers believe they need to develop more in the future and which have been structured according to the DigCompEdu taxonomy (European Commission, 2017) are the teaching-learning areas, specifically the implementation of devices and digital resources in teaching, student support and fostering collaborative learning (58%) (Figure 2).

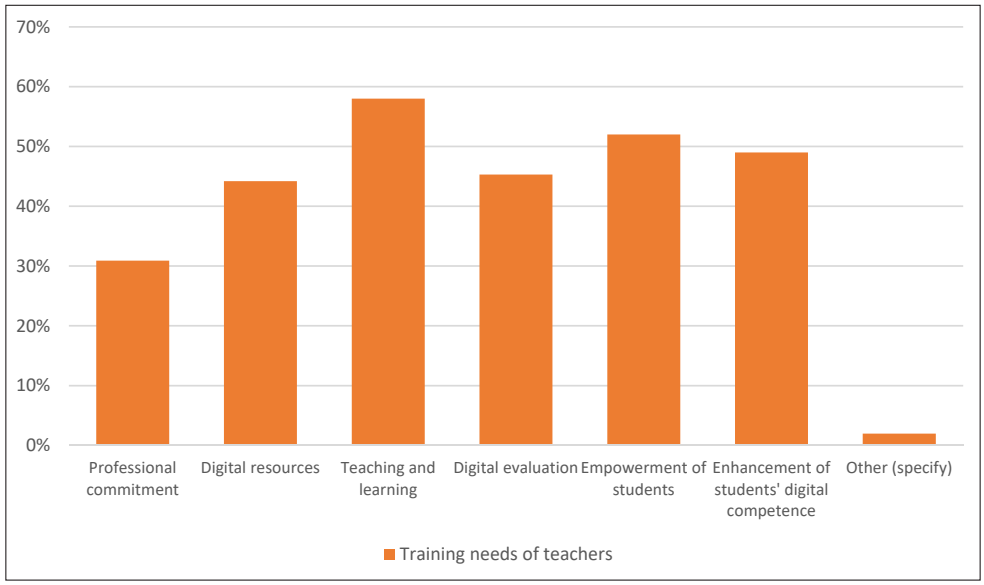

Figure 2: Teaching practices and tools during the pandemic

While we notice the interest shown by almost half of the sample regarding all the areas of competence we proposed, the area of professional commitment remains the most marginal. This is the area which concerns, specifically, the reinforcement of organisational communication and professional collaboration (30.9%) and special-needs teachers, in particular, who urgently need specific training (36.3%).

The emergency concentrated more on the efforts made by teachers to provide online teaching than on aspects related to collaboration with colleagues, deemed marginal with regard to future professional training, and, as we shall see, when it comes to improvements to be implemented in the light of lived experience.

This contingency highlighted the need for methodological training aimed at permitting teachers to use available technology effectively and exploit the potential it offers to teaching practices.

This emerges also through the answers regarding the question on the DT activities designed and provided by the teachers during the emergency. These proved to be mainly of a transmission type, in most cases a recorded online lecture. Teachers seemed to be aware of this limitation. This emerges when they identified the methodological area of teaching-learning as the main area on which to focus when organising future training.

3.2 Strengths, Criticalities, Future Challenges

Although, on the whole, the teachers contacted were very satisfied with distance learning in response to the emergency (52.5%), they were less inclined to say that they were generally satisfied with their distance relationships with students and colleagues.

Dissatisfaction with their distance relationship with students emerged more among preschool teachers; an understandable perception given the age of the pupils, and the teaching strategies usually adopted at this particular educational level (manipulation, play, exploration, etc.). The teachers who declared being less satisfied with relationships with their colleagues during DT were those employed in lower and upper secondary schools.

Generally, the teachers were very critical of the scheduling and work methods activated during the emergency. Almost 80% of the teachers surveyed agreed that the frequent use of digital devices made them feel tired. On the other hand, 40% of them maintained that network problems were difficult to handle, and 60% of them believed that the online education platforms should be standardised to avoid fragmentation and dispersion when managing didactic materials.

The teachers were then asked to express their feelings concerning polarised semantic variables (e. g., distance/proximity; difficulty/ease, etc.) arranged on a seven-modality scale. We know how positive and negative feelings influence learning and can reinforce past attitudes, or create conditions that feed negative or positive inclinations towards future learning. This applies to students as well as teachers in their professional practice (Illeris, 2003).

This survey revealed that more than half of the teachers (53.6%) felt that their teaching was penalised by distance lessons. This widespread feeling among teachers speaks of a shared difficulty associated with the remote transmission of didactic content, in terms of effectiveness and performance of the educational act.

However, this perception does not seem to have had a direct impact upon the serenity of teachers during lesson preparation, which aroused anxiety in only 27.7% of the respondents. It did not apply to remote lessons when it came to the use of technology as such in 21.9% of the cases considered, nor to the indifference towards digital technologies of a minority of teachers (24.4%). The difficulty, therefore, seems not to lie, according to the teachers, in the use of digital devices, but in the way these technologies seem to condition teaching practices, specifically teacher-learner relationships/interactions.

The female teachers of our self-selected sample suffered most from the relationship mediated by digital technology, about which they were less enthusiastic than their male colleagues. Being isolated from their pupils/students was perceived mostly by preschool school teachers and those operating in Northern Italy, for whom the continuation of

teaching activity added to the spread of the pandemic, with all the difficulties this caused to teaching.

Teachers aged over 60 complained by 7% more than teachers aged between 41 and 50 years when responding to the questions about the perception of isolation. Older teachers suffered most from the change, often feeling insufficiently supported by the administration and colleagues. Furthermore, among other considerations, teachers over 60 were those who in the semantic continuum were not at ease with ICT and experienced greater difficulty with digital devices, 19% as against 5.5% of teachers aged between 31 to 40, and 11.2% aged 41–50.

Among the strengths of the reorganisation of the teaching experience during the emergency, more than 60% of the teachers consulted emphasised their experimentation with innovative organisational and teaching models (67.2%). These data, however, need to be read in the light of the actual activities carried out during the lockdown.

Of those who indicated experimentation with innovative organisational and teaching models as strengths, only 25.8% and 17.3%, respectively, involved students in group and project work, in experimental laboratories and in-depth research, though 85% of these same teachers organised video conferences and transmitted teaching materials through digital platforms. Therefore, an idea of innovation centred on the use of digital devices rather than on ways that characterise their use emerges, indicating, as already highlighted in the previous paragraphs, the prevalence of transmissive teaching focused on content.

The teachers noted, in particular, two types of problems relating to the lived experience. Among the difficulties encountered during the reorganisation of teaching during this emergency were the considerable increase in their working hours (79.4%), followed by an increase in stress and physical fatigue (65.5%), experienced in particular by primary and lower secondary school teachers (Fig. 3).

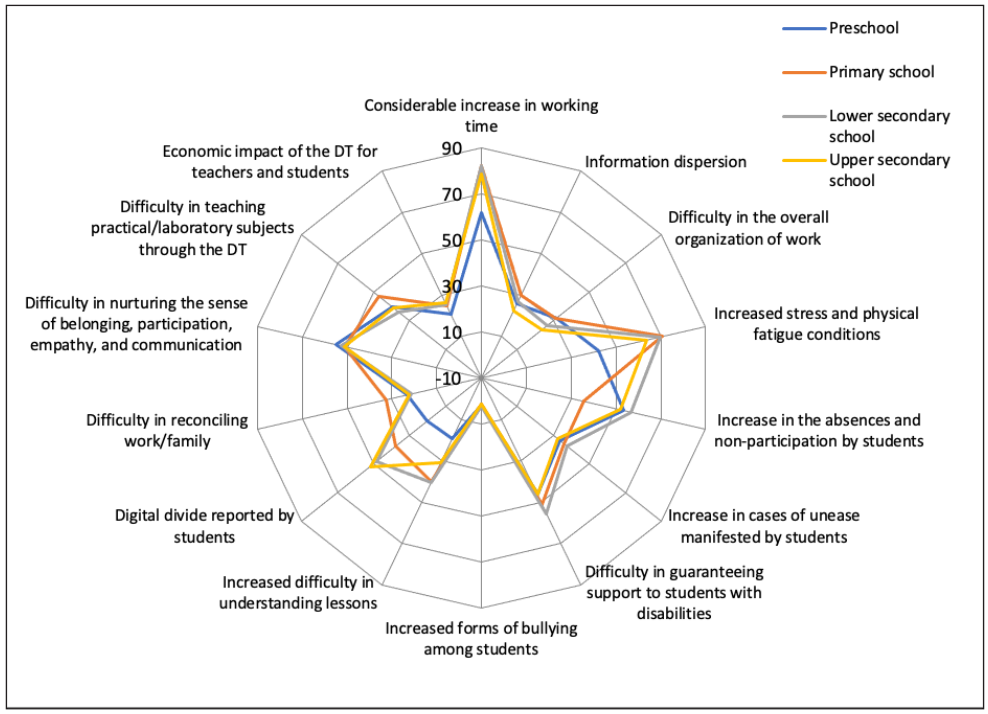

Figure 3: The criticalities which emerged according to school level

Next in rank were the difficulties encountered when trying to use DT to convey a sense of belonging, participation, empathy, and effective communication with students (51.8%) and when seeking to guarantee assistance and educational support to students with disabilities (49, 9%). Next came of the figure for absences and non-participation by students (48.1%).

When assessing the improvements teachers believed might favour processes of integration of digital technology capable of redesigning teaching, they emphasised most the need for an adequate share of resources in support of teaching-learning quality with the help of digital resources (53.7%), followed by a perceived need to organise internal training courses for the development of specific skills related to the exercise of the role of teaching within new digital environments (46.6%).

Almost half of the sample also believed it important to organise and collect assessments by students and families of the DT experience during the emergency (42.5%), and advocated a conscious redesign of the teaching and learning processes. Only 20% of the sample believed that a self-evaluation pathway shared by teachers might prove of use to reflect on the experience, and share socially what had been experienced with colleagues. This is

reflected also in the amount of time dedicated to discussions with colleagues which, for 50% of the teachers consulted, did not exceed two hours a week, a datum which probably fuelled the sense of isolation and self-referentiality when appraising the teaching emergency.

Very few teachers considered their colleagues' experience a value to be shared in order to assess their experiences together. This perception coincided with the low score of those who identified this point as an opportunity to identify objectives for the future (14.9 %).

All told, DT seems to have been experienced as a temporary parenthesis and not as a challenge to address in the long term; a perception ignored, unfortunately, as the pandemic continues.

4 The analysis of Latent Dimensions

The variables pinpointed by the survey need to be considered as indicators of latent constructs extracted by means of multivariate statistical techniques like exploratory factor analysis (De Lillo, 2007).[3] This statistical methodology makes it possible to simplify the amount of information collected when extracting factors regarding latent structures emerging from within the data gathered, with a minimum loss of information or variability. The approach used is that of an exploratory factor analysis aimed at identifying the underlying dimensions, and not at confirming theoretical constructs. However, before proceeding to a reduction of the data, an evaluation of the internal coherence of the scale (the series of questionnaire items) using the Cronbach Alpha method was deemed useful (Cronbach, 1951). This is a simple but widely used measure, applied in social studies to indicate degrees of agreement, namely, consistency, existing between several measures of the same theoretical concept obtained during the same administration and using the same detection method.[4]

This analysis was applied to the data relating to the degree of agreement or disagreement of teachers measured by a Likert scale (at 5 levels, where 1 represented total disagreement and 5 total agreement) on the following items:

3 For further methodological information on the technique and application of the technique, see De Lillo (2007).

4 According to the literature (Nunnally & Bernstein, 1994), statistical values of between 0.8 and 0.9 are considered adequate (the scale does not need to be reviewed); values lower than 0.8 suggest that the scale is incomplete (the item series needs to be integrated); values above 0.9 indicate redundancy (the number of questions in the questionnaire needs to be reduced). This analysis, conducted using Minitab, also permits one to verify how to adapt the consistency of the scale to the exclusion of one of the indicators deemed inconsistent.

- Students were prepared/competent to deal with distance learning.
- The content of the lessons was easy for the students to use and understand.
- The teaching material was easily available to students.
- Distance learning facilitated student involvement and participation.
- Distance teaching increased the teacher's workload.
- The online lessons were compatible with one's schedule.
- The attention threshold of students during online lessons was higher than in traditional lessons.
- There was good coordination between teachers.

The internal consistency of the items, measured using Cronbach's alpha, reveals a poor consistency (0.6826) that can be slightly improved (target value 0.7214), excluding from the questions the item "Distance teaching increases the teacher's workload". Therefore, considering only the items that achieve a fair degree of coherence, the latent dimensions of the variations in the methodological approach adopted by the teachers during the emergency were sought by application of exploratory factor analysis.

Based on the variability replicated by the factors as well as by the *scree-plot* (Figure 3), three factors were extracted; factors which cumulatively accounted for approximately 67% of the total variability, beyond which the eigenvalues were significantly lower than one while the curve tended to change its gradient.

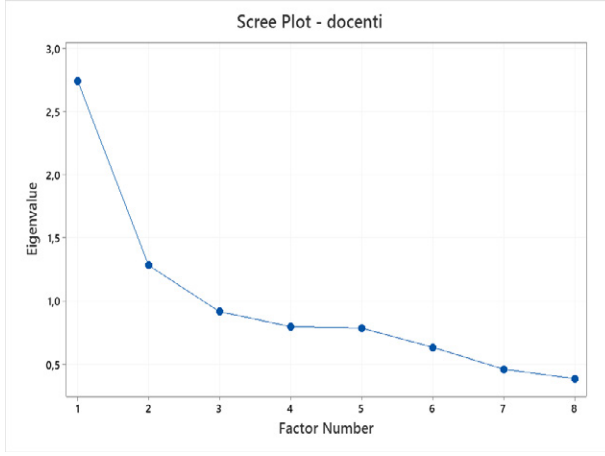

Figure 3: Scree-plot for the identification of latent factors to be extracted – teachers

The first factor explained 39% of the entire variability, when the second was added it explained from 54%, to 67% of the variability when the third factor was extracted. For interpretative purposes, the three factors were extracted and rotated orthogonally. The results are provided in Table 1 which shows the weight on the rotated factor of each variable of the dataset.

Table 1: Statistical output of the factor analysis, factor loadings of the extracted factors – teachers

Variable	Factor1	Factor2	Factor3	Com.
The teaching material was readily available to students	**0.752**	-0.088	0.152	0.597
The content of the lessons was easy for students to use and understand	**0.706**	-0.223	0.287	0.631
There was good coordination between the teachers	**0.229**	-0.194	0.062	0.094
The threshold of students' attention during the online lessons was greater than traditional lessons	0.093	**-0.761**	0.133	0.606
Distance learning facilitated student involvement and participation	0.217	**-0.563**	0.418	0.539
The online lessons were compatible with my schedule	0.150	**-0.323**	0.154	0.151
The students were prepared/competent to deal with distance learning	0.283	-0.265	**0.513**	0.414
Variance	1.2754	1.1665	0.5896	3.0315
% Var	0.182	0.167	0.084	0.433

The results of the factor analysis suggest that the main thrusts for teachers in terms of variations in the methodological approach were related to the *management of digital educational content* (factor 1), the *management of the dynamics of the virtual classroom* (factor 2) and the *digital maturity of the students* (factor 3) (Table 2).

Table 2: Organisational response factors

Factors	Variance	Items
Factor 1 **Organisation of the digital educational content**	39%	Positively correlated with: – The teaching material was easily available to students – The content of the lessons was easy for students to access and understand. – There was good coordination among teachers.
Factor 2 **Difficulty in managing the dynamics of the virtual classroom.**	54%	Negatively correlated with: – The threshold of students' attention during online lessons was greater than traditional lessons – Distance learning facilitated student involvement and participation – The online lessons were compatible with my schedule.
Factor 3 **Digital Maturity**	67%	Positively correlated with: – The students were prepared/competent to deal with distance learning

These factors were a useful basis when seeking to define teacher profiles through hierarchical cluster analysis. The exploratory analysis conducted with the help of the dendrogram and information about the level of similarity permitted the identification of 3 clusters (Table 3).

Table 3: Statistical output – centres of final groups and number of teacher groups

Variable	Cluster1 (n=644)	Cluster2 (n=594)	Cluster3 (n=777)
Organisation of digital educational content	-0.97	0.54	0.39
Difficulty in managing the dynamics of the virtual classroom.	0.15	0.66	-0.63
Digital Maturity	-0.23	-0.17	0.33

The groups can be interpreted by observing Table 3, which shows the average values of the centres.

- The first group consisted of 644 teachers with a below-average ability to organise digital teaching content, and a slightly above-average difficulty in managing classroom dynamics. This group of teachers perceived their students as endowed with below-average digital maturity. We defined this group *unprepared for the digital challenge*.

- The second group (594 teachers) which contained teachers with an above-average capacity to organise digital content in the face of difficulties when managing classroom dynamics, perceived their students as digitally less mature than average. We named this group as *contents centred*.

- In both these groups, the teachers appear to have been incapable of acting as mediators between digital culture and society. This way they risked amplifying the initial inequalities characterising students who live in difficult conditions and, therefore, unable to develop their digital maturity in different contexts.

- The third group of 777 teachers were quite well organised when required to prepare digital educational contents. They experienced a lower-than-average level of difficulty when seeking to manage classroom dynamics and perceive their students as digitally mature enough to deal with DT. We labelled this group of teachers as *mediators*, because they were able to mediate between technology, contents, the primacy of relationships, classroom management and the digital maturity of their students. The breadth of the spectrum of action of this teacher group seems to bear witness to a certain degree of digital mastery. It would be interesting to investigate the type of relationship that arises between the digital maturity of the teacher and that of the students. And where and how such digital maturity is formed in today's school.

The pandemic highlighted the strategic role that teachers play as mediators in learning (Pitzalis et al., 2016), decoding and understanding when it comes to contents, technology, norms, values and emotions. The mediator might be compared to an oarsperson rowing from one state/condition to another. The image of a bridge also conveys this idea of mediation which may also be compared to a filter or a game that proceeds along a pathway of empowerment capable of accompanying the players towards autonomy. To carry out this complex and sensitive function, however, the mediator must have bridged the gap before the others, have experienced the different states/conditions involved and have mastered all the nuances with respect to which he/her proposes himself/herself as intermediary.

The analysis suggests that the teacher's digital maturity and his/her ability to redesign the teaching/learning process within the digital environment favours the active participation of students, their inclusion and their digital maturity. Once again, the communicative dimension, this time regarding the management of interpersonal dynamics and the classroom group, presents itself in all its strength, placing the need for teachers to supervise this competence at the core of things.

5 Concluding Remarks

In conclusion, with the intention of finalizing the research work illustrated, it is considered useful to focus on some of the most significant results that emerged.

The analyses carried out show a very rich and complex snapshot of the Italian school system. It allows us to look at the educational action, to grasp its dynamism with respect to the regulatory effort, the direct change, the practices and processes of innovation and contamination in the daily working environment of the education system.

In 2020, the lockdown imposed by the global pandemic led the education system to a transformational event that completely redesigns its general order. When digital technology enters the Italian school, it does not simply pose a problem of adapting the skills of all its operators (technicians, staff and teachers). It also imposes the overall redesign of the entire structure, through the logic of the five Rs suggested by Thompson (1967): restructuring, redesigning, reinventing, realigning, rethinking; through the exercise of a reflective rationality (Schön, 1991), aimed at exploring, problematizing, contextualizing and responding, with creative and innovative solutions, to the introduction of digital technology in the setting and in the specific educational context. In fact, there is no technical rationality (technology or codified knowledge) capable of giving determined, generalizable and standardisable answers to the variability and uniqueness of the educational relationship, and to the varied service functions that each school offers to its community.

Regarding teachers, despite the great effort and difficulties in reaching all students, there is no significant change in teaching practices. The distance teaching highlighted the teaching and organisational models operational in Italian schools even before the pandemic.

Many teachers claim to have experienced DT as an emergency teaching tool, which persists in the time and space defined by the pandemic situation, but which cannot be considered the normality of the educational relationship. The relevance of the socializing dimension has come to light and what students and teachers have suffered most, in fact, is the discomfort linked to the lack of spaces for relating. Spaces where practical knowledge is generated which, through habits and daily experience, feeds perceptive mental schemes, reference values and principles of judgment.

The experience of DT probably made the community re-evaluate all this essential social and socializing function that precedes and goes beyond the transmissive mission itself. If we tried with Brint (1998) to answer the question "What kind of socialization made possible the de-territorialized and de-materialized space of the virtualized school?" we would deal with:

a) the absence of the behavioral dimension determined by the *non-materiality* of the online relationship. An environment which cancels the physicality of the encounter, the

experience of the other and of learning, leaves the subject alone in front of the recognition and care of oneself. A situation which creates loneliness, further fueled by the tendency and/or need to participate in educational activities with the webcam turned off;

b) the danger of self-referentiality due to the absence of a territory of comparison that relegates everyone, parents and children, teachers and students, and society as a whole, to their own personal bubble where there is no place for meeting, for the *other*, for discovery, feeding the risk of incommunicability and fear of the *other*, of the different and of the unknown;

c) and, finally, the impossibility of providing new generations with the necessary cultural framework to move easily in the *infosphere* (Floridi, 2015) determined by the digital revolution. It also dramatically reveals the digital skills gap already highlighted by all the international research in recent years (OECD, 2018, 2019a, 2019b, 2020; CC.EE, 2020).

The teachers reach this conclusion even in the face of an increase in the workload that does not correspond to the actual resources deployed by the Italian school system, the main element that also emerges when asked about the areas for improvement concerning the lived experience. The theme of recognizing the teachers and their work therefore returns, to which it is necessary to correspond with policies (recruitment, for continuing education, remuneration) that respond to this request.

However, it clearly emerges that greater awareness and ability in the use of digital technology for teaching purposes by teachers favours their active participation with students and the acquisition of new technological skills.

The research also shows a desire by teachers to re-read the parenthesis of DT in the light of the experience of students and families (42.5%). This need intercepted by the survey is an element that invites the school itself to become a promoter, and in turn, a beneficiary of the culture of data, in the didactic planning and management of the institute. But at the same time, the teachers' answers do not reveal this same sensitivity towards peer evaluation and self-evaluation related to the experience of DT, still preferring a predominantly hetero-evaluative model of a cognitive type. The data collected render us with a teaching staff that seems to be, in some ways, still rather self-referential, in which the opportunities for internal and external collaboration at the institute itself remain episodic and spread patchily throughout the national territory. Teachers declare a lack of motivation to communicate their own DT experience with colleagues, accompanied by 41.1% by the feeling of isolation from their peers. On the other hand, however, there is a need for internal training courses that allow teachers to develop the appropriate skills to exercise their role remotely.

Starting from this explorative data, we believe it is important to make a critical reflection to propose new developments. These should call into question the status quo, through the promotion of a culture of a professional network, of exchange between peers and of self-evaluation, favored by the school management itself.

A culture of self-reflection is important both in the teaching-learning process and in the decision-making and organizational processes that affect the school (Hoy & Miskel, 2001). Several studies have highlighted the positive relationship between teachers' self-assessment and their professional growth (Festinger, 1954; Peterson, 2000; Connelly & Clandinin, 1988). A reflexive meta culture has a dual purpose:

1) to intervene directly in the organizational climate and culture to build positive social relations between the members of the organization, and in this way respond to internal and external demands for change (Fullan, 1993);

2) to support subjects in the acquisition of methodologies and skills adequate to respond to the challenge of contemporaneity (Kyriakides et al., 2002; Muijs & Reynolds, 2001), to increase educational effectiveness (Scheerens & Bosker, 1997).

In particular, with respect to the experience of distance learning, the use of self-assessment tools integrated with other personal and group supervision strategies can help teachers and staff to: (a) increase awareness of the sense of the effectiveness of their own formative and organisational action; (b) help teachers and administrative staff to build pathways of improvement and define the actions necessary to deal with the criticalities and challenges of change; (c) facilitate communication between peers and nurture a sense of belonging and collaboration; (d) stimulate constructive strategies capable of solving the problems that DT inevitably produces at organisational and teaching level, undermining, in some cases, a sense of self-efficacy in teachers themselves obliged to re-interpret their role and reconsider their skills.

On the basis of this analysis, it seems possible also to recognise, with Capogna (2016), that three major areas of competence emerge in the exercise of the teaching profession, which are combined in different ways and degrees of complexity according to the school level (preschool, primary, lower/upper secondary) and which must be developed in the near future:

1) the socio-emotional skills that affect the entire relational sphere at different levels of professional action that, when it comes to professionalism, is played out in multiple spaces concerning interaction with students, colleagues and the organisation of affiliation and the broader community of reference;

2) the methodological skills, namely, the variegated range of skills that refer to the entire cycle of the educational process from an analysis of student's needs and their historical-biographical specificity to activities of assessment, evaluation and restitution;

3) and the enlargement of communication skills capable of expressing maturity and mastery of media and digital literacy and competencies.

Hence, rethinking the post-pandemic school means looking with hope at a series of actions that can transform the crisis into possibility:

1) to move from the directive/top-down logic to the empowering logic which aims to enhance and empower people with regard to their choices;

2) to pass from the self-referential structure to that of a supply chain that enhances inter-system relations;

3) to move from the logic of competition to that of cooperation to educate for the common good;

4) to move from the paradigm of transmissivity to the socio-constructionist one to educate the subject to be an active protagonist in building paths of personal and collective knowledge;

5) to move from the emphasis on performance, centered on the execution of the performance that objectifies the subject, to the idea of per-forming (in its original Latin meaning) which refers to "giving shape", recovering the relational dimension of the outcomes of learning;

6) to move from the dichotomy between theory and practice to reflective action that is always situated and specific;

7) to overcome the concept of competence to recover that of *virtue*, already reconquered by the whole strand of positive psychology (Seligman & Csikszentmihalyi, 2000; Seligman et al., 2005; Capogna, 2019), which gives us a holistic vision of the person;

8) to move from the emphasis on evaluation to the centrality of motivation, the only real boost to personal and professional growth;

9) to pass from executive thinking, typical of the educational model operated in the modern era, to the *critical thinking* necessary to live in the complex and global society of our times;

10) to move from training to what and how, aimed at training the workers of the first, second and third industrial revolution, to the awareness *of who* and *for whom*, necessary to inform an action oriented towards global ethics in a digital society (Millennium Group, 2017).

With the persistence of this pandemic and the resulting economic and social crisis, much remains to be done to bring schools back to the centre of individual and social develop-

ment policies, and to do this "a great reset" is necessary. A change of perspective is necessary, one aimed at putting the value of the *person*, *care* and *sharing* back at centre stage, starting from communities.

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Music Teachers' Motivation and Need Satisfaction Before and During the COVID-19 Crisis

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Abstract

After the WHO (2020) declared COVID-19 a pandemic in March 2020, the world was forced to move online. Instrumental music instruction was also affected by this situation. This paper presents a study which focuses on teacher motivation and assessment of music teachers' working conditions before (retrospective assessment) and during (N = 112) the COVID-19 crisis in Austria.

The study investigated the extent to which the transition to online instrumental music instruction impairs motivation and the satisfaction of basic psychological needs among music teachers. The theoretical basis of the study is self-determination theory, which distinguishes between autonomous and controlled forms of motivation and assumes that the satisfaction of basic psychological needs is essential for the development of autonomous motivation. The results of the study primarily indicate that autonomous motivation is rated significantly lower when online instruction is enforced compared to pre-pandemic motivation. In contrast, controlled forms of motivation did not change before and during the pandemic. Furthermore, the satisfaction of basic psychological needs appeared to decrease significantly with enforced distance teaching. A structural equation model showed that the variance in autonomous forms of motivation is best explained by satisfaction of the basic need for autonomy, perceived restrictions and age. Another structural equation model looking at pre-pandemic data similarly points to the varying differential importance of needs for instructor motivation.

Keywords

Basic psychological needs, teachers' motivational regulation, instrumental music instruction, distance learning, COVID-19, self-determination theory

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> You learn to appreciate many things
> when you no longer have them.

From the perspective of cultural studies, learning a musical instrument is relevant for the attribution of identity and the cultural memory of a country (Szabó-Knotik, 2004). In the "music country Austria" (Szabó-Knotik, 2004) most people learning a musical instrument attend a music school. Music schools in Austria are independent institutions outside the formal education system. These institutions offer not only instrumental and vocal instruction (major subjects) but also music theory, ensemble, and orchestral playing (minor subjects). Teaching and learning at music schools usually take place in individual lessons, sometimes in groups on a weekly basis. Music schools are open to all age groups and financed, on average, 80% by public funds and 20% by school fees. When the World Health Organization (WHO, 2020) declared COVID-19 a pandemic in March 2020, people had to switch to online modes in several areas of their lives. The education sector was also massively affected, with over 90% of all students worldwide no longer able to participate in face-to-face classroom teaching. Forced to do so, educational institutions transferred to online teaching and learning. This transition can be described as more or less successful, depending on the staff's skills and technical equipment. Based on Marshall et al. (2020), teachers during forced distance teaching reported limited scope of action, difficulties with technical conditions and a lack in communication with their students. This was a particular challenge for musical instrument lessons, where the synchronicity of interaction or the quality of 'sound transmission' is essential. Therefore, our initial hypothesis was that this transition would not be frictionless for teachers, and that the change to distance teaching would negatively affect autonomous forms of motivation. With the sudden conversion to online teaching, the learning environment of instrumental music teachers changed drastically. They had to adapt their teaching concepts and deal with the technical challenges of enforced distance teaching.

The theoretical basis for the study was the self-determination theory (SDT) (Ryan & Deci, 2017), which conceptualises different styles of motivational regulation depending on the degree of autonomy. It assumes that autonomous forms of motivation are supported by the satisfaction of basic psychological needs (BPNS) for autonomy, competence, and social relatedness. Thus, BPNS is essential for the maintenance and development of autonomous forms of motivation in instrumental teaching and learning (cf. e. g. Evans, 2015). Consequently, we hypothesized that teachers would exhibit lower basic psychological need satisfaction (BPNS) and perceived constraints. Accordingly, teacher motivation should be less autonomous and more controlled than before the pandemic.

In the past months, several studies based on SDT concerning student motivation in enforced online learning were published (e. g. Chiu, 2021a, 2021b; Chiu et al., 2021; Holzer et al., 2021; Müller et al., 2021a; Pelikan et al., 2021; Wong, 2020). This is not surprising, since student motivation was already a prominent field of research before the pandemic

(cf. Taylor et al., 2014). In contrast, less research was conducted on teacher motivation. No studies on teacher motivation in distance learning, especially for instrumental music instruction, and based on SDT, could be found.

In this empirical study, we investigated whether the motivation of music teachers to teach in enforced distance settings differs from that in face-to-face teaching. Furthermore, the aim of this study was to explore the conditions of teacher motivation in distance teaching. In terms of SDT, the conditions of motivation refer primarily to the satisfaction of the basic psychological needs for autonomy, competence, and relatedness. Here, Austrian music teachers were interviewed during the pandemic about their motivation, the BPNS, the perceived restrictions due to enforced distance teaching and learning, and their technical equipment. In addition, they had the opportunity to assess their motivation and the BPNS before the pandemic while face-to-face lessons were still possible retrospectively.

The article first provides an overview of the SDT and then summarises relevant literature on teacher motivation, teaching a musical instrument, and motivation in distance learning. Furthermore, this article suggests directions for future research and concludes with practical implementations.

1 Self-Determination Theory (SDT)

Similar to other motivational concepts, SDT (Ryan & Deci, 2017) distinguishes between extrinsic and intrinsic motivation. In SDT, intrinsic motivation is considered to be self-determined and not determined or influenced by external factors. In contrast, extrinsic motivation occurs when behaviour has a more or less instrumental character. For example, people act to obtain a reward or avoid anticipated negative consequences. SDT differs from other theories of motivation in two aspects. In addition to the focus on cognitive and emotional factors, SDT (1) focuses on behaviours that arise from the interaction of people with their environment (Evans, 2015) and (2) makes qualitative distinctions concerning extrinsic motivation (Ryan & Deci, 2002, 2017). (See Figure 1.) Accordingly, SDT distinguishes between the following four regulatory styles of extrinsic motivation and intrinsic regulation, which can be arranged on a continuum from self-determination to heteronomous control (fig. 2): intrinsic regulation, integrated regulation, identified regulation, introjected regulation, and external regulation. First, *intrinsic regulation* is a regulation style that is accompanied by fun, joy, interest, and inquisitiveness. Intrinsic regulation is the prototype of self-determined motivation. Second, more than any other extrinsic motivation, *integrated regulation* depends on self-determination. It results from the integration of values and regulations into one's coherent sense of self (Deci & Ryan, 1994). Third, within *identified regulation*, "[...], the focus is on the personal relevance of an action: when a learner, for example, identifies with the values and tasks of a learning arrangement and also integrates them into his or her self' (Müller & Louw, 2004, p. 171).

Fourth, the regulatory style of *introjected regulation* includes behaviour aimed at contingencies that relate to one's self-esteem. For example, one attends a music school to impress others, or because it is 'right and proper' to act in a certain way. "The cause of action may come from the person him/herself, yet is not controlled by the autonomous self, it is external to the person's sense of self" (Müller & Louw, 2004, p. 171). Fifth, *external regulation* depends on external contingency, for example, to attain rewards or to avoid negative feedback from colleagues or supervisors. This regulatory style can be described as the 'classical' extrinsic motivation.

In SDT-based studies, it has become established that intrinsic and identified regulation are combined to autonomous motivation, and external and introjected regulation to controlled motivation (Vansteenkiste et al., 2009). Integrated regulation is usually not assessed separately because the correlations with intrinsic motivation are very high and can hardly be separated empirically (Vallerand et al., 1992).

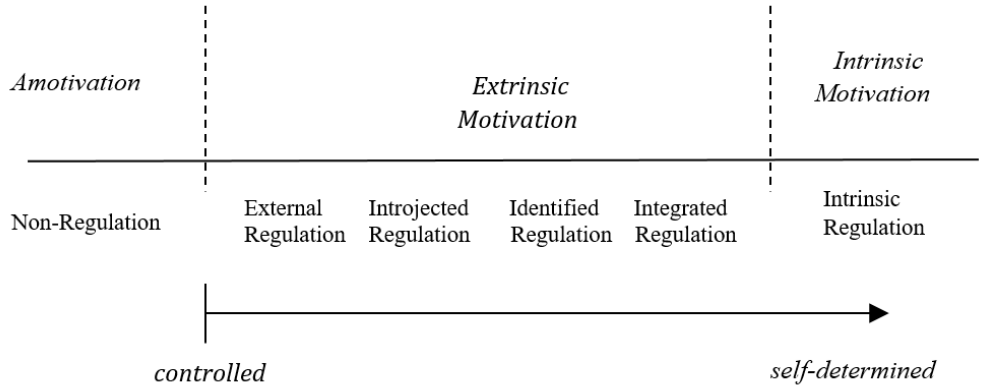

Figure 1: Continuum of self-determination (based on Ryan & Deci, 2002, p. 16)

For the development and maintenance of autonomous forms of motivation, the satisfaction of basic psychological needs for autonomy, competence, and social relatedness is essential (Ryan & Deci, 2017). This is because basic psychological needs provide our psychological system with information and feedback on the quality of the person-environment interaction (Krapp, 2005). That is, the satisfaction or dissatisfaction of basic needs tells us whether we are acting congruently with our 'individual self'. This quality of person-envi-

ronment interaction is particularly important in the educational context, since learning and teaching are directly linked to other people and the (learning) environment.

Evans (2015) sees SDT, especially in music, as a suitable theoretical framework. It provides a broad range of explanations for motivational behaviour in this field. Furthermore, he emphasised the satisfaction of the three basic needs in the music context.

Autonomy: Numerous studies have shown that support for autonomy is a key factor in the development and maintenance of autonomous motivation (Ryan & Deci, 2017). Teacher research has also repeatedly shown that teachers who perceive their working conditions at school as autonomy-supportive show higher autonomous motivation and well-being (Slemp et al., 2020).

Competence: The feeling of competence and the self-efficacy associated with it, as well as the ability to perform play an essential role in autonomous forms of motivation (Van den Broeck et al., 2010). For example, O'Neill and Sloboda (1997) showed that musicians who believed in their competence and musical development made more progress than those who defined their competence as unchangeable.

Social Relatedness: In addition to autonomy and competence, social connectedness may also play an important role in the development of autonomous forms of motivation, which is also true for the domain of instrumental music (cf. Evans 2015; Evans et al., 2013). The reason for this is, among other things, that teaching and learning an instrument involves social belonging, collaboration and affiliation (Philippe, Schiavio & Biasutti, 2020).

2 SDT Research on Instrumental Music and Motivation

A literature review on the conditions, processes, and outcomes of teacher motivation in instrumental teaching reveals the following considerations:

(1) Similar to research in other domains, studies on the conditions and processes of self-determined learning motivation can be found in the field of music education as well (Freer & Evans, 2019; Kingsford-Smith & Evans, 2019; MacIntyre et al., 2018; Miksza et al., 2019). (2) Only a few studies have used SDT as a theoretical framework and dealt with instrumental music in particular (Comeau et al., 2015; Evans & Liu, 2019; Liu et al., 2015; Schatt, 2018; Wieser, 2018). This is especially true for studies focusing on teacher motivation. (3) Very little is known about the motivation of teachers and students in musical learning settings that take place outside regular schools.

2.1 Teacher Motivation

In general, intrinsically motivated teachers or teachers who pursue intrinsic goals apply a higher mastery approach to their practice (Malmberg, 2008) and show higher levels of

enjoyment and satisfaction in teaching and the teaching profession (Collie et al., 2016; Cuevas et al., 2018; Dinham & Scott, 1998). Numerous studies on motivating teaching styles and their effects on student motivation have been published (e. g. Jang et al., 2016; Reeve & Jang, 2006). In the last decade, several studies also dealt with teachers' own motivation regarding environmental factors, such as working conditions and their influence on teachers' motivation (e. g. Müller et al., 2009; Pelletier et al., 2002; Slemp, Field & Cho, 2020; Taylor et al., 2008). In contrast, SDT-related research on teacher motivation in instrumental music is limited to the instructional context, and teachers' motivational styles and their effects on student learning (Cheon et al., 2018). For example, studies have shown that teachers, who adopt an autonomous supportive style show higher capacity for empathy, promote students' interests, set optimal requirements according to the performance level of their students, and address students' needs (Küpers et al., 2014).

Studies dealing with contextual conditions such as working conditions and the impact of BPNS on music teachers' motivation in instrumental music instruction cannot be found. Especially in times of enforced distance teaching and learning, which is a big challenge in instrumental teaching, motivation and BPNS can suffer substantially. Moreover, restrictions, fewer options in lesson planning as well as a lacking technical equipment for online teaching may have an influence on BPNS and motivation during the pandemic.

When reviewing the literature on motivation in online-based music education, the following can be summarized: Studies dealing with online music lessons or even online instrumental lessons are scarce (e. g. de Bruin, 2020; Hash, 2021). This is true for research on the quality and quantity of motivation of students and teachers alike. If there is research on this topic, the focus is primarily on aspects in the learning environment that are relevant for students' engagement and motivation (Johnson, 2017; Ng, Ng & Chu, 2022). We are not aware of any studies that address teacher motivation during enforced distance learning in music education.

3 Aims and Hypotheses

The aim of this study was to determine the extent to which teachers' motivational regulation and perception of basic needs differed between the time of conventional teaching and enforced distance learning. In addition, by using structural equation modelling, we investigated whether teachers' motivational regulation in enforced distance learning could be explained. Furthermore, we examined whether the SEM related to the situation before the pandemic differs from that related to the situation in forced distance learning.

Based on theoretical explanations and the research review, the following hypotheses were formulated:

H1a: Similar to recent studies conducted on the motivational differences between forced distance learning in the pandemic and face to face learning before (e. g. Müller et al., 2021b) teachers' autonomous motivation would be significantly lower in enforced distance learning than before the pandemic. H1b: Accordingly, controlled motivation would increase. However, the increase in controlled motivation should be rather small, since these forms of regulation are less situation-dependent and cannot be explained well by environmental variables (e. g. Vandenkerckhove et al., 2019).

H2: Based on the results of Marshall et al. (2020) and regarding SDT, these factors undermine the satisfaction of the three basic psychological needs. Therefore, we argue that perceived BPNS would be lower in enforced distance teaching than it was before the pandemic.

H3: Based on SDT (Ryan & Deci, 2017), the BPNS predicts autonomous types of motivation, whereas frustration predicts controlled types of motivation. Therefore, BPNS would be positively associated with autonomy and negatively associated with controlled forms of motivation. Because of the situation in enforced distance learning, it was exploratively examined whether both the perceived restrictions due to enforced distance teaching and the quality of teachers' technical equipment at home contribute directly or indirectly to the prediction of motivational regulation styles.

Additionally, we will examine whether teachers' age explains the two forms of motivation differently. Empirical studies provide evidence to support the proposition that older individuals are less motivated in a controlled manner than younger individuals (Sheldon et al., 2006; Sheldon & Kasser, 2001; Weman Josefsson et al., 2018). It is an open question to what extent age, especially in online instrumental lessons, is related to the satisfaction of needs and the quality of teacher motivation.

4 Method

4.1 Sample

In the present study, 112 music teachers (43% male, 57% female) from private music schools participated. The average age was 45 years (SD = 9.28), and in average they had 21 years (SD = 9.71) of teaching experience. The teachers taught a wide variety of instruments from wind and string instruments to piano. The most represented instrument group was wind instruments (39%), and the least represented was the vocal group (4.5%).

4.2 Procedure and Analyses

Due to the lockdown in spring 2020, it was not possible to hand out questionnaires directly in the music schools. Therefore, the questionnaire was converted into an online version. Music schools received an internet link in May 2020 to the questionnaire with the request to forward it to their teachers to complete it. Surveys took approximately ten minutes to complete. The received data did not contain missing values because the online questionnaire did not allow participants to proceed to the subsequent question without having answered the previous one. All questions were defined as mandatory fields.

In analysing the data, we used comparisons of means (paired sample t-test) to test the differences between the time before and during enforced distance learning for statistical significance. In addition, the effect sizes (Cohen's *d*) were calculated for comparison of means. For the confirmatory factor analyses (CFA) and structural equation models (SEM), chi-square statistic (χ^2), comparative fit index (*CFI*), and root mean square error of approximation (*RMSEA*) are reported. Following the suggestions of Kline (2016), *CFI* close to .95/90 and *RMSEA* close to .08/.06 were considered indicative of adequate model fit. All CFAs and SEMs were computed using Amos 28.0.

5 Measures

The questionnaire's design allowed teachers to give their assessments both before COVID-19 (conventional face-to-face teaching) retrospectively and during COVID-19 (enforced online teaching). All items of the reported scales of the teacher questionnaire had five response options from 'do not agree at all' (1) to 'agree very strongly'.

Motivational Regulation. A shortened version of the Self-Regulation-Questionnaire (Ryan & Connell, 1989), adapted for instrumental lessons, was used to investigate motivational regulation of teachers. It captures intrinsic regulation (e. g. 'I am engaged in my profession as a music teacher because I enjoy teaching young people') and the three forms of extrinsic motivation regulation styles[3] (e. g. identified regulation – '... to further develop my competence to teach an instrument'; introjected regulation – '... so that the parents think I am a good teacher', and extrinsic regulation – '... because I do not want any trouble with my school principal'). The same items were given twice: first to assess the perception of motivational regulation retrospectively and second, to assess the perception for enforced distance teaching.

Factor analysis showed that the four regulatory styles of motivation could not be statistically separated. Because of this, intrinsic and identified regulation were combined into one scale (autonomous motivation; $\alpha_{(\text{Before COVID-19})} = 69$; $\alpha_{(\text{Distance Teaching})} =. 77$) and intro-

3 Integrated regulation is not surveyed separately here (Ryan & Connell, 1989; Vallerand et al., 1992).

jected and extrinsic regulation into a second scale (controlled motivation; $\alpha_{(\text{Before COVID-19})}$ = 80; $\alpha_{(\text{Distance Teaching})}$ = .86). The forming of two constructs, autonomous and controlled motivation, is a common practice in SDT research (see, e. g. Vansteenkiste et al., 2009). The two-factorial solution demonstrates that the two motivational constructs can be statistically separated. Thus, CFA showed just acceptable model fit, with the RMSEA being slightly too high, $\chi^2(47) = 75.395$, $p = .005$, $CFI = 0.91$, $RMSEA = 0.073$.

Basic Psychological Needs Satisfaction (BPNS). To assess perceived basic psychological needs satisfaction, validated scales for the school sector (Müller & Hanfstingl, 2018) were used and only the term "teacher" was adapted to "music teacher" to fit the context ($\alpha_{(\text{Before COVID-19})}$ = .70 - .84; $\alpha_{(\text{Distance Teaching})}$ = .75 - .83). The same items were given twice: first to assess the perception of BPNS retrospectively and second, to assess the perception for enforced distance teaching. Considering that short scales were used to assess need satisfaction (two items; Autonomy – e.g. 'As a music teacher, I can work according to my own ideas', Competence – e. g. 'I feel that I can manage my work well', Social Relatedness – e. g. 'My colleagues support me in my work'), the reliabilities can be rated as good. CFA showed a very good model fit, $\chi^2(10) = 10.830$, $p = .371$; $CFI = 0.993$; $RSMEA = 0.027$.

Perceived Restrictions due to Forced Distance Teaching. To assess perceived restrictions due to technical conditions and online teaching, three items were created by the authors and used within the survey ('The implementation of online lessons puts me under pressure', 'I feel overwhelmed by the technical conditions', 'Online teaching as well as the technical conditions limit my scope of action'; $\alpha = .68$).

Teachers' Technical Equipment at Home. Due to the prevailing circumstances concerning COVID-19 and the resulting change to online instrumental music instruction, music teachers were asked to indicate how well they were technically equipped for online teaching at home. By that time in the pandemic it was unclear which technical conditions are necessary for qualitative teaching online. Therefore, only one self-developed item was used to measure the adequacy of technical equipment at home. Measurement with only one item has the disadvantage that reliability is limited. This must be considered when interpreting the data.

Table 1: Descriptive Statistics and t-Test

	Before COVID-19 ($N = 112$)			During distance teaching ($N = 112$)			t	p	Cohen's d
	M	SD	α	M	SD	α	Number of items		
Autonomous motivation	4.70	0.44	.69	4.24	0.74	.77	4	6.634	<.001	0.760
Controlled motivation	2.13	0.80	.80	2.10	0.80	.86	6	.468	.641	0.037
BPNS:										
Autonomy	4.43	0.69	.84	3.98	0.88	.75	3	5.245	<.001	0.560
Competence	4.45	0.55	.71	4.03	0.90	.76	2	5.678	<.001	0.566
Social relatedness	3.92	0.81	.70	2.95	1.30	.83	2	10.345	<.001	0.886
Good technical equipment				3.85	1.05		1			
Perceived restrictions				2.55	0.95	.68	3			

Scale: 1 (do not agree at all)–5 (agree very strongly). BPNS, satisfaction of basic psychological needs

6 Results

6.1 Descriptive Statistics

See Table 1 for the following descriptive statistics.

Motivational Regulation. Teachers in the period before COVID-19 retrospectively reported a higher degree of autonomous motivation (M = 4.70; SD = 0.44) than during enforced distance teaching (M = 4.24; SD = 0.74). A significant difference with a large effect size was found. Teachers' perception of controlled motivation remained at the same low level both before COVID-19 (M = 2.13; SD = 0.80) and during online teaching (M = 2.10; SD = 0.80).

PNS. Perceived satisfaction of basic needs – as rated retrospectively – was significantly higher before COVID-19 than during enforced distance teaching. However, differences can be observed in the size of the effects. Autonomy and competence showed medium effect sizes, whereas social relatedness showed a high effect size for the mean difference with respect to teaching before and during the COVID-19 crisis.

Furthermore, teachers assessed their technical equipment available at home for distance learning as relatively good (M = 3.85; SD = 1.05), but also perceived restrictions due to enforced distance teaching (M = 2.55, SD = 1.05).

6.2 Correlations

Table 2 provides an overview of the correlations between the main variables before and during the enforced shift to online instrumental music instruction.

Before COVID-19. Autonomous motivation showed the highest correlation with the need for competence (r = .47, p < .01). Low but significant correlations were found with regard to social relatedness (r = .29, p < .01) and autonomy (r = .23, p < .05). A negative correlation was found for age (r = -.28, p < .01). Thus, older teachers were less controlled in their motivation before enforced distance teaching and learning. With respect to the intercorrelations of the BPNS, it is noticeable that competence and relatedness correlated relatively highly with each other (r = .59, p < .01). Moreover, social relatedness is marginally but significantly associated with controlled motivation (r = .12, p < .05).

During enforced distance teaching. Needs for autonomy and competence correlated highest with autonomous motivation (r = .59 and .60, p < .01). Furthermore, good equipment (r = .27, p < .01) and perceived restrictions during online teaching (r = -.30, p < .01) predicted autonomous motivation during enforced distance teaching. Controlled motivation correlated weakly with social relatedness (r = .21, p < .05) and age (r = -.26, p < .01). Compared to the correlations before the shift to enforced distance teaching, it is noticeable that BPNS for autonomy correlated higher with the BPNS for competence

(r = .60**). In addition, good technical equipment at home and perceived restrictions due to enforced distance teaching correlated positively and negatively with BPNS, respectively (see Table 2).

Table 2: Correlations Among Measured Variables Before COVID-19 Restrictions and During Enforced Distance Teaching

	1	2	3	4	5	6	7	8
1. Autonomous motivation	—	-.06	.23*	.47**	.29**	-	-	-.07
2. Controlled motivation	**.18**	—	-.11	-.05	.12	-	-	-.28**
3. BPNS autonomy	**.59****	**.10**	—	.52**	.12	-	-	.21*
4. BPNS competence	**.60****	**.01**	**.60****	—	.19*	-	-	-.03
5. BPNS social relatedness	**.19***	**.21***	**.20***	**.25****	—	-	-	.01
6. Good technical equipment	**.27***	**.01**	**.25****	**.52****	**.09**	—	-	-
7. Perceived restrictions	**-.30****	**.17***	**-.37****	**-.46****	**-.19***	**-.49****	—	-
8. Age	**-.11**	**-.26***	**.00**	**-.08**	**.03**	**-.09**	**.15**	—

Note. *p < .05; **p < .01; correlations during enforced distance teaching are printed in bold. BPN = basic psychological need

6.3 Structural Equation Model

One aim of this study was to predict motivation during teaching in the online mode. For this purpose, structural equation modelling (SEM) was conducted (see figure 2). The SEM in figure 2 showed a mainly acceptable model fit, $\chi 2(214) = 300.496$, $p < .01$, $CFI = 0.91$, $RMSEA = 0.057$. The best predictor for autonomous motivation ($R^2 = .80$) was the BPNS for autonomy ($\beta = .84$, $p < .01$), followed by competence ($\beta = .12$, $p < .05$). It should be noted that these two predictors were highly correlated with each other and thus there is a clear indication of co-linearity. Perceived restrictions due to forced distance teaching ($R^2 = .02$) were predicted by the teacher's age ($\beta = .14$, $p < .05$). In turn, perceived restrictions predicted the BPNS for autonomy ($R^2 = .24$, $\beta = -.48$, $p < .01$) and competence ($R^2 = .41$, $\beta = -.64$, $p < .01$).

The model explained 16% of the variance in controlled motivation. The predictors of controlled motivation were age ($\beta = -.23$, $p < .01$), perceived restrictions ($\beta = .29$, $p < .01$), and social relatedness ($\beta = .21$, $p < .01$). The variable good technical equipment correlated with perceived restrictions due to online teaching ($r = -.49$, $p < .01$) and provided no additional explanatory value. Consequently, it was not included in the model.

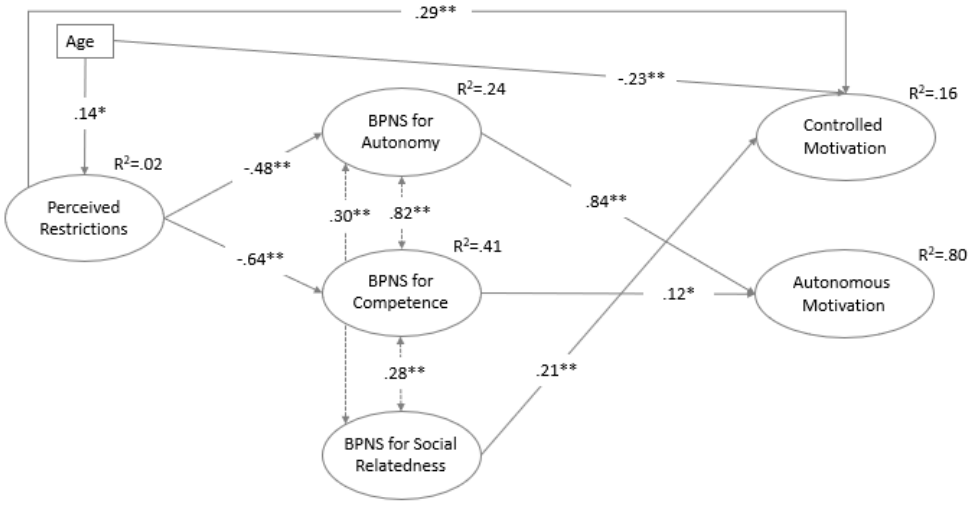

Figure 2 SEM: Teacher motivation during enforced distance teaching.
Note. Variables are modelled latently; measurement models are not shown; * $p < .05$, ** $p < .01$
Non-significant paths are not shown.

Comparing the SEM result with the SEM based on data of teachers' retrospective perceptions before the pandemic, we found that BPNS and teachers' age can explain motivation (see Fig. 3). The model fits are slightly worse for the second SEM and are outside the recommended cut offs ($\chi 2(154) = 230.086$, $p < .01$, $CFI = 0.863$, $RMSEA = 0.063$). The main difference is that before the transition to distance teaching competence ($\beta = .78$, $p < .01$) provides the highest predictive power for autonomous motivation ($R^2 = .80$). In contrast, no significant path coefficient was found between BPNS for autonomy and autonomous motivation. As with the first SEM, the BPNS for autonomy and competence are highly correlated, resulting in no additional explanatory effect of autonomy for autonomous motivation. Controlled motivation can also be explained ($R^2 = .14$) by age ($\beta = -.39$, $p < .01$) and social relatedness ($\beta = .20$, $p < .05$) before the pandemic.

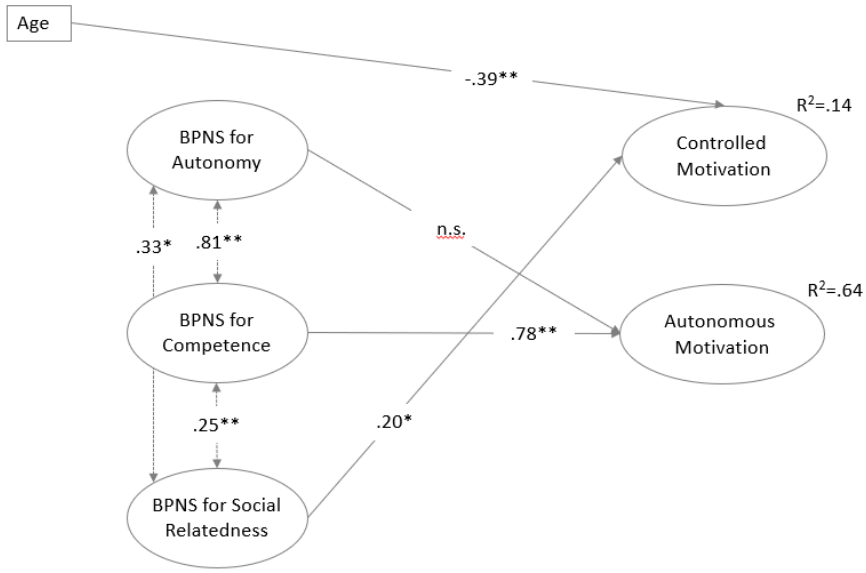

Figure 3: SEM: Teacher motivation before enforced distance teaching.
Note. Variables are modelled latently; measurement models are not shown; * $p < .05$, ** $p < .01$
Non-significant paths are not shown (except autonomy).

7 Summary and Discussion

The aim of the study was to investigate teachers' motivational regulation before and during enforced distance teaching in instrumental music instruction. In addition, the relevant conditions of motivation for distance learning were investigated.

As expected, autonomous motivation to teach was significantly lower than reported from a retrospective perspective before the pandemic (H1a). The relatively high effect size indicates that the enforced shift to online instrumental music instruction had negative consequences for teachers' autonomous motivation. However, compared to the retrospective perceptions, autonomous motivation remained at a relatively high level ($M = 4.24$ on a five-point scale). Nevertheless, the retrospective view may be confounded due to the overall low satisfaction during the pandemic. The second sub-hypothesis, which predicted significantly higher controlled motivation in enforced distance teaching, was not confirmed (H1b). Controlled forms of motivation apparently remained constant at a low level, which indicates that the overall quality of teachers' motivation remained quite high (cf. Vansteenkiste et al., 2009). One possible interpretation for controlled regulation remaining unchanged in the pandemic could be found in relatively stable personality traits

or abilities of self-regulation. There is empirical evidence that dispositional anxiety or general life stresses, for example, correlate moderately with controlled motivation in the teaching profession (Müller & Hanfstingl, 2018). However, further studies would need to corroborate the hypothesis that in the case of environmental changes (crises, etc.) controlled motivation is less affected, as relatively stable personal characteristics particularly determine controlled motivation. The extent to which controlled forms of motivation change among teachers after longer-enforced distance learning remains open and would also be an interesting further research topic. The second hypothesis (H2), which predicted lower BPNS than before the pandemic, was confirmed by significant mean differences for all three scales. In particular, social relatedness was rated significantly lower by teachers in enforced distance teaching. However, autonomy, which is associated with the feeling of being able to do what one really wants to, as well as competence, which goes along with experiencing personal efficacy, were assessed lower than before the pandemic. Again, teachers might have experienced less BPNS due to the overall low satisfaction during the pandemic; that could have influenced the teachers' retrospective and current perception. Furthermore, other studies have also found that teachers have lower motivation in enforced distance teaching than in a face-to-face environment (e. g. Kulikowski et al., 2021).

Due to the two-dimensionality of the motivational regulation scales for teachers, autonomous and controlled motivation were latently modelled as dependent variables in a structural equation model. In line with our expectations, autonomous motivation could be explained by the two basic psychological needs for autonomy and competence, whereas the high intercorrelation of these two needs strongly underestimated the predictive part of competence (first SEM) and autonomy (second SEM) respectively. The finding that satisfaction of relatedness did not predict autonomous motivation in enforced distance teaching during COVID-19 and before the pandemic was somewhat surprising. The correlation of relatedness with the other two basic psychological needs was weak, and collinearity is not a sufficient explanation for the fact that social relatedness has no explanatory effect on autonomous motivation. Our results corroborate the findings of other studies (Holzer et al., 2021; Martinek et al., 2021; Müller et al., 2021a), which also found little or no effects of relatedness on intrinsic motivation among university students during enforced distance learning. They argued that social relatedness does not necessarily affect internal psychological regulations. Online situations may well be experienced as highly self-determined (e. g. Ryan et al., 2006; Ryan et al., 2010). If the other two basic psychological needs for autonomy and competence are sufficiently satisfied, students may still be 'well aligned with their inner selves' (Martinek et al., 2021) and the need for relatedness may play a subordinate role. Another reason could be that the need for relatedness is not predominantly satisfied in the work context, but in the context of family or among friends and acquaintances (Tezci et al., 2015). These explanations are tentative, and future investigations should examine the role of relatedness for motivation over longer periods of (enforced) distance learning, not only in music education.

Moreover, in the structural equation model, controlled motivation could be explained less well than autonomous motivation. This phenomenon has been reported in other SDT-based studies (e. g. Vandenkerckhove et al., 2019). Surprisingly, social relatedness is a small but significant predictor of controlled motivation in both structural equation models ($\beta = .14/.20$, $p < .05$). This finding is not consistent with theory and is difficult to interpret. On the one hand, it cannot be ruled out that it is a chance discovery. On the other hand, it is conceivable that people feel they belong to a group and at the same time have not fully internalized the norms and values of the group. Thus, they could feel pressured internally, despite being socially integrated in the group. Of course, further research would have to be conducted to substantiate this assumption.

Additionally, results of the SEM showed that, age and perceived restrictions due to forced online teaching explained controlled motivation. Apparently, older teachers perceive themselves as less externally controlled than younger teachers. This age effect was also found in the retrospective assessments at the time before the pandemic (see fig. 3). A possible explanation might be greater life experience. Older teachers have learned to regulate themselves more independently of external influences. In this regard, Sheldon et al. (2006) refer to the concept of psychological autonomy. In this process, individuals gain the ability to make more self-appropriate decisions. Sheldon and Kasser (2001) found that older participants reported more goal autonomy compared to younger participants. Weman Josefsson and colleagues (2018) also showed in their study that the significant positive pathway between exercise, motivation, and psychological need satisfaction was stronger in older participants. However, this could also be a sample effect, since in the literature, and the findings on the correlation between age and controlled forms of motivation vary. Plausibly, there may be negative effects of perceived restrictions on the needs for autonomy and competence, and a direct path on controlled motivation.

8 Limitations

The study has limitations in relation to the sample composition and partly the quality of the instruments and the fit indices. The survey reached about a quarter of all teachers working in music schools in an Austrian state. This speaks for the high representativeness of the data, but does not completely exclude the effects of self-selective sample composition. It can be assumed that more intrinsically motivated and committed teachers participated in the study.

Due to pragmatic considerations, short scales had to be used in the study to measure motivational regulation and BPNS. Therefore, the reliability coefficients, compared to other factors, were partly lower (e. g. Autonomous Motivation -.69). Another limitation concerns the items used for measuring the restrictions due to enforced distance teaching. These items were developed by ourselves and did not run through a validation process.

Despite that, the reliability for this factor can be rated as acceptable (.68). Another limitation is the investigation of teachers' technical equipment at home with only one item. Future studies using this short scale should employ an extended item pool for competence and relatedness. Moreover, another limitation concerns the study design. Due to the circumstance, this study was composed with a cross-sectional design with a retrospective measure and a "current" measure of teachers' motivation. So, no real longitudinal data was used here. A not negligible limitation concerns the survey's retrospective measurement of teachers' motivation and need satisfaction before enforced distance teaching. Here, the retrospective assessment may be distorted. This common method bias may have an influence on the study's validity, reliability and correlation (Kock et al., 2021). A final limitation concerns the fit indices (especially in the second SEM), which are partly due to the relatively small sample and the measurement with short scales.

9 Further Research Directions

Future surveys could investigate whether motivational regulation and BPNS have since changed. It would be especially interesting to know whether motivation and BPNS recovered after the partial return to face-to-face teaching and whether there were interpersonal differences in development. In addition, the personal characteristics and which further environmental conditions lead to changes in motivation and BPNS among teachers should be investigated.

Moreover, it would be interesting to explore whether largely stable person-related variables, such as personality or self-direction skills, can additionally predict motivation, not only in distance learning (see above).

Furthermore, it would be interesting to find out whether, from the perspective of students and teachers, distance learning and teaching (at least partially) would be a viable option for teaching an instrument or whether this form of learning is completely dysfunctional for music schools.

10 Conclusion and Implications

The perception of autonomous motivation and BPNS of music teachers was substantially lower during enforced distance learning, whereas controlled motivation was rated the same. BPNS emerged as predictors of motivational regulation and the need for autonomy explained autonomous motivation best. The study also showed that older teachers, not just during the pandemic, exhibited less controlled motivation.

Teachers reported significantly lower relatedness in the online instrumental music lessons. This may be due to the switch to distance learning on the one hand and the general

restrictions in everyday life on the other. Another study with music students also showed, that the quality of contact between the teacher and students essentially suffered during learning an instrument in times of enforced distance instruction (Wieser & Müller, submitted; 2021).

From an emotional-motivational point of view, online instrumental music instruction is an emergency solution that had to be used in the pandemic. This is demonstrated by the findings of this study. Of course, there are also advantages in online teaching, such as time flexibility, which could have a positive impact on autonomy. However, especially in instrumental music instruction, the disadvantages outweigh the advantages.

The limitations of online instrumental music instruction can be seen, for example, in the limited social interaction, the time delay in transmission, and the lack of 'holistic' perception of the interaction partners. Additionally, Thielemann (2020) suggests that, especially, in simultaneous online music lessons and due to (the lack of) technical equipment, providing qualitative feedback does not work well. This is due to poor sound quality, unclear tone colours or phrasing, or difficulty in assessing posture. However, these factors are considered essential for quality teaching (Johnson, 2017).

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Declaration of Conflicting Interests

The authors declare no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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STEM Teachers' Experiences with Online Teaching During the COVID-19 Pandemic: A Canadian Context

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Abstract

The COVID-19 pandemic necessitated the closure of K-12 schools globally, abruptly shifting to an online format or emergency remote teaching (ERT). In this chapter, the authors focus on STEM teachers' experiences with online teaching in Canada. Specifically, the authors address i) the level of support received by teachers with a focus on resources and professional development (PD), and ii) teachers' recommendations for successful online teaching in the future. A mixed-methods design was utilized, and quantitative and qualitative data were collected from teachers through an online questionnaire administered to 75 grade 1–12 STEM teachers in a large Canadian province in May–July 2020. Data analyses were guided by theoretical frameworks that entail PD, social constructivism, and communities of practice.

Results indicate that teachers faced a wide array of challenges including the fact that the support they received to effectively implement ERT did not parallel their expectations. Furthermore, the majority of teachers did not envision ERT as a positive experience for themselves nor their students. Based on their successes and challenges, participating teachers listed several recommendations to school boards, policy makers, and the government. These include clear time boundaries for teachers; centralized high-quality digital resources; quality technology for teachers and students; additional information technology and PD support; clear administrative direction; enforcing accountability measures for students; and equitable access to learning among students.

Keywords

online teaching, K-12 education, STEM education, teacher professional development, communities of practice

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1 Introduction and Objectives

The COVID-19 pandemic forced the closure of most K-12 schools around the world, abruptly shifting teaching and learning to an online format. In Canada, school closures were in effect from March to June 2020, impacting 6,643,213 students (UNESCO, 2020). All provincial and territorial ministries of education instructed schools to start online/distance teaching for K-12 students. Some provinces articulated that elementary level teachers focus on mathematics and literacy, while secondary level teachers focus on literacy, math, and sciences, with a notable emphasis on science, technology, engineering and mathematics (STEM) subjects. Teachers were provided with a handful of suggestions on resources and platforms to use during online teaching.

This abrupt world-wide shift to online teaching or emergency remote teaching (ERT) (Hodges et al., 2020) was accompanied by many challenges. Documented online teaching 'good practices' that engage students in learner-centered approaches are considered rare. Moreover, teachers' familiarity with integrating technology into instructional practice is limited (Reimers & Schleicher, 2020). Teachers also had to align available digital educational content with their national curricula, and at the same time cater for their students' academic, mental health, social, and emotional needs (World Bank, 2020). The fact that online teaching was a first-of-its-kind for many educators, an exploration of teachers' needs and practices during ERT is warranted. Thus, it is crucial to explore how STEM teachers functioned in this new teaching and learning environment. A review of the literature (e. g., Barbour, 2018; Hung, 2016; Taie et al., 2019; Tallent-Runnels et al., 2006) highlights a dearth of studies on online teaching in K-12 settings, especially in a Canadian context. Hodges et al. (2020) maintain that under normal conditions, online teaching can be evaluated using several frameworks including students' learning, attitudes, interest, motivation, and engagement; quality of technological tools; faculty support and PD; and policy and governance matters. On the other hand, ERT evaluation needs to ask additional broader questions. Hodges and Fowler (2020) believe that teachers' reflections can lead to better teaching practices and better preparation for similar instructional situations. Reflection can be defined as the careful examination of ideas to create new insight through ongoing cycles of expression and re-evaluation (Marshall, 2019, as cited in Hodges & Fowler, 2020). Accordingly, in this study the authors explored teachers' reflective practices to evaluate the quality of support they received during unprecedented conditions of a pandemic.

Hence, the overall study focused on STEM teachers' online practices during the pandemic in Canada. In this chapter, the authors focus on successes and challenges teachers encountered, including the support provided to teachers and their recommendations for improving online teaching in the future.

2 Literature Review

2.1 Online Teaching Definition, Advantages, and Challenges

Online teaching is the process of teaching with some, or all instructional materials delivered over the internet, with the teacher facilitating the process by structuring and sequencing the online activities (Cook & Steinert, 2013; Hoffman, 2018). Prior to the pandemic, the number of virtual schools were increasing in K-12 education. For instance, almost every state in the United States offers a version of fully online or blended education (Toppin & Toppin, 2016). Research has demonstrated many affordances associated with online teaching. First, it overcomes physical distance as a barrier to learning, allowing for more versatility and flexibility (De Paepe et al., 2018; Saadé et al., 2007; Thoms & Eryilmaz, 2014; Vivolo, 2019). From a pedagogical perspective, online teaching has a positive impact on teaching and assessment strategies (Cook & Steinert, 2013; Hung & Jeng, 2013). Teachers can incorporate effective pedagogical and instructional strategies such as games, interactive models, computer simulations and animations, and audio and video clips. Online teaching can also be adapted to the needs and lifestyles of many students, which can be beneficial for those struggling academically or who are at-risk (Toppin & Toppin, 2016). Studies have also highlighted the positive impact of internet-supported learning on students in terms of grade achievement, engagement, motivation, participation, and satisfaction (Amasha et al., 2018; Bekele & Menchaca, 2008; Dumford & Miller, 2018).

On the other hand, several obstacles and challenges face online teaching, including those associated with administration, students and teachers, pedagogy, and equity. Bolliger and Wasilik (2009) categorize the challenges as institution-related, student-related, and instructor related. Institution-related challenges entail those linked to policies, workload, time, and teacher compensation. In addition, administrative challenges include the required investments in time and money for development and maintenance, as well as the deficiency in instructional designs and valuable resources (Cook & Steinert, 2013; De Paepe et al., 2018). Toppin and Toppin (2016) also question the level of preparedness of teachers, the efficiency of their support services, and the reliability of the technology and the infrastructure required for successful online teaching. Student challenges include isolation, lack of face-to-face interaction, access to technology, and issues related to learners' motivation and engagement to learn using technology (Cook & Steinert, 2013; Davis et al., 2007; De Paepe et al., 2018; Dumford & Miller, 2018; Lao & Gonzales, 2005; Leire et al., 2016; Saadé et al., 2007; Searls, 2012; Toppin & Toppin, 2016; Zhang & Lin, 2020). On the other hand, teacher challenges include the fact that online technologies are time-consuming and require adequate technology access, equipment, and infrastructure. Moreover, from a pedagogical perspective, it can be challenging for some teachers to differentiate instruction online (Smith et al., 2016). Additionally, some teachers face challenges in nurturing higher-order thinking, student-centered teaching methods, and interaction between them, the student, and the content in online classrooms (Baran et

al., 2011). Elsewhere, the authors discuss the challenges encountered by Canadian STEM teachers, specifically in online teaching during the pandemic (DeCoito & Estaiteyeh, 2022).

2.2 Emergency Remote Teaching (ERT)

Well-planned online learning experiences in normal situations provide a robust educational ecosystem for learners. This differs from online courses offered in response to a crisis in which temporary access to instruction is provided (Hodges et al., 2020). Hodges et al. (2020) define ERT as "a temporary shift of instructional delivery to an alternate delivery mode due to crisis circumstances" (p. 6). This implies that quality online teaching requirements such as careful instructional design, planning, and development, as well as support systems are mostly absent in emergency situations such as the COVID-19 pandemic. Furthermore, teachers' beliefs (Davis et al., 2006) and levels of self-efficacy (Bandura, 1995) are factors impacting teachers' willingness and effectiveness in ERT contexts. Research also implies that teachers' high self-efficacy has a very significant impact on their online teaching effectiveness (Barberà et al., 2016; Chen, 2010; Wang & Ha, 2012). Since teachers' self-efficacy beliefs translate into quality of instruction, bringing change to teachers' practice must start with their belief systems (Hoy et al., 2020).

As part of the larger study, DeCoito and Estaiteyeh (2022) report on STEM teachers' general sense of dissatisfaction with and negative attitudes towards ERT during the COVID-19 pandemic in Canada. Moreover, despite few successes, teachers faced a wide array of challenges that negatively affected their views toward ERT. Teachers cited lack of readiness and lack of required technological skills, which impacted their self-efficacy. The major challenges included time constraints, digital resources and accompanying pedagogy, and student engagement. There was also an evident disconnect between teachers' positive beliefs in their technological competence, and their evaluation of their ERT experience. This is not surprising given the lack of opportunities for teachers to engage in effective instructional design, planning, and development during crisis circumstances such as the COVID-19 pandemic. In this chapter, the authors focus on the support received by teachers and their recommendations in an attempt to further explore the reasons behind their negative attitudes toward ERT.

2.3 Teachers' Roles and Competencies in Online Teaching

Several studies highlight the most important characteristics that exemplify successful online teachers (Dipietro et al., 2008; Pulham & Graham, 2018). Álvarez et al. (2009) collate teacher roles that are unique to teaching in virtual environments into three categories: planning and design; social; and instructive. Similarly, Zhang and Lin (2020) categorize the roles into pedagogical, managerial/logistic, and social which aims at establishing and maintaining a positive student-teacher relationship in a friendly learning

environment (Baran et al., 2011). Meanwhile, Pulham and Graham (2018) place online teaching competencies into seven categories:

1. Pedagogy which includes flexibility and personalization, student collaboration, content knowledge, discussion facilitation, student-centered learning, motivation strategies, problem-based learning, project-based learning, and student grouping.
2. Management.
3. Assessment, including timely feedback, authentic assessment, student-self assessment, formative assessment, and data use.
4. Technology which includes software and digital tools use, management, and troubleshooting.
5. Instructional design which includes curating online learning activities, diverse curriculum activities, universal design, and access.
6. Dispositions, including respect, growth mindset, and commitment to school opportunities.
7. Improvement which requires constant reflection and evaluation.

Dipietro et al. (2008) maintain that teachers need to be flexible with their time, motivate students, have good organizational skills, use student and course data to evaluate their own pedagogical strategies, and foster interaction and communication with and among students. Furthermore, Dipietro (2010) ascertains that teachers should also engage in fluid practice by guiding knowledge construction and individualizing learning; making content accessible; managing the course and maintaining academic integrity; and supporting student success by meeting their needs and structuring the content to scaffold learning. Zhang and Lin (2020) conclude that teachers should balance carefully between the time spent on managerial practices and that spent on pedagogical roles. The latter needs to be strongly emphasized to promote students' satisfaction and enhance their learning experience.

2.4 Online Teaching and Teacher Training

Acknowledging the diverse teacher roles and challenges they may encounter speaks directly to effective and focused continuous professional development (PD), including teacher education and teacher training. In a national survey in teacher education programs (all 50 states in the U.S.), Kennedy and Archambault (2012) concluded that the vast majority of the respondents did not offer online learning programs for preservice teachers. This reiterates the need to develop staff capacity to work more effectively in online environments (Bigatel et al., 2012; Davis et al., 2007). Jung (2005) highlights the importance of well-designed programs to train teachers in using information and communications technology (ICT) effectively in their teaching practice. This requires more information on

the effectiveness and cost-effectiveness of different training approaches; more research on the factors affecting students' learning process, satisfaction, and achievement; and more attention to the specific roles of ICT in modeling effective pedagogical practices.

Additionally, teacher training should be aimed at empowering online teachers, enhancing critical reflection, and incorporating technology in pedagogical inquiry (Baran et al., 2011). High-quality teacher preparation needs to focus on integrating technological, pedagogical, and content knowledge (TPACK) (Koehler & Mishra, 2009) in order to enhance teachers' competency and self-efficacy (Álvarez et al., 2009; Barnes et al., 2018; Barril, 2018; Lao & Gonzales, 2005; Recker et al., 2013; Saadé et al., 2007; Simonson et al., 2009; Tinoca & Oliveira, 2013). Teachers' technological knowledge, efficacy, motivation, and beliefs highly influence their perception of and effectiveness in terms of integrating technological tools in their practice (Barberà et al., 2016; Chen, 2010; Wang & Ha, 2012). In general, teachers need to acquire higher levels of digital literacies (Ng, 2013), which will require more training on designing appropriate curricular materials (Recker et al., 2013); instructional methods and course design (King, 2002; Simonson et al., 2009); multiple communication techniques (Fernández et al., 2017); and various essential competencies such as active/student-centered teaching, leadership, and technological competence (Bigatel et al., 2012).

Gacs et al. (2020) recommend several steps to prepare schools for online teaching, whether intentional or crisis prompted. These steps include experiencing online education from students' perspective, conducting a needs analysis to proceed accordingly, and providing training, PD, and technology support. Gacs et al. (2020) admit the difficulty of these conditions due to time constraints during crisis. Yet, even if these steps were done minimally, they would be helpful in determining the ideal outcome. Thus, it is important to explore the level of support teachers received during their pandemic-related teaching. The authors contend that setting high standards dictate high-quality actions and reflect positively on the performance of all stakeholders, even under emergency situations.

3 Theoretical Frameworks

Effective STEM teaching requires teachers' proficient pedagogical content knowledge (Shulman, 1986) as well as increased self-efficacy in teaching content (Tschannen-Moran & Hoy, 2001). Similarly, when integrating technological tools in teaching, teachers need enhanced TPACK levels. The TPACK framework (Koehler & Mishra, 2009) combines the three constructs (technology, pedagogy, and subject content) both theoretically and practically, to produce the knowledge needed to successfully integrate technology into teaching. Furthermore, this complex teaching and learning environment requires unique teacher preparation and support. Thus, the theoretical frameworks include PD, social constructivism, and communities of practice. These frameworks inform the design of the

study instruments including the questionnaire, as detailed in section 4.3. These theories complement each other and are suitable to interpret teachers' needs and level of support in online teaching.

3.1 Effective Professional Development (PD)

PD can be defined as processes intended to enhance the professional knowledge, skills, and attitudes of teachers so that they might, in turn, improve student learning (Borko, 2004; Guskey, 2002). PD can take two forms: formal and informal, with the former structured and including face-to-face workshops, distance education courses, and instructional coaching which seeks to facilitate change in teacher's practice through a coaching partnership (Mangin & Dunsmore, 2015, as cited in Stoetzel & Shedrow, 2020). These activities introduce teachers to educational innovations and evidence-based methods of teaching in their respective content areas. The latter is usually open-ended, flexible, and self-directed and includes conversations between colleagues and accessible online learning platforms, which requires high motivation and self-regulation (Beach, 2017).

Gibbons and Cobb (2017) identified five dimensions for designing PD opportunities – they should be ongoing; address authentic problems of practice; support inquiry into student thinking; build teacher communities as spaces to endorse and refine professional discourse; and engage pedagogies of investigation and enactment to translate findings into practice. Similarly, McQuiggan (2012) discusses several components for successful PD such as recognizing faculty needs, individualized plans, utilizing faculty experience, providing a learning environment that respects and supports teachers, active participation, reflection, collaborative inquiry, observation of online courses, authentic context, action plan, and ongoing support.

Research has documented the importance of PD in general, and for online teaching, in particular. Generally, teachers' PD activities that foster self-directed learning can contribute to higher levels of motivation for learning and the implementation of pedagogical and content knowledge in practice (Beach, 2017). McQuiggan (2012) noted that learning to teach online had the potential to transform faculty assumptions and beliefs about teaching and even change their face-to-face instruction practices. It also resulted in more connections and expertise sharing with colleagues. In-service and pre-service teacher training can positively impact their perspective about technology use and technology application in education, empower them, enhance their confidence, and result in greater engagement in self-directed, collaborative, and reflective learning (King, 2002; Luo et al., 2017).

Despite the affordances of PD, school districts face several implementation challenges. In response to the lack of financial or resource capacity, online PD is increasing as it offers choice, ownership, and connectivity to educators (Stoetzel & Shedrow, 2020). Nevertheless, the overall quality of the offered PD is still in question despite the exponential growth of online teaching (Barbour & Harrison, 2016). Barbour and Harrison (2016)

report on the effectiveness of some teacher education and in-service systemic PD initiatives in enhancing teachers' understanding of and interest in the design, delivery, and support of K-12 online learning. Reiser (2013) recommends that for PD opportunities to be successful, they should be embedded in subject matter; involve active and collaborative learning; be connected to teachers' own practice; be part of a coherent system of support; and capitalize on cyber-enabled environments.

3.2 Social Constructivism

Vygotsky's (1978) sociocultural theory of human learning describes learning as a social process, in which social interactions affect cognitive development. Learning occurs through communication with peers and experts or seniors in a real-life context (Wang & Ha, 2012). Since most teachers in this study were also learners of new approaches and strategies, they were co-constructing knowledge of online teaching.

Wang and Ha (2012) state that teachers' learning is impacted by individual and social factors. Prior knowledge and experience are examples of individual factors that can facilitate or inhibit teachers' PD. Individual factors also include technological competence, teacher beliefs, and learning and teaching experiences. In addition to these factors, social factors also influence teachers' perceptions and practices in online teaching settings and should be considered in teacher learning (Wang & Ha, 2012). For example, social factors include the social culture, school context, social interaction with peers, government policy, teacher support, and professional culture. It is thereby important to analyze teachers' views through this lens.

3.3 Communities of Practice

Parallel to social factors influencing teachers' learning is Wenger's (1998) communities of practice, defined as groups of people who share a concern or a passion for something they do and learn how to do it better as they interact regularly. Wenger's model consists of four interdependent components: community, practice, meaning, and identity. In a community, members engage in joint activities and discussions, help each other, and share information. They build relationships that enable them to learn from each other. What makes communities of practice unique are shared domain of interest and social engagement of the participants engaged in learning. Research highlights the importance of these communities as they can positively impact teachers' learning, capabilities, and pedagogical practices (Luyten & Bazo, 2019). They also result in more collaboration and resource sharing among teachers (Shi & Yang, 2014; Warren Little, 2002). Thus, it is crucial to investigate how communities of practice informed teachers' online teaching practices, especially given that many teachers were teaching online for the first time.

4 Methodology

4.1 Research Design

This study utilizes a mixed-methods design (Creswell & Creswell, 2018) involving the collection of both closed-ended quantitative data and open-ended qualitative data. The two forms are integrated through merging the data, explaining the data, or building from one database to another. This integration minimizes the limitations of both approaches and provides a more comprehensive understanding of the phenomenon, specifically teachers' experiences in ERT. In this study, both quantitative and qualitative data were collected from teachers through an online questionnaire. Quantitative data provided a broad and general overview of the level of support provided to teachers, while qualitative data provided in-depth and detailed accounts of their experiences (Merriam & Tisdell, 2015).

Participant recruitment methods included snowball sampling through teacher networking and referral (Parker et al., 2019). Teachers were invited to participate in the study through email from school boards and teacher associations. In addition, researchers and consenting teachers recruited additional participants via social media (e. g., Twitter, Facebook, LinkedIn).

4.2 Participants

The questionnaire was administered to STEM teachers (n=75) from various locations in a Canadian province. Participants included STEM subject teachers (biology, chemistry, environmental sciences, physics, earth sciences, general science, technology, and mathematics). Participants' educational background included those with bachelor's degree (71%), and graduate degrees (masters or doctorate – 29%). In terms of age, 72% of the teachers are between 31–50 years, 16% between 21–30 years, and 12% are above 50 years. Teaching experience varied with 15% of the respondents having less than five years teaching experience, while 85% have more than 5 years of teaching experience (24% between 6–10 years, 38.5% between 11–20 years, and 22.5% above 20 years). Finally, 51% of the participants teach elementary and middle-school grades (grades 1–8), while 49% teach high school (grades 9–12). Table 1 details the distribution of teacher demographics in relation to each age range. It is worth noting that, while the majority of teachers have a bachelor's degree, most of the teachers with a graduate degree are between 31–50 years of age and possess between 6–20 years of teaching experience.

Table 1. Details of teachers' demographics: distribution of teachers within each age range.

Age (years)	Sample (n)	Grades taught		Educational background		Teaching experience (years)			
		Gr. 1–8	Gr. 9–12	Bachelor's	Graduate	1–5	6–10	11–20	20+
21–30	16%	8%	8%	12%	4%	12%	4%	0%	0%
31–40	25%	16%	9%	18%	8%	0%	14%	12%	0%
41–50	47%	24%	22%	33%	14%	3%	5%	21%	17%
51–60	9%	3%	7%	7%	3%	0%	1%	5%	3%
61+	3%	0%	3%	1%	0%	0%	0%	0%	3%
Total	100%	51%	49%	71%	29%	15%	24%	38%	23%

Note: One teacher did not indicate their class taught, and two teachers did not indicate their educational background.

4.3 Data Sources

Data sources for the overall study included questionnaire statements and open-ended questions, developed based on the previously discussed theoretical frameworks and literature, taking into consideration the ongoing ERT. This chapter reports on a sub-section of participants' responses to 3-point Likert scale items and open-ended questions from the larger study. The questionnaire statements and open-ended questions explore teachers' i) challenges, ii) support during transition to online teaching, and iii) recommendations for enhancing the quality of online teaching.[3]

The following four Likert scale items required participants to rank the value or benefit (Inadequate, Average, or Excellent) in terms of preparing them for ERT:

1) School or school board support

2) Departmental support or community of practice

3) Quality of resources at your disposal (ministry and other)

4) Professional development focusing on online teaching

3 Data presented is part of a larger study which explored i) STEM teachers' views of and attitudes towards online teaching, ii) tools and resources teachers used during online teaching, iii) development and implementation of curriculum to be taught online, iv) models of student assessment, and v) impacts of online teaching on student outcomes, as observed by teachers.

Teachers' reflections regarding their practices during ERT were obtained through the following two open-ended questions:

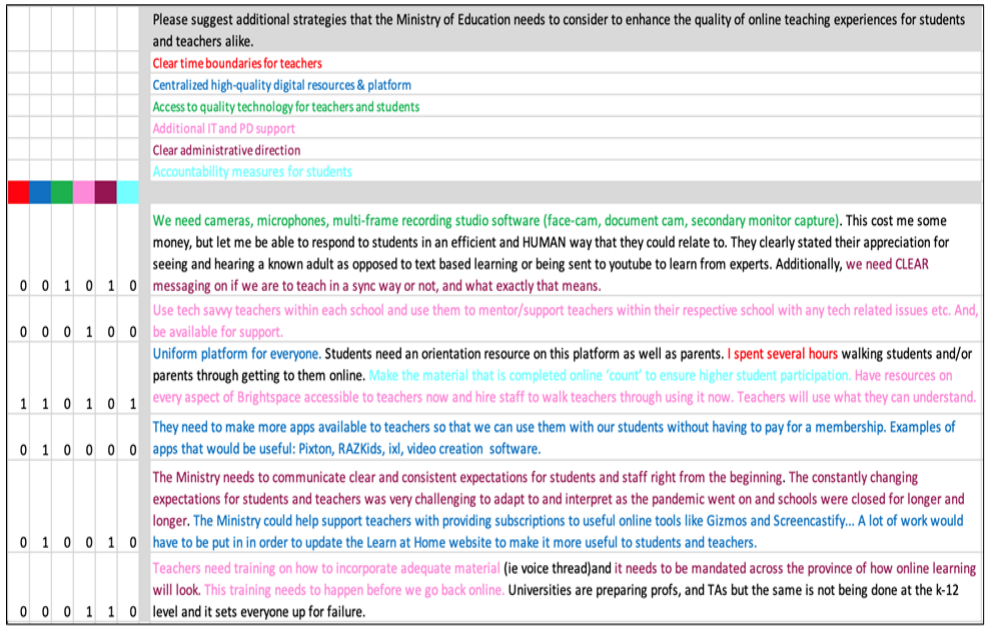
1) *List some challenges that you face(d) as a teacher while preparing for or implementing online teaching. Please elaborate on how you address(ed) these challenges.*

2) *Please suggest additional strategies that the Ministry of Education needs to consider in order to enhance the quality of online teaching experiences for students and teachers alike.*

4.4 Data Analysis

While the initial plan was to collect data from 100 STEM teachers, this chapter is based on 75 participants as data saturation (Charmaz, 2006, as cited in Creswell & Creswell, 2018) occurred in qualitative data. This was evident through initial and ongoing data analysis performed through Qualtrics, the web-based software used for data collection, whereby new categories and themes beyond those identified were not prevalent. Concurrently, similar trends were occurring in quantitative data. Accordingly, the authors ceased data collection. Quantitative data was exported to Microsoft Excel while qualitative data was exported to NVivo 12 data analysis software.

Quantitative data analysis was conducted in MS Excel using descriptive statistics including calculating percentages, averages, and standard deviations, as well as constructing bar graphs. Qualitative data analysis from open-ended survey questions was performed as an inductive process that builds patterns, categories, and themes by organizing the data into more abstract units of information (Creswell & Creswell, 2018). The qualitative data were analyzed through an interpretational analysis framework, using NVivo 12 and executed through the process of thematic coding and constant comparative method (Stake, 2020). Initial codes were created in NVivo 12 through word clouds that illustrated emerging codes as well as their frequency based on the size of the font (word frequency query). These codes were then explored and interpreted in order to seek context as some words carry equal or similar meaning; similar codes were combined into themes. Both authors performed thematic coding in which themes were analyzed for frequency across participants (see sample in Figure 1).



						Please suggest additional strategies that the Ministry of Education needs to consider to enhance the quality of online teaching experiences for students and teachers alike.
						Clear time boundaries for teachers
						Centralized high-quality digital resources & platform
						Access to quality technology for teachers and students
						Additional IT and PD support
						Clear administrative direction
						Accountability measures for students
0	0	1	0	1	0	We need cameras, microphones, multi-frame recording studio software (face-cam, document cam, secondary monitor capture). This cost me some money, but let me be able to respond to students in an efficient and HUMAN way that they could relate to. They clearly stated their appreciation for seeing and hearing a known adult as opposed to text based learning or being sent to youtube to learn from experts. Additionally, we need CLEAR messaging on if we are to teach in a sync way or not, and what exactly that means.
0	0	0	1	0	0	Use tech savvy teachers within each school and use them to mentor/support teachers within their respective school with any tech related issues etc. And, be available for support.
1	1	0	1	0	1	Uniform platform for everyone. Students need an orientation resource on this platform as well as parents. I spent several hours walking students and/or parents through getting to them online. Make the material that is completed online 'count' to ensure higher student participation. Have resources on every aspect of Brightspace accessible to teachers now and hire staff to walk teachers through using it now. Teachers will use what they can understand.
0	1	0	0	0	0	They need to make more apps available to teachers so that we can use them with our students without having to pay for a membership. Examples of apps that would be useful: Pixton, RAZKids, ixl, video creation software.
0	1	0	0	1	0	The Ministry needs to communicate clear and consistent expectations for students and staff right from the beginning. The constantly changing expectations for students and teachers was very challenging to adapt to and interpret as the pandemic went on and schools were closed for longer and longer. The Ministry could help support teachers with providing subscriptions to useful online tools like Gizmos and Screencastify... A lot of work would have to be put in in order to update the Learn at Home website to make it more useful to students and teachers.
0	0	0	1	1	0	Teachers need training on how to incorporate adequate material (ie voice thread)and it needs to be mandated across the province of how online learning will look. This training needs to happen before we go back online. Universities are preparing profs, and TAs but the same is not being done at the k-12 level and it sets everyone up for failure.

Figure 1: Sample thematic coding exploring teachers' recommendations for improving online teaching

5 Results

5.1 Teacher Support and Professional Development

In this section, quantitative findings resulting from the 3-point Likert scale items and related to the level of support provided to teachers during ERT are presented. As shown in Figure 2, teachers reflected on i) support they received from school/board; ii) departmental or community of practice support; iii) quality of the resources; and iv) PD. The two major areas needing improvement, according to participating teachers, are the quality of online resources at their disposal and the PD they received. Questionnaire statements reflecting the quality of resources received the highest ranking in terms of inadequacy, while the PD statement resulted in the lowest ranking in terms of excellence. On the other hand, the support provided by departments and communities of practice received the highest ranking in terms of excellence and the lowest ranking in terms of inadequacy compared to the other three items.

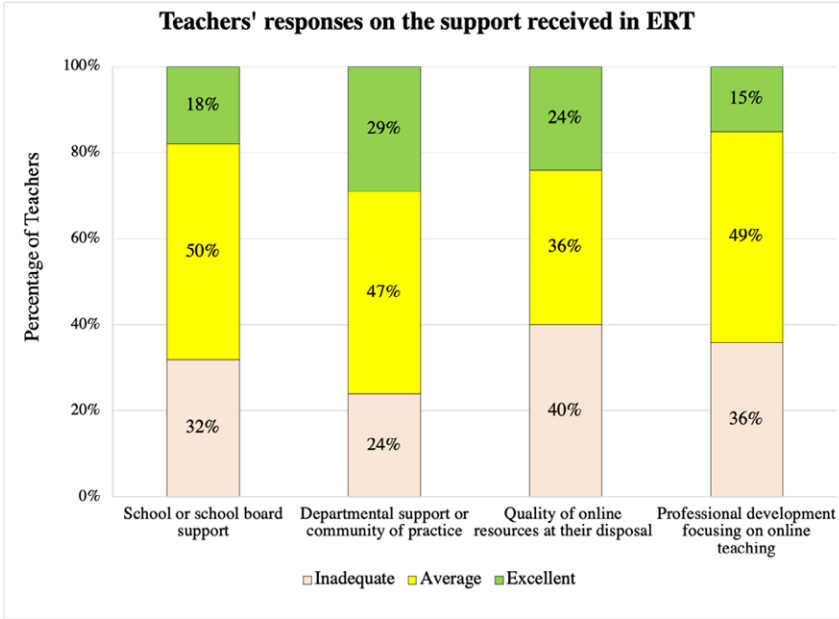


Figure 2: Teachers' evaluation of the support they received during ERT

Teachers expressed frustration towards the lack of prior exposure to the needed technologies and PD opportunities:

> PD was insufficient and the courses always full. (Secondary science and math teacher)

> I have been teaching for more than 20 years and I know what I am doing in a real classroom, not in a digital one! (Elementary science, technology, and math teacher)

Correspondingly, one of several teachers expressed a similar frustration with the available resources:

> The lack of resources meant I often had to reinvent the wheel. I couldn't find the resources I needed online because I teach French Immersion, so I had to create most of my resources for my students. (Elementary science & technology, math, and health & physical education teacher)

In terms of support received from the school board or the ministry, one teacher noted:

> It was 100% new to me and I had to figure it out independently. There was no timely guidance or assistance. I was able to do it through research I completed on my own time using resources created by other teachers. The Ministry was of no help and my school board offered help weeks after we had started to teaching full time online. (Elementary science & technology, math, and health & physical education teacher)

On the other hand, the support teachers received from their departments or communities of practice was relatively better, according to participants:

> Through collaboration with my grade team, we were able to provide students with variety of learning opportunities. They were provided instruction to run their own science experiments at home and participate in hands on math activities. They were also provided with many online resources to engage with on their own time. (Elementary science, technology, and math teacher)

> My department has worked very closely on a daily basis – helping each other and sharing resources- we have a group chat and text each other nonstop. (Secondary biology teacher)

5.2 *Recommendations for Online Teaching*

This section presents teachers' recommendations to various stakeholders for improving online teaching in the future. These findings are based on qualitative data resulting from three open-ended questions in the questionnaire. STEM teachers listed several recommendations for consideration by school boards, policy makers, and the government. The corresponding themes derived from the qualitative data include clear time boundaries for teachers; centralized high-quality digital resources and uniform online learning platform; quality technology for teachers and students; additional IT and PD support; developmentally appropriate digital resources for students; clear administrative direction; and enforcing accountability measures for students to encourage student participation.

These recommendations can be classified into three categories: i) student and teacher resources, ii) administrative, and iii) training. As shown in Figure 3, in terms of student and teacher resources, teachers demanded a) centralized high-quality digital teaching resources and a uniform learning platform (57%); and b) quality technology (i. e., internet, document cameras, computers, etc.) for students and teachers (31%).

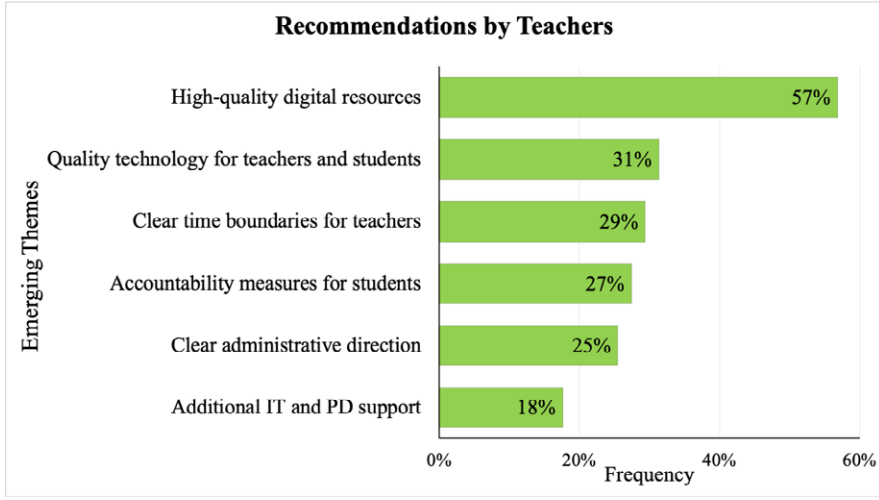


Figure 3: Recommendations by teachers for successful online teaching in the future

Findings highlight the fact that teachers were not satisfied with the quality of the resources provided. They did not have the digital tools they needed to implement high-quality online learning in the time provided. This made initiatives such as synchronous learning a challenge. They also spent a lot of time finding and modifying free resources for students. They demand that digital resources be developmentally appropriate for students. Furthermore, teachers prefer teacher-recommended and teacher-created digital resources rather than generic ones, as they are more pedagogically relevant to their context:

> They need to make more apps available to teachers so that we can use them with our students without having to pay for a membership. (Elementary science & technology, math, and health & physical education teacher)

> The materials (on the Ministry website) were outdated in many courses and was all information based with no evaluation suggestions. A lot of work would have to be put in in order to update the website to make it more useful to students and teachers. (Secondary biology teacher)

With respect to technology, teachers expressed their personal and their students' need to access quality equipment and fast internet:

> Teachers don't have the equipment and resources to teach from home. I personally spent 1000 dollars to teach with only marginal effectiveness. So, money for hardware and software. (Secondary technology and computer studies teacher)

> I was recording several videos every day and scanning in documents with slow, old equipment at home. This took up my whole workday. (Secondary math teacher)

In the area of technology, teachers emphasized the importance of equity among students, especially in terms of access to technology for learning:

> Children need better technology if we are doing online. Each child in household needs a device. Training for some parents is also needed. (Elementary science, technology, and math teacher)

> The Ministry of Education needs to ensure all students, especially those in rural settings have access to the technology and internet speed required for online learning. (Elementary science, technology, and math teacher)

In the category of administrative recommendations, three themes emerged based on teachers' responses: i) clear time boundaries for teachers (29%); ii) accountability measures for students (27%); and iii) clearer administrative directions (25%).

Time management was a fundamental challenge for teachers. They expressed the need or the expectation to be available for prolonged periods of time. Moreover, teachers had to deal with very new technologies and environments. This forced them to spend more time becoming acquainted with these technologies, prepare for their classes, and interact with their students, as outlined below:

> (I need) time to prepare! While I may have not always worked 8 hours straight, many times I did, and it was broken up and was somewhat steady from 7 am till 10 PM. Regularly responding to

> emails late or having meetings in the evening. (I need) course content time. I teach 4 grade levels and 2 different academic levels, and 3 different courses of study. That is roughly 10 different courses I have to prepare for. (Secondary technology and computer studies teacher)

> Teachers are very busy. In Grade 12 courses, unit evaluations were pretty frequent (about one every 1.5 weeks), and that would take about 20 hours to mark (with over 90 grade 12 students in total). It takes a lot longer to mark virtual work on a computer. (Secondary math teacher)

Regarding student accountability, teachers expressed disappointment in the public announcement that online student assessment would not contribute towards final grades, which resulted in a lack of engagement from students, as noted in the following teacher quotes:

> One of the reasons that the students lost interest in engaging in online learning was the ministry's announcement of midterm mark would be the final mark. In order to have good quality online learning the expectations must be clear and same as the in-class learning. (Secondary physics and math teacher)

> Not counting (student work) devalues the efforts of the students and makes it challenging to motivate them. (Secondary math teacher)

As for administrative directions, teachers demanded clearer and more unified expectations, enhanced teacher involvement in decision making, and the removal of mandated synchronous learning:

> Consult teachers before making public plans. Nothing worse than fielding stress, questions, and concerns from parents and students when you get the information after them or at the same time. (Secondary science and math teacher)

> Promote teacher professional judgement. Place the trust in the teachers to utilize and enact policy within schools and classrooms/online. (Secondary science and math teacher)

Finally, in terms of IT support and PD, 18% of teachers felt overwhelmed as they tried to navigate the digital learning space in terms of providing content and learning at the same time. While there were online board provided PD sessions, these were limited in capacity or not effective. Teachers recommended:

> Much more PD. There are about 5000 teachers in my board. The classes I managed to sign up for had 36 attending. Most classes I tried to sign up for were full. I want to learn. I want to be a good teacher. This is taking too long by trial and error. (Secondary science and math teacher)

> Teachers need training on how to incorporate adequate material (i. e., voice thread) and it needs to be mandated across the province of how online learning will look. This training needs to happen before we go back online. Universities are preparing profs and teaching assistants, but the same is not being done at the K-12 level, and it sets everyone up for failure. (Elementary science and technology teacher)

6 Discussion

6.1 Teacher Support and Professional Development

Findings pertaining to the levels of support received by the teachers (as shown in Figure 2) highlight specific challenges. These include lack of effective PD and scarcity of quality resources, which are two crucial factors contributing to the success of online teaching, especially during unprecedented conditions. Teachers' evaluations of the quality of PD offered by school boards further reinforce the need for better preparation to acquire the seven online teaching competencies, as outlined by Pulham and Graham (2018). Teacher training and in-service PD focusing on online teaching tools would enable teachers to learn how to utilize the necessary technological skills effectively (Barbour & Harrison, 2016; Davis et al., 2007; Jung, 2005; Smith et al., 2016; Stoetzel & Shedrow, 2020). The lack of appropriate digital resources further supports claims of current deficiency in instructional designs and valuable online resources (Cook & Steinert, 2013; De Paepe et al., 2018). Organizing digital educational content to align with existing curricula can be critical in providing users and teachers with a way to ensure that the learning opportunities provided correspond to broader educational objectives within an education system (World Bank, 2020). On the other hand, teachers' positive rating of departmental support and communities of practice further emphasizes and renews the call for capitalizing on the expertise of these groups to maximize their effectiveness. This highlights the importance of communities of practice (Wenger, 1998) and collegial support as examples of social factors necessary for teacher learning (Vygotsky, 1978; Wang & Ha, 2012).

6.2 Recommendations for Online Teaching

Findings indicate that teachers' recommendations were aligned with challenges they encountered and the level of different kinds of support they received. On the availability of quality digital resources, Recker et al.'s (2004) findings suggest that teachers use a broad range of resources that they deem age-appropriate, current, and accurate. Moreover, teachers intend to include these resources with little modifications into planned instructional activities. Our findings highlight teachers' recommendation of developmentally appropriate digital resources that are aligned with curriculum. The availability of these resources, in a unified platform that students and teachers are familiar with, is crucial for the success of online teaching.

On the importance of access to technology among students, teachers' recommendations reiterate the documented literature on addressing equity concerns with respect to students' access to the required technologies, including software and equipment that impact their opportunities to participate in online learning (Lao & Gonzales, 2005; Rohleder et al., 2008).

Finally, in the category of administrative recommendations, teachers documented institutional challenges that they face in online teaching, similar to those reported in the literature (see Bolliger & Wasilik, 2009; Cook & Steinert, 2013; De Paepe et al., 2018). Such challenges are critical as they impact teachers' attitude towards online teaching. Furthermore, these recommendations fall into the category of sociocultural factors that impact teachers' knowledge construction (Vygotsky, 1978; Wang & Ha, 2012). With respect to the importance of ensuring and maintaining student accountability reported by teachers in this study, Toppin and Toppin (2016) highlight that student discipline is crucial for success in a virtual school setting. This factor can be a challenge, especially when students are in isolation from other peers, as in ERT during the COVID-19 pandemic.

6.3 Limitations

Due to the social distancing measures implemented, online questionnaires were the most convenient means of data collection in the setting of a large Canadian province. As well, given that teachers were busy throughout the period of data collection (May–July 2020), and to avoid additional stress and increased workload, we chose not to interview participants. While this may be considered a limitation to the research design, the unique circumstances during the COVID-19 pandemic necessitated such a measure. In spite of this limitation, the researchers ensured the collection of rich qualitative data via open-ended questions that detailed teachers' experiences during ERT. Another limitation in this study is reliance on self-reported responses by teachers which may increase bias. The authors believe that collecting timely data during ERT outweighs the highlighted limitations. Thus, the integration of quantitative and qualitative data from a relatively large sample during ERT enhances data trustworthiness and validity.

7 Conclusions

The overall results of the study demonstrate a general dissatisfaction and negative attitudes toward online teaching among the participating STEM teachers during the COVID-19 pandemic. Teachers expressed that the support they received did not match their expectations. The two major areas of improvement noted are the quality of online resources at teachers' disposal and the PD they received, as indicated in Figure 2 – quality of resources generated the highest ranking in terms of inadequacy, while PD generated the lowest ranking in terms of excellence. These factors exacerbate challenges faced by teachers and could potentially foster negative attitudes toward and low self-efficacy in online teaching, as reported by DeCoito and Estaiteyeh (2022).

This also echoes the importance of teacher training and PD focusing on online teaching tools so that teachers learn how to utilize the necessary technological skills (Davis et al., 2007; Jung, 2005; Leire et al., 2016; Smith et al., 2016; Stoetzel & Shedrow, 2020). So-

rensen et al. (2007) found that science teachers who learned about technology in their teacher preparation program were prepared to use technology in more substantive and meaningful ways. This also mirrors previous findings on the importance of PD around teachers' technological and pedagogical content knowledge to achieve desired change (DeCoito & Richardson, 2018). An effective change in teachers' practices cannot happen by simply introducing technological tools and infrastructure into schools or by traditional one-time teacher training. PD should entail initial preparation and training for pre-service teachers; workshops, seminars, and short courses for in-service teachers; and ongoing pedagogical and technical support for teachers as they address their daily challenges and responsibilities (DeCoito & Richardson, 2018).

On the other hand, findings indicate that teachers appreciated most the support received from departments or communities of practice, as indicated in Figure 2 – communities of practice generated the highest ranking in terms of excellence and the lowest ranking in terms of inadequacy compared to the other three items. This reiterates the importance of communities of practice that can serve as repositories for teachers to share their expertise and resources. Hence, teachers can build relationships that enable them to learn from each other in preparation for nimble adjustments, such as those necessitated in transitioning to online teaching during the pandemic. One example of PD programs is a recent initiative developed by the OECD (2020), that combines teachers' online communities of practice, PD, and digital resources. The initiative, "The Global Teaching InSights" makes use of technology in building teachers' collective intelligence by creating and sharing the "know-how" of teaching. This initiative enables teachers to work together and tackle the challenges of teaching by having deep and meaningful conversations with their peers around the world. It entails a digital platform for the teaching community, that makes teaching visible through classroom videos and instructional materials and provide teachers with a space to reflect and interact with their peers from around the globe. Such programs and initiatives are very crucial in assisting teachers and sharing expertise among teachers from a wide range of backgrounds and experiences.

Teachers suggested several recommendations to ministries of education, policy makers, and school administrators, as shown in Figure 3. These included investing in high-quality technological resources such as highspeed internet, computers and free software aligned with curriculum standards; developing a database of free high-quality bilingual digital resources in accordance with curriculum expectations; accountability measures to encourage student participation; reconsidering allotted time and workload required to plan and implement high-quality online education; and more effective PD opportunities. These recommendations align with Hodges et al.'s (2020) criteria for successful transtion to ERT during crisis states. Decision makers must address these important recommendations given the prevalence of ongoing online teaching during the pandemic.

Teachers in this study emphasized students' equitable access to technology. This finding reiterates the importance of stakeholders attending to inequities among families and communities, which impacts teaching and learning. Moreover, moving to online learning at scale magnifies profound equity concerns especially that differences still exist between rich over poor, urban over rural, high-performing over low-performing, students in highly educated families over students from less educated families, and for students with disabilities who have particular and individual needs that must be met (World Bank, 2020).

8 Implications and further research

This research will advance knowledge about online teaching at K-12 levels. Moreover, it will inform government, policy makers, and school administrators about the challenges associated with online teaching. Findings are being shared with the education community through seminars and working groups and provide teachers with opportunities to reflect on and assess their current practices and explore other teachers' practices. The recommendations suggested by the teachers are crucial as teachers' voices need to be heard to enhance the quality of online teaching in the future.

Future research can explore teachers' online teaching approaches in various Canadian provinces, especially the Canadian territories, the home of Indigenous communities. Moreover, we recommend that similar research explore student perspectives to obtain a holistic view of teaching and learning. A handful of studies have been conducted with students at the post-secondary level (for example, Petillion & McNeil, 2020; Wilcox & Vignal, 2020); however, there is a scarcity of studies involving K-12 students and their experiences during ERT. It is also recommended that future research compare various time periods during the pandemic, for instance comparing the period of March–June 2020 to September 2020–June 2021. This will help identify changes in practice after an extended period of preparation, and less disruptive conditions. On an additional but important note, this research will help develop a solid framework that can be used in assessing online teaching needs and practices in emergency situations. Finally, we need to investigate the reported challenges more thoroughly and explore how they can be dealt with through PD programs for in-service teachers, as well as more robust preparation for pre-service teachers.

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Shifting Identities and Changing Mindsets: A Case of Lecturers Adopting Digital Pedagogies in Vietnam

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Abstract

The advent of COVID 19 accelerated the need for transformational practices in higher education that were both flexible and agile in nature. The demand was that higher education institutions respond in a way that best supported each of their students and staff to find solutions to unpredictable challenges. This chapter reports on a qualitative case study of how university lecturers from three universities, located in disadvantaged regions of Vietnam, were forced to use digital technologies for teaching, and how they came to see themselves, their students and their interdependent roles in new ways that transformed their practice for the long term. Drawing on advice from international educators, over a short period of five months, the Vietnamese lecturers used a collaborative action learning approach to choose and deploy appropriate pedagogical approaches with digital technologies fit for their local context. In the absence of existing policy frameworks for using digital pedagogies and associated technologies, and with very constrained budgets for additional learning support and the expansion of digital infrastructure or new devices, the lecturers were able to make significant changes towards the adoption of appropriate and transformative digital pedagogies. The success is attributed to an approach comprising of four key steps: recognition of the professional learning opportunity, access to capacity building opportunities with existing international partners, formation of an active informal professional learning community among staff members, and capture of evidence of learning to share with others. It is argued that this approach visibly generated a shift to

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identifying one's practice more broadly as an educator, as opposed to the role of a traditional lecturer, and promoted a changing mindset about online learning, and the importance of developing digital pedagogic practices that are transformative and sustainable.

Keywords

digital pedagogies, online learning, Vietnamese higher education, change, identity

1 Introduction

Early in 2020, the global COVID 19 pandemic wrought drastic effects at multiple levels all around the world. Vietnam managed to initially escape the worst of the effects by closing down quickly. As a consequence of this rapid closing down, Vietnamese universities were unprepared to continue operating in a crisis environment where students were unable to attend campus for face-to-face classes. Globally, many educational institutions responded rapidly to the changing landscape by adopting new and existing digital technologies as a short-term solution to the inability of students and staff to access campus as usual. This response was referred to in some jurisdictions as "emergency remote teaching" (Trust & Whalen, 2020, p. 189) which implied an assumption that, when the pandemic receded, practice could revert to 'offline' with students attending face-to-face classes. Such emergency responses did not always align with the widespread recognition over the last decade or more, that notwithstanding COVID 19, university teaching and learning needed to transform (Ashford-Rowe et al., 2014; Nykvist et al., 2022; Sursock, 2015; Tømte et al., 2020) to meet the changing demands of an information age (Jin et al., 2017, p. 95).

The required transformation could be realised in part through technological advances (Oke & Fernandes, 2020), but a complete digital transformation requires changes in thinking as well as tools. Digital technologies and associated new pedagogical approaches have the potential to transform teaching and learning (Ertmer et al., 2012; Tamim et al., 2015), however adoption of digital pedagogy is not yet universal (Bate et al., 2013; König et al., 2020; Tamim et al., 2015), nor the potential benefits fully realised (Newman & Beetham, 2017). Digital technology used for convenience or as a bureaucratic requirement does not guarantee more effective pedagogy (Gregory & Salmon, 2013; Kirkwood & Price, 2014; Salmon, 2014). Given this state of play, educators might reflect on their mindsets about the use of digital technologies, and the potential changes in their roles and identities that digital transformation may herald in the coming decade. Using digital tools effectively for teaching and learning in the information age requires a reconsideration of the roles of both the teacher and learner with respect to each other and how they use the tools to engage in new learning experiences (Darling-Hammond et al., 2019; Hannaway, 2019; Santos et al., 2019; Tømte et al., 2020).

This paper presents a case of how lecturers in three universities, in an economically disadvantaged area of Vietnam, embraced the need for digital transformation, while providing reflections on their journey. The case illuminates how the imperative to use digital pedagogies due to COVID 19 restrictions generated shifts in lecturer identities and mindsets about teaching and learning. The case study addressed the following questions:

1. What was the situation regarding the use of digital pedagogies at the three universities prior to the onset of the pandemic? How did lecturers see themselves and what was their mindset about teaching and learning including online learning?

2. What was the universities' and lecturers' practical response to the restrictions which forced them to use digital technologies? What did they actually do?

3. What unexpected changes in lecturers' identity and mindsets became visible when they began consciously experimenting with digital pedagogies and reflecting on those experiences?

4. What, if anything, makes the changes durable/sustainable?

The case study was constructed after a five-month period of professional development, conducted from July to November 2020 with lecturers from three universities. Permission was granted from each university and the participating staff to compile this case based on the triangulation of evidence in the following data sources: an initial needs analysis of university lecturers' online teaching and learning needs, reports provided by participants during the professional learning, observation notes taken by the facilitator and the adviser during and after the professional learning sessions, the funded proposal to employ a facilitator for professional learning and the report at the end of the funding period. The primary data was in a mixture of English and Vietnamese. The authors of this chapter were each directly involved in the professional development activities described – one was the facilitator, one was the adviser, and the others were participants.

To compile the case, the qualitative data have been analysed both in the original language and in translation. The needs analysis included participants' qualitative answers to questions about prior experience with and attitudes to digital pedagogies. The participant reports provided rich participant descriptions of experimental uses of digital pedagogies and interpretation of that experience. These two data sets were analysed manually in text files for themes in how the participants talked about themselves, their roles, and what they did. The selected quotes illustrate the experiences and changes in the words of some of the participants. Three concepts were evident and have affected the choice of terminology used in this chapter: the word *lecturer(s), giảng viên* in Vietnamese, is used as a job title because that is the preferred English translation of the Vietnamese job title of the primary participants in the activities described here. As university lecturers, they have teaching, research, and service responsibilities. The word *teacher, giáo viên* in Vietnamese,

is used by the lecturers when referring specifically to the act of teaching. The word *educator, nhà giáo dục* in Vietnamese, refers to a broader concept than job title, a concept which embraces the capacity to understand and judiciously choose between the use of a wide repertoire of teaching and learning methods.

The proposal for and report on the professional development activity provided some specific contextual information. The facilitator and adviser observation notes flagged surprises when participants appeared to be stuck, tried new technologies and pedagogical approaches, or expressed new insights. These confirmed the perception of changes in mindsets of the participants and their shifting identities from teachers to educators.

1.1 Background Literature

The role of an educator is already quite complex and often challenging, and the pandemic brought with it further challenges for educators and institutions as a whole. The pandemic accelerated the need for digital transformation that can respond to student needs within a relatively short time frame (Carolan et al., 2020; García-Morales et al., 2021; Mishra et al., 2020). Even prior to the pandemic, higher education students wanted more flexible and agile alternatives to current practices, including access to more relevant and authentic learning experiences and greater choice (Buchem et al., 2014; Thibodeaux et al., 2019). When this demand to be more flexible and agile intertwines with the need to adopt digital technologies, the hurdles are multiplied for educators and institutions.

Prior to COVID 19, some hesitancy was observable regarding the adoption of digital technologies in teaching and learning (Oke & Fernandes, 2020). Recent events associated with the pandemic have forced many lecturers, once reluctant or not willing to use digital technologies, to embrace them in new ways. Lecturers who were sometimes identified as being resistant to change, often lacked the confidence to use digital technologies in meaningful ways with their students (Nikolopoulou & Gialamas, 2016). When these same lecturers were thrown into a state of needing to use solely digital pedagogies with their students, the availability of digital technologies varied immensely between countries, cities and provinces, and even between local schools. In some situations, the infrastructure and digital technologies already existed, providing a relatively seamless step to provide online learning opportunities for students, even if not being used effectively by all (Hjelsvold et al., 2020). In other situations, there was no infrastructure or common access to the technologies necessary to support digital pedagogies (Autorengruppe Bildungsberichterstattung, 2020; Fraillon et al., 2019). While infrastructure and access to appropriate digital technologies can be identified as one of the major issues associated with such an urgent need to change approaches to teaching and learning in response to a pandemic, an issue worthy of further exploration is the need for change in culture and mindset around the use of these digital technologies to support transformations in teaching and learning. This issue prevailed even in pre-pandemic times because lecturers often have deeply en-

trenched ideas about what teaching and learning is and how digital technologies should (or should not) be used in the classroom (Nykvist & Mukherjee, 2016).

Lecturers' prior experiences and sense of identity shape their attitudes to the use of digital technologies. This experience and identity come to the forefront of any need to work in new ways and adopt digital technologies in transformational ways (Buabeng-Andoh, 2012; Nykvist et al., 2022). Supporting this notion, Senge (2011) claims that "culturally embedded assumptions and habitual ways of operating" (p. 60) can be problematic when attempting to transform at the institutional level. Transformation often takes time and according to McGuire et al. (2015) there is no "quick-fix transformation formula" (p. 4).

Professional learning opportunities provided for university lecturers with regards to digital pedagogies vary greatly. Some focus on the finer aspects of didactic skill development or the use of particular technologies, while others may focus on teaching theory (Gregory & Salmon, 2013). Some require their lecturers to undertake specific educational qualifications, while others rely on more of an apprenticeship style model (García et al., 2010; Gregory & Salmon, 2013). Professional learning communities (PLCs) (Hargreaves, 2019; Watson, 2014) and peer review and support of teaching practices (PRT) (Johnston et al., 2020) have often been touted as opportunities for educators to collaborate within a safe and supportive environment that promotes improved program and student outcomes. Nonetheless, evidence suggests that a top-down approach to PLCs or PRT can fail in transforming teaching and learning as opposed to an approach where educators are empowered to be part of the culture change (Chester et al., 2019; Hargreaves, 2019). Social capital evidently has the most strength in transforming teaching and learning where educators can inspire and motivate each other to improve (Chester et al., 2019; Hargreaves & Fullan, 2012). For this to be successful, it is essential that networks should be promoted in ways that build trust between the educators. These networks then offer opportunity for lecturers to grow together through double loop learning where they share and build knowledge as questions are posed and answers are shared (Kantamara & Ractham, 2014).

Until now, many professional learning opportunities for lecturers have been based on how to use specific software such as Zoom or Microsoft Teams, as opposed to capacity building opportunities that were focussed on effective pedagogy. When the use of digital technologies is focussed on enhancing the efficiency of current teaching and learning practices (Tamim et al., 2015), digital technologies have been used in familiar didactic ways (Oke & Fernandes, 2020) distinct from being used in new pedagogical ways that can truly transform teaching and learning (Crompton & Burke, 2020). These familiar didactic approaches and software training approaches are reflected then within the classroom when lecturers focus on the teaching of software skills as opposed to supporting learning with digital technologies (Nykvist et al., 2019). Ensuring a mindset change amongst lecturers through capacity building as opposed to just a change in digital skills is important. To readily embrace change, educators need a positive or growth mindset (Dweck, 2007)

where they share beliefs, values and attitudes that will be necessary for a positive and successful transformational experience (Whelan, 2016).

The pandemic was unexpected and there were no quick-fix solutions to capacity building opportunities for many educators. Nevertheless, the literature emphasises the aspiration for a digital pedagogy which embraces the use of digital tools with a technological and policy infrastructure and reflexive practice on the part of those employed as university lecturers. With this aspiration, capacity building opportunities for lecturers at three Vietnamese universities were designed and delivered in a network where trust and familiarity were essential to success. The lecturers needed to work in an environment that promoted safety and gave opportunity for each of them to be heard and build upon prior understandings, as they transformed their pedagogical approaches with digital technologies.

1.2 The pre-COVID Situation of Three Vietnamese Universities

In Vietnam, in 2020, a number of universities had already engaged more active and inclusive pedagogic practices, and incorporated some transversal skills into their curricula (Tran, 2020), though for many, the journey was just beginning. The lag to embrace digital technologies and online tools was due to a variety of factors which rapidly needed to be transcended during the coronavirus pandemic. The Ministry of Education and Training expected universities to continue teaching so students could graduate on time, even though for months at a time many students and staff were prohibited from attending university campuses (Nguyen & Pham, 2020; Pham & Ho, 2020; Pham Thi Thu & Tran Thi Ngoc, 2019).

This chapter is based on the experiences of three universities located in the northern mountainous region of Vietnam. Each of the three universities, Thai Nguyen University of Economics and Business Administration (TUEBA), Thai Nguyen University of Agriculture and Forestry (TUAF) and Tay Bac University (TBU) enrol many economically disadvantaged students, including students from Laos, Indonesia, East Timor, Bangladesh, Nigeria and the Philippines. Class sizes are commonly around 30 students per group. Available evidence suggests that most students had not ever experienced something they identified as digital pedagogy or online learning (Nguyen & Pham, 2020). When COVID 19 arrived, these universities had no policies related to the use of digital pedagogies and lacked the broader experience required for effectively using digital pedagogies in the virtual classroom. Accordingly, they lacked much of the infrastructure needed to support common institutional approaches to digital pedagogies, especially a fully online environment. They certainly did not have anything like an online teaching and learning support team like many universities in the western world and wealthier Asian countries. Many of the lecturers were not aware of the best approaches to using digital technologies for online teaching. Indeed, prior to the pandemic, most lecturers had very limited experience with online teaching and learning.

Until recently the prevalent teaching and learning culture has been predominantly teacher-centred, with prescribed syllabus content and a heavy dependence on lectures. Often faculty members not only taught as they were taught, but lecturing practices were supported by the way faculty were monitored to be in class delivering content as per the syllabus. However, over the last few years, pockets of innovation have revealed some transitions to more inclusive student-centred practices. Some lecturers have realised that more potential and energy for learning can be activated by building on what students bring from their prior experience and knowledge, and engaging more senses and emotions in the learning process. The new emphasis on employability of graduates has also driven curriculum renewal and support for students developing practical skills, self-motivation, problem solving, and a sense of responsibility for their own lifelong learning. With the funds from an Australian Aid program called Aus4Skills (Australian Government, 2019) these three universities had begun transforming their curricula including teaching and learning practices.

Many lecturers had laptops, but not all had reliable internet access when forced to work from home, and at times used data connections via their smartphones. Many students were not very literate with the tools needed for online learning, and those from economically poor backgrounds only had smartphones and no other devices to connect to the internet. When the students were forced to leave campus, many also returned to homes without internet access, so needed to travel to coffee shops or other places to gain network access. Some lecturers who were already using online tools in their teaching prior to the COVID 19 lockdown conceded that the tools had served relatively limited purposes:

> I did not use ed-tech systematically … All I did was sometimes create activities with some online game-based tools for students to do as a class activity, to change the class atmosphere or for homework for them to do without any clear purposeful and systematic plans … I also did not pay much attention to the evaluation of these apps effectiveness. (TUEBA participant 1)

> I just used the tech that I liked … I didn't care much about effectiveness or response of the students. I thought the trendy thing was a good … that we have to pursue [it] because the whole world is moving towards that. (TBU participant 1)

While each of the three universities had started their transformational journey in the area of teaching and learning, the COVID crisis put them in the position where they had little choice but to take another step rapidly. Although economically disadvantaged, the universities had the benefit of having already formed networks of lecturers focused on developing and practicing creative, active and inclusive pedagogies, which built students' transversal skills, and harnessed peer review among the lecturers. Leaders, mid-level managers and lecturers across the universities had experienced the benefit of taking time for short practical courses using action learning methods, and collectively had made some major pedagogical changes in their universities. In their situation, based on their experience of what creates effective change, the obvious step when faced with needing to begin

to deliver university courses online was to build networks of lecturers who could help each other learn to do that effectively.

2 Responding to the Sudden Need

Similar to many universities locally and internationally, the response to COVID 19 has been emergent. Where these Vietnamese universities are located, provincial authorities made the decisions about campus closures for community health and safety, without time for students and lecturers to make informed decisions about online learning opportunities. This required a short-term contingent response, a temporary change which also generated insecurity waiting for the next decision to come at another unpredictable time. The indefinite closure of campuses forced many students to return home to rural areas or their home countries where many had limited bandwidth and internet access and lacked other necessary resources for a productive online learning experience. One Lao student enrolled at TBU became famous in the local online news for travelling hours from home to connect on her boat to the internet and download her learning materials and upload her assignments (see http://zingnews.vn/vuot-song-me-kong-tim-song-hoc-online-post1071621.html). From the lecturers' perspective, exploration of how to use available digital technologies for teaching and learning could no longer be delayed.

While developing capacity for online learning had been on the horizon, responding to the need generated by the pandemic conditions was urgent. The Ministry of Education made it clear that student academic progress to graduation should not be delayed. This generated many organisational challenges with very little budget flexibility. At TBU, Zoom licenses were purchased, at TUAF lecturers and students were asked to use Microsoft Teams, and at TUEBA lecturers were asked to use Google Classroom. Very limited internal technical support was available and the universities expected lecturers and students to work together to find effective solutions to teaching and learning online. However, the university leaders had confidence in specifying their need for assistance and working with an international partner they had learned to trust. They turned to Aus4Skills to ask for help. Aus4Skills was able to deploy funds that were saved since travel and all face-to-face delivery was restricted, and agreed to pay for a short additional activity to support the adoption of effective digital pedagogy.

A total of 90 lecturers (N=90), from across the three universities, were nominated to participate in a facilitated learning activity to expedite the use of digital technology for teaching and learning (see Table 1). At the beginning of the activity, a needs analysis survey of those 90 participants was conducted using an online questionnaire to which only 80 of the participating lecturers responded (Table 1). The 80 participant responses revealed that they had limited, but positive experiences with online learning prior to the impact of the pandemic.

Table 1: Response rates for survey

University	Number of lecturers surveyed	Survey response rate	
		Number	Percentage
TBU	30	25	83.33%
TUEBA	40	39	97.50%
TUAF	20	16	80.00%
Total	*90*	*80*	*88.89%*

The survey revealed that just over four out of five (81.25%) had experimented with online tools in their classes, but only 67.5% of them reported talking to others at the university about online learning options (see Table 2). A further 32.5% reported that their academic department was supportive of them trying to use online tools for teaching and learning, while approximately one in five (21.25%) reported that they had undertaken some courses about online learning tools. However, 78.75% reported that they had learned to use digital tools by themselves and/or from colleagues with fewer than one in six (16.25%) lecturers reporting having personal prior experience as an online student.

Table 2: Response rates for online learning questions

Question Topic	Survey response rate to focussed questions		
	Yes	No	Percentage Yes
Experimented with online tools in class	65	15	81.25%
Talked to university colleagues about online learning options	54	26	67.50%
Have a supportive academic department/working environment for using online tools for teaching and learning	26	54	32.50%
Self-taught to use digital tools for teaching and learning	63	17	78.75%
Have taken courses about using online learning tools	17	63	21.25%
Personal experience as an online student	13	67	16.25%

A four-step process was undertaken, firstly, the universities identified the demands of the COVID-19 crisis as a professional learning opportunity for lecturers who had to adjust, and time was allowed for developing new skills and knowledge. Secondly, support for professional learning was delivered entirely online by Australian partners, which modelled some possible practices for online teaching and learning. Thirdly, the participating

lecturers collaboratively explored options and tools which increased the opportunity to learn about potential choices and how to choose the tool best fit for purpose. Fourthly, the learning was captured in the form of principles and examples that were shared in an online resource portal for others to use and add to. The following sections elaborate upon each of these four steps.

2.1 A Professional Development Opportunity

These three universities, though disadvantaged economically speaking, were led by people with a vision for more student-centred inclusive, active and practical learning experiences. They had a culture which recognised that staff need time and support to collaborate to make changes in their practice, and when needed, asked for expertise from outsiders which they could adapt, given local enablers and constraints, to meet their local needs. After a short negotiation, Aus4Skills agreed to fund a facilitator with expertise in online teaching and learning to support the staff professional learning. The funding was available from savings due to the travel restrictions imposed under the pandemic. The agreed intended participant outcomes were to: a) understand that tools are always chosen and used to meet an overarching objective which drives the way the tools are used; b) have basic skills and confidence to use a short-list of tools consistently with principles of educational design (e. g. constructive alignment); c) practise using the tools in their teaching, and share and reflect on the experiences with a view to developing a more nuanced way of using digital tools to support learning and teaching; and d) contribute to a bank of resources for online teaching and learning that could be shared with others at the university.

The leaders at each university determined a target group of lecturers to work with the facilitator and develop their knowledge and skills in online learning. The expectation that those lecturers would share their experiences and new-found expertise with others at the university was clear and consistent with their usual practice for multiplying learning within their organisation. Aus4Skills also recommended including technical staff who support the IT system to join the learning activities alongside the lecturers. This recommendation had limited feasibility due to the limited number of technical staff at each university.

The lecturers who were nominated as participants demonstrated an appetite for learning and a sense of their own capacity to try new things:

> We are not tech savvy. We felt our poor understanding of the technologies and we needed to boost our modest skills and knowledge and spend some hours asking colleagues how to use Google classroom. We had to focus on small changes as opposed to big changes. (TUEBA Participant 3)

2.2 Support from a Trusted Experienced Partner, Delivered Entirely Online

The challenge and opportunity were to draw on experience from Australia and knowledge of the university context in Vietnam to develop an efficient and effective online professional development activity with the participating lecturers. A facilitator was recruited who had worked previously with the universities on curriculum renewal and also was experienced in online facilitation. The facilitator worked with another advisor who also had expertise in online pedagogy and working experience with the three universities.

The bespoke activity, designed specifically for professional development of the target group and their context, took an action learning approach, rooted in the value of peer support among professionals who knew what they are doing and were fully competent in normal 'non-COVID' circumstances. The activity provided some input on the primacy of teaching purpose and intended learning outcomes, and the importance of choosing tools accordingly. Participants were expected to report between every session on their experiments with using particular tools for specific teaching purposes. In the facilitated sessions, the participants shared their experience of the effectiveness of their experimentation using online tools. The design intended to bring lecturers together as a professional learning community (Hargreaves, 2019) to explore and experiment using digital pedagogies and associated supportive digital tools, and provide impetus to continue and expand that exploration after the available funding was spent.

Given COVID restrictions, the facilitator and advisor could not travel to Vietnam, so the engagement was entirely online. The participants also could not gather in one place. The facilitator and the group had to work with similar technological constraints as the lecturers did every day in their teaching, i. e. limits to bandwidth and speed and capacity of various devices, sometimes only having access to smartphones. The online delivery mode modelled, for the participants, ways that they could manage and facilitate teaching and learning with online tools. Participants agreed to undertake tasks that they could practice or trial between the online meetings. The online meetings came to be recognised as a safe and supportive community where they could trust each other to give honest and practical feedback to each other. In these meetings the lecturers were encouraged not to be afraid to ask questions or to explore a diverse range of ideas no matter how silly they may sound. This developed a trusting community where experimentation was encouraged and the lecturers, as experts in their field of teaching, were empowered to be leaders in digital pedagogy.

In the meetings, the facilitator ensured that all participants had a voice, and maintained a shared sense of norms and goals. Practical inquiry-based activities promoted critical and creative thinking from different perspectives about what the real problems were that they were trying to solve. In the online meetings, participants were encouraged to share thinking and feedback to the group no matter how shy they were. The online discussions with

the facilitator were conducted in English and Vietnamese with a bilingual simultaneous interpreter, so participants could choose to speak in Vietnamese or English. The option to speak in their mother language gave some participants more confidence when speaking about a topic and allowed for more spontaneous flow of conversation (albeit a few thoughtful pauses).

2.3 Collaborative and Reflective Exploration and Experimentation re Options

The participating lecturers came to this professional development opportunity with mixed experience and expertise, conscious of their limits with online tools:

> [I knew about various apps but] I was stuck with the questions "How to teach effectively online? How to make effective use of the tools I knew?" (TUEBA Participant 1)

The lockout from campus forced the lecturers to think about how they could deliver their entire course online. Lecturers had to quickly find solutions, and make the best of what they knew. Without clear external direction or reference points from university policies or established digital practices, the lecturers relied heavily on each other to figure out the most effective ways forward. They reported challenges which initially confounded them, such as, how to engage students online and check their level of engagement and understanding:

> Except for asking questions to increase interaction, and use Quizizz in the class, I had no other ideas for online teaching ... The stress was even higher when students did not turn on the camera and some of them never answered me. [The fear] that students have less motivation and excitement in class made the question keep running in my mind how to create an active, interactive online class and how to let students be as autonomous in online learning as offline learning. (TUAF Participant 1)

> Though I posted the materials for learning before teaching for students to prepare, I was not sure who read them in advance. (TUEBA Participant 1)

The professional development activity funded by Aus4Skills provided a regular place and time to focus and share experiences of successes and challenges using online tools to facilitate the students' learning. While the course facilitator provided some input on the principles for using online tools and pointed to some easy-to-access free apps, the learning among peers amplified the outcomes. By convening a group of lecturers from three universities, reflective collaboration occurred among a wider range of colleagues – across disciplines and universities – than otherwise would have happened. Simultaneously the participants were learning from each other about new pedagogical approaches, the existence of related digital tools, different possibilities for using those tools, and the principles of choosing a tool that served the learning goals in ways that were accessible and motivating for students:

> I realised that there are many other ways of teaching and software that I can use to make the learning materials more digestible or relevant to students ... (TBU Participant 7)

> The most useful part has been the discussion with my colleagues so now I don't feel alone, see that other people have similar problems. I have learnt new software which provides me and the students more opportunities. Using Zoom and Padlet has made for effective group discussion. When students submitted work for assessment via Padlet I provided formative feedback. Students were quite excited. (TBU participant 2)

> Other colleagues kept sending me texts about new apps and way of doing things. We learn from each other. Previously we didn't [do that] but these discussions gave us new perspectives [on teaching and learning] ... Now in different courses I try different software and check students' responses to see what is the best fit. (TUEBA Participant 16)

> Now I use online tools, especially to increase participation and communication. The limitation is that students only have mobile phones no laptops ... I have been using Quizzizz and Kahoot to check their level of understanding. Students are more engaged through games. (TUAF participant 5)

> The group discussions created a change of mindset ... I thought more about the others' problems ... we talked about how to get help from others and gave tips on ... engaging students. (TBU Participant 8)

As the lecturers learned from each other they demonstrated consciousness of the importance of being very clear about the purpose of learning activities, and that choosing fit for purpose tools requires different thinking about the teaching role than preparing lectures to follow a prescribed syllabus:

> I learned about fundamental considerations in online and blended teaching, which helped me ensure the online and blended teaching quality, in a more systematic way. I also received suggestions about the application of a number of online tools, for instance for which tasks/purposes they should be used rather than applying them without knowing whether they are really suitable with the target tasks. From this, I realised what my shortcomings were when conducting my online class (for example not really clear delivery of instructions and expectations, lack of structured activities, etc). I recognized that I had done everything spontaneously but failed to connect them together for higher teaching efficacy. (TUEBA Participant 1)

> I used to be very strict about the use of the text books. Now I realise that there are many other ways of teaching and software that I can use to make the learning materials more digestible or relevant to students. (TBU participant 15)

> I choose software that is easy for students living in rural areas to use. So, I use Google Forms to make surveys and gain feedback, for short response or multiple choice. However, in other lessons I use Zalo. I ask them to submit assessment via email. (TUAF Participant 3)

With practice, many lecturers reported increasing confidence and appreciation of the usefulness of the tools for a particular purpose:

> Previously I thought the teacher was the leader who led students. My subject is accounting. Instead of going to the text book I gave them relevant examples and things they could connect with. I made

> some video clips to show them the reasons they should learn the topics. I created many scenarios and case studies instead of giving them theory. I also used other software. (TUEBA Participant 3)

> I decided to ask students to make a video clip and upload that to google classroom instead of asking them to submit written work. This created resources for all students. They could visit their resources any time. This gave them a voice and a channel as well. Students were very competent creating videos. (TUAF participant 2)

> [We used social networks with the students.] Keeping in touch with students regularly through social networking groups helps teachers to promptly support students when they have difficulties. Students have the opportunity to interact directly with teachers through these social networking groups. (TBU Participant 1)

While initially the lecturers had reported challenges to engaging students, different experiences emerged over the months, and many lecturers reported satisfaction with increased student engagement, interaction and responsibility for their own learning:

> To reduce my own workload, I followed the advice of the facilitator, dividing class into groups and assigned group leaders to help me manage the group works. I found that student empowerment was great because it not only helped me to reduce my workload but also made my students more responsible for their learning. (TUEBA Participant 1)

> The knowledge is one part of story. More important is how we better equip the students to learn or to self-study. Now I spend more time to think about activities than previously. (TUEBA Participant 6)

> This semester I applied a small change using suggestions from colleagues. I realise that the role of the teacher has changed and the student must be the centre of the classroom. I enhanced the amount of discussion and created a game show to engage students. I empowered the students to be the trainers or presenters. I stepped back to be facilitator. Students were more excited – lucky for me. I had the chance to also do a survey to get feedback. All responses were positive. (TUEBA Participant 8)

The students' active engagement provided the lecturers with feedback that enabled even better preparatory work to meet the students' learning needs:

> Teachers' pedagogy has changed a lot, teachers pay more attention to students' opinions on issues related to professional knowledge. They have revised their lectures to suit the online teaching program to ensure the output standards for students. Instead of talking continuously in front of the camera, teachers are flexible in using chat tools during the teaching process to promptly exchange students' opinions about the units of knowledge in the lesson. Teachers also flexibly use interactive sharing tools to increase interaction with students instead of sharing their own screen for the entire time. (TBU participant 1)

> Actually COVID-19 became an opportunity for us to develop new ways of teaching and learning. I have learnt from my colleagues through and after the Aus4skills course, and also from my students in every online class. At first, the students were unfamiliar but they adapted quickly. It encouraged us teachers to provide more efficient tools to the learners. I have changed my attitude to online learning. Students and parents have changed their attitudes too after their initial hesitation. COVID forced them to do it and now they see the benefit. (TUEBA Participant 2)

2.4 Capturing Learning to Resource Others

From the outset, the plan was to capture learning into a resource portal that could be shared with other lecturers at the universities, and potentially beyond. The facilitator took responsibility for compiling this in the form of a Google site, and having it translated where necessary. Initially the resource portal was used as a learning resource for the participants where resources and references were accessible, and participants could access activities. The final iteration of the resource portal included the notes used by the facilitator and worked examples and problems initiated by the participants.

Google Sites was chosen as a resource to illustrate that a free and accessible resource tool could be used for online learning and teaching without the need to purchase expensive learning management systems (LMS) and it could also be modelled for the participants while they worked within the constraints of that system. The facilitator modelled how the Google site could be used to link to a whole range of tools in a readily accessible way. Even with the most popular LMS systems, lecturers often seek other tools to support their students' learning, and given the need to respond quickly during COVID-19 without policies and guidelines in place, all lecturers could use the resources on the Google site with the existing university technology infrastructure.

3 Mindsets, Identities and Commitment to the Ongoing Change

The Aus4Skills funds for this professional learning opportunity were provided for developing a community of learners who were focussed on the need to build knowledge related to digital pedagogical approaches that could support their students during and beyond the pandemic. As indicated in some of the quotes above, and below, within a few months, the participants were part of a significant culture change that they anticipated could be sustained beyond November 2020.

The experimentation during the activity helped some participants to step beyond their hesitation about where to begin with the plethora of available information about online teaching and digital tools – which was not always relevant to their local context. Other participants were able to overcome the barriers they had encountered earlier when trying to use new pedagogical approaches and digital tools to connect and engage with their students. Participants also recognised that time saved travelling to and from campus could be used more productively for other teaching and learning purposes. In the face of bandwidth and connectivity challenges, the participants shared how they and their students learned to make adjustments using new and existing tools to deliver smaller files and limit the amount of bandwidth needed for synchronous meetings. Many participants discovered that online learning could enable even better connections with the students – more interaction, delivery of a wider range of learning resources, with more timely feedback – which in turn made the teaching and learning more effective and satisfying. At least

one participant expressed concerns about online security and confidentiality, and as a community they supported each other in working through these related issues. Some participants noted the need for more training and manuals about how to use different digital technologies, while others commented on the need to have online training regulations and sponsorship of better home internet connections for students. As one TBU participant declared "Just within a short course, the activities have changed mindsets" (TBU Participant 2).

Many comments indicated that the journey of personal change and change in practices was expected to continue:

> Through group discussion in the course with team members at TUAF, TUEBA, TBU I learned methods to increase interaction between lecturers and students; students and students. For example, how to manage class to make sure students are listening rather than doing something else, what I need to be well prepared before an online class, how to design online syllabus and group discussion effectively, which online games we can use to facilitate the activities in class ... some members also shared about getting students involved in reviewing and commenting for other students. Above all, I learned the motivation, and willingness to change ourself and approach new methods to deliver the best online hours for students. (TUAF participant 1)

> [I'm] very excited to be engaged in the discussions [with colleagues] ... I've changed my mindset as teacher, I'm empowered to use existing software. I thought that we need a textbook or bible to give guidance and method and all the instructions. Now I realise it's not necessary. We are here to elicit the problems from the students. Time management is an issue – we cannot be available all the time. We need to set expectations – need to develop our own toolkit for teaching and learning online. (TBU participant 3)

The lecturers described how they came to "change mindsets" and see themselves, their students and their interdependent roles in new ways that transform their practice for the long term. Lecturers perceived themselves as co-learners with their students and peers, learning how to learn with digital tools on limited infrastructure and with smartphones of all types as the primary device. They articulated insights into their students' motivations, and ways of engaging and learning. The lecturers realised that they didn't need access to the very latest devices and digital tools, or necessarily a text book on how to use them. Rather, they needed to delve deeply into pedagogical approaches best suited to what they were trying to achieve with their students, and recognise the importance of choosing the best available digital tool to support their pedagogical approaches as opposed to focusing on the most popular digital tool:

> [Now] I realise that the old and new have their strengths and weaknesses. We have to select the tools that best fits the learners that we are working with. For my own experience the project is about making a small step but I realise the change is difficult and challenging to all of us as it makes us think a lot. When we implement the project, we realise that the students also feel the burden. We ... realise many don't have the basic skills for this. We need to look at the starting point of the student so as not to overwhelm them. Students really struggle in using the technology, [use] too much energy as opposed to focusing on what is really important. (TBU Participant 1)

> I even [sic] see some advantages of online learning. First, I can control some things online that I could not control in class. Chalk and blackboard, which are traditional means of teaching and learning, must be erased completely after every class; but with online tools I do not need to rewrite the material that has been done during the previous class. It used to take so much time. Second, there are resources online that I do not have in the classroom every day. Resources that are common in western universities are not available in poor, developing countries like Vietnam, especially in mountainous and midlands region like TUEBA. But in the internet ... We can get access to the latest inventions just by clicking like the Westerners. Moreover, online I can show the students many valuable small things like random selection process, skills of searching for information in the internet, etc. So long as we have a desire to learn, it doesn't matter if we are online or offline. In future, we will combine both online and offline methods to make the most of each way for strengthening learning. (TUEBA Participant 1)

> I have changed through practising. Becoming more experienced in using software is important. My subject requires personal reflection so I have to think of ways to make students speak up. Now I can use the technology to leverage and help them share their personal experiences. [My choice] depends on the nature of the student group and the situation of COVID-19 ... I prefer working face to face than online. (TUAF Participant 7)

The COVID-19 situation in Vietnam worsened in 2021, but thankfully some of the poorest mountainous areas where these three universities are located, were spared the severest hardships. One academic year was completed with on and off lockdowns and bans on attending the university campus. Another has commenced with some restrictions still in place for most students. In universities, face-to-face teaching has been encouraged where possible for some groups, with limits to how many students are on campus at once. However, many international students who returned to their homes are still absent from campus. Thus, many lecturers continue to provide online support for students in their classes while many borders remain closed.

Since the completion of the professional learning opportunity many lecturers report continuing to experiment with new approaches to pedagogy with a focus on what they want to achieve as opposed to the tool. However, it is important to note that as they look for new ways of teaching online, they are also experimenting with new tools and sharing their experiences with others. While there are no fixed meeting times this now occurs informally in online or face-to-face environments (where permitted). In addition to this experimentation and continuing efforts to transform pedagogy, the universities are actively developing policies and guidelines to support new ways of working. While regular sharing has been occurring informally between staff within and outside of their own institutions, the resource portal has become stagnant and is not being used as anticipated. This problem may be due to a changing workload and routine imposed by the pandemic or due to a lack of resources.

TBU's lecturers and students are now accustomed to online teaching and learning. TBU has updated a number of learning policies and guidelines for flexible use of technology platforms for online teaching to ensure a better learning experience for students. Support

from partners in the field of telecommunications has been mobilised to help students to access high speed internet and to optimise online learning opportunities. The university administration has supported students and faculty to have easier access to online teaching tools and methods. TBU lecturers and students emphasise creativity in the process and in their new ways to connect with each other:

> Faculties of TBU are proactive in realizing online teaching goals. Initially not all teachers could use the teaching tools proficiently. The leaders have asked some lecturers who are experienced in online teaching to guide their colleagues and students in the use of technology platforms in online teaching and learning. Faculties focus on online tools that are relevant to the level and needs of students instead of modern or trendy platforms ...
>
> Many students at TBU are already teachers in primary and secondary schools. These students can learn from their teachers' online teaching methods – both pedagogical and technological skills that in turn the students can apply to their own work. The students and teachers began to share online teaching experiences together. This is also a good way for TBU to expand its reputation and influence to the community. (TBU participant 1)

TUAF staff have made many changes compared to the first days of teaching online in 2020:

> After more than one year of teaching online we actually changed a lot. We adopted online classes with less stress, and even feel convenient and comfortable. More activities, more tools can be used to increase interaction with students. We have learned together and from each other. All TUAF staff now can proficiently use an LMS such as Google classroom and Microsoft Teams to manage classes. Online applications on Google (Google doc, Google form, etc.) or other online tools are used in the class. Lecturers are adapting and adopting teaching online with more excitement. Some lecturers said they now even like teaching online rather than offline since it saves time for travelling and they can easily use tools to manage class ... We receive support from the University to transform our traditional class to a digital class. (TUAF Participant 1)

At TUEBA, changes are visible also at all levels – individual, departmental and the wider university. Initially, both lecturers and students were reluctant to learn to complete tasks online, hoping that the effects of the pandemic would recede quickly and they could go back to their traditional teaching and learning methods. However, that has not eventuated yet. Lecturers have become more and more familiar and at ease with online tools and realize their effectiveness in promoting new pedagogical approaches to teaching and learning in an online environment. Therefore, they accept the fact that they must put aside any preconceived disadvantages of online classes to stay focused more on how to improve their online practices and engage students in new ways. Now, WIFI has been provided free for lecturers to help them access more resources and to provide a better choice of teaching activities. Even though the COVID-19 pandemic is more controlled, the university has set up two online classes for each department to practice teaching this way:

> Lecturers in different departments share with each other their practices and experience using technology in teaching through informal talks and group meetings. More journal articles have been

published by lecturers about students' attitudes towards application of specific online tools and/or their evaluation of technical application in their classrooms. (TUEBA participant 1)

4 Conclusion

This chapter started with the premise that COVID-19 accelerated the need for transformational practices in higher education that are able to respond to constantly changing societal needs. This case has shown how university lecturers addressing this challenge in three universities, in disadvantaged regions of Vietnam, explored with urgency, new pedagogical approaches to using digital technologies to remain connected and engaged with their students. Drawing on advice from trusted educators overseas, who had greater experience using digital pedagogies, the Vietnamese lecturers used a collaborative action learning approach and learned to choose and deploy, with confidence, appropriate pedagogic practices online with digital tools fit for their context. The participants reported that the collaborative professional learning experiences helped change their mindsets about online learning and the use of digital tools; they could observe the changes in each other and had an appetite for continuing exploration and experimentation with digital pedagogies. Their sense of what they could and should do as teachers, and what their students could do, had transformed. This was achieved in a relatively short time, within the constraints of a very limited budget for additional learning support, expansion of digital infrastructure or new devices.

The case has illuminated how in the face of coronavirus' effects, these lecturers and their universities adapted. The lecturers were able to use their agency and hard work to turn adversity into opportunity and take steps towards transformation. This case identified four critical steps that expedited the ability of these universities to turn the COVID crisis into an opportunity for them to continue on a transformation journey. The four steps are that firstly, the university leaders recognised that to effectively survive the COVID-19 crisis their staff and students needed time and some help to learn new ways of doing things; secondly, they accessed relevant assistance from trusted international partners; thirdly; the lecturers strengthened their professional learning community with a focus on exploring how digital pedagogies and associated digital tools could serve their teaching and learning goals; and fourthly, the learning was captured as it accumulated for sharing with others. These are lessons that are transferable to other similar institutions, though they are not proposed as any sort of guaranteed quick fix.

Indeed, the context was particular and the universities had a certain readiness in their disposition to building collaboration for change, but the selected examples of participants' voices highlight how purposeful learning opportunities with a clear focus on lecturers helping each other address current needs, can rapidly generate workable solutions to many challenges. What is even more noteworthy, is how the community of participants in this

activity empowered each other to seek out the very best contextualised solutions to effectively connecting and engaging with their students. This meant that once-habitual ways of doing things were identified and re-examined for their effectiveness in the new circumstances. Peers supported each other to test new tools and methods and share the experiences of what worked and what didn't.

The reported mindset changes amongst the lecturers included a change in their sense of identity from being teachers primarily responsible for delivering content in a lecture format, to becoming 'educators' who could confidently choose, among a repertoire of options, to use the most appropriate approach including the most useful tools for their students to achieve the intended learning goals. It is these changes in the lecturers' mindset and sense of identity as educators that hold the promise that digital transformation will serve educational purposes and be sustained beyond the first impacts of COVID-19.

More research is warranted to confirm the sustainability of the transformation and how it has been sustained. Other questions worthy of research relate to how the university lecturers and the university technology teams collaborate to enhance digital pedagogic practices, and the students' perceptions of the renewed teacher mindsets and identities, and their use of digital pedagogies.

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Adapting to an Online Learning Environment in the Midst of the Global Pandemic: Insights from a Private Higher Institution in Cyprus

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Abstract

The pandemic crisis of COVID-19 affected millions of people around the globe and brought upheavals in their lives. In fact, the unprecedented appearance of the 'invisible' enemy has impacted the economy and businesses across the world, whilst the travel and tourism industry have been severely damaged. In addition, this global pandemic has raised significant challenges for the higher education sector, including in the context of Cyprus. In particular, academic staff in Cyprus, were brought into the spotlight and they were expected to adjust their educational practice with insufficient or minimum training and preparation. Based on the aforementioned, the main objective of this particular paper is to present and discuss the reactions and the operational measures that were implemented at Frederick University in order to address this crisis, together with the presentation of the challenges that occurred in this setting. In addition, since the emphasis was given on the academic staff, we will provide their reflections and perspectives, based on a small-scale study that was conducted, concerning the degree of effectiveness of the university measurers in dealing with this unexpected change. Overall, through this chapter, our intention is to reveal the crucial aspects of the important mechanisms for meeting the demands for online teaching in higher institutions, the enhancement of the capacities and capabilities of the instructors to deal with this change, and finally the challenges that occurred during this unprecedented change.

Keywords

higher education, pandemic crisis, emergency remote teaching, instructors, professional development training, university

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1 Introduction

The global pandemic crisis of COVID-19 affected millions of people around the globe and brought upheavals in their lives. In fact, the unprecedented appearance of the 'invisible' enemy has impacted the economy and businesses across the world, whilst the travel and tourism industry have been severely damaged. Researchers (e. g., Shrivastava et al., 2013; Ansell & Boin, 2019) argued that modern societies around the world live in the eye of a "perfect storm" with issues related to the global financial crisis, global climate crisis, and global poverty crisis, all of which interact and affect all stakeholders since they are increasingly faced with "unknown unknowns". Currently, the crisis of the COVID-19 pandemic has once again brought to the surface the concepts of crisis and uncertainty, affecting all sectors and societies of mankind. Especially in organizations, this pandemic brought upheavals and insecurity for the employees, financial problems, as well as management problems. Bartsch et al. (2021) argued that this particular crisis besides the health crisis led to an unprecedented economic and social crisis that hit organizations hard. In general, any potential crisis triggers a period of uncertainty since everything changes and the need to redesign and redefine processes and procedures is more urgent than ever. Based on that, crises are unpredictable and disrupt normal operations of the organization, while they require an immediate response (Fener & Cevik, 2015), and do not provide enough time to get prepared in advance (Bhaduri, 2019). Also, in relation to the organizational sector, Calogero and Yasin (2011) supported that when a crisis ceases to exist, it marks the organization by changing the operating level which affects everyone inside the organization. In order to do so, during a crisis specific measures and initiatives must be considered. Furthermore, this change affected education systems worldwide and disrupted the way in which students are educated around the world (Kafa & Pashiardis, 2020). In fact, about 1.5 billion learners at all educational levels were influenced by institutions decisions to lockdown in 191 countries due to the pandemic (UNESCO, 2020) and the overall educational practice was re-designed and dramatically altered (Harris, 2020). As a consequence, this global pandemic has raised significant challenges for the higher education sector worldwide, particularly the unexpected and urgent need for previously face-to-face university courses to be taught online (Rapanta et al., 2020). Therefore, during this crisis supporting education continuity in higher education institutes is deemed necessary.

Having said that, Cyprus has certainly been no exception to this. In fact, academic staff in Cyprus, were brought into the spotlight and they were expected to adjust their educational practice, from the conventional learning environment into this new distance/online learning environment called emergency remote teaching (Joshi et al., 2018; Rush et al., 2016; U.S. Department of Education, 1996), with insufficient and/or minimum training and preparation. Since 1980, technology was used for teaching and learning at distance in times where emergency remote teaching was employed (U.S. Department of Education, 1996). As Hodges et al. (2020) supported, emergency remote teaching is adapted when

external forces affect all levels of education and transform the conventional teaching mode of delivery to the distance learning mode of delivery. Due to the pandemic restrictions in our case, emergency remote teaching was implemented in order to continue the teaching and learning process in all educational levels. This sudden change could be also specified as a radical change and a rapid transition to education at distance, since it interrupts the normality of education, referring mostly to the conventional aspect of teaching and learning. In general, various natural (Joshi et al., 2018; Rush et al., 2016) and extreme violence crisis require the use of technology for the implementation of emergency remote teaching. Yet, the transition to this emergency remote teaching during the pandemic crisis revealed the inadequacy of various institutions, educators and students, since different conditions are needed in regard to the course design and delivery, technological infrastructure, etc.

In this particular chapter, and through the case of Frederick University (FredU), (a private university in Cyprus that offers undergraduate and graduate programs on two campuses) the reactions and the operational measures that were decided and implemented in order to address this crisis, together with the accompanied challenges, are presented and discussed. Overall, through this chapter, our intention is to reveal the crucial aspects of the important mechanisms for meeting the demands of emergency remote teaching and learning in online environments in higher education institutions, the enhancement of the capacities and capabilities of the instructors to deal with this change, and finally, the challenges that occurred during this unprecedented change. In order to present the following topic, the subsequent subchapters will present some of the current literature in the field of the online environment, set the stage of the private institution in Cyprus, referring to FredU and present the process of the adaptation of the emergency remote teaching and learning employed due to the pandemic crisis. Also, since the emphasis was given on the academic staff, we provide their reflections and perspectives, based on a small-scale study that was conducted, concerning the degree of effectiveness of the university measurers in dealing with this unexpected change. Finally, the discussion provides an overview of this particular topic together with its implications section.

2 Framing the Online Learning Environment in Educational Practice

Educational technology effectiveness depends on how well it helps teachers and students achieve the desired instructional goals as argued by Ross, Morrison and Lowther (2010). Specifically, e-learning effectiveness can be identified by 6 factors: instructor's performance, learners' attitudes, supportive issues, system quality, service quality and content quality (Ozkan & Koseler, 2009). Other studies reported students' attitudes and leaners' satisfaction as parameters for the e-learning effectiveness (Liaw et al., 2006, p. 1072; Ozkan & Koseler, 2009). Additionally, interactive learning activities among students and between students and the instructor revealed to be an important element in improving

academic achievement and effectiveness of online teaching (Castaño-Muñoz et al., 2014; Means et al., 2013).

The potential, educational value, and possibilities of distance learning are highlighted by several elements such as: self-learning, learner resources and amount of information, inclusiveness, ease of access, the level of interaction and communication, previous online experience of both students and instructors, personal characteristics of students and instructors, as well as external factors (Arkoful & Abaidoo, 2014; Baber, 2020; Ghazi-Saidi et al., 2020; Wahab, 2020). Other factors of success related to faculty members are the following: lecturers' pedagogical knowledge, training, support and workload, the provision of course access and flexibility, development of instructional design skills (Helms, 2014). Students' preparation via pre-training programs for technological issues, orientation programs, online individual counselling, guidance and assistance (Giesbers et al. 2021), as well as e-mentoring and virtual community spaces are also considered to be positive contributors to the effectiveness of online and blended learning environment. At the university level, the policies and strategies adopted and employed are crucial. Specifically, collaborative leadership and '*properly resourced, achievable and sustainable*' action plans (Garrison & Vaughan, 2013, p. 25), in relation to the quality of IT infrastructure and services, the use of the available technology to its full potential is extremely important (Alsabawy et al., 2013).

3 Setting the Stage: The Case of a Private Higher Institution in Cyprus

Before introducing the higher institution to which this chapter is referred to, we briefly present the overall context of Cyprus, as well as how the COVID-19 pandemic crisis affected the educational system in Cyprus. To begin with, Cyprus is an island in the Eastern Mediterranean Sea that gained its independence and became an independent state in 1960. Since 2004, Cyprus has become a full member of the European Union. In general, the island of Cyprus is a small country, classified as a middle-income country, with a population of over one million (1.212,274) where the majority of the population are Greek-Cypriots.

Concerning the educational system in Cyprus, the Ministry of Education, Culture, Youth and Sports is responsible for the various educational levels in Cyprus (primary, secondary, higher). The highest authority comes from the minister in collaboration with various departments such as the Management, Planning, Registry, and Accounts Office in which they support the functioning of education at the three main educational levels: primary, secondary and higher which includes public and private universities, as well as public and private colleges or institutes (Pashiardis & Tsiakiros, 2015). The Ministry is responsible for the policymaking and administrative issues of the governance of education (especially

in the primary and secondary levels), as well as regulating and supervising all the institutions under its jurisdiction and is responsible for the implementation of educational laws and the preparation of new legislation (Pashiardis & Tsiakiros, 2015).

The COVID-19 pandemic hit the island on March 09, 2020, when the first two confirmed cases were announced. For Cyprus, this invisible threat was in fact a very uncommon and dramatic experience, which consequently had a negative impact on all citizens who eventually had to be locked up in their own spaces for several months throughout the year 2020–2021. The very next day, the Ministry of Education, Culture, Youth and Sports, for precautionary reasons decided to suspend the operation of school organizations for a number of days. Yet, due to the increase of the cases in the following weeks, the Ministry decided the closure of school organizations until further notice. During that time, a total lockdown was imposed by the local government. Also, the Ministry of Education, Culture, Youth and Sports recommended, in an abundance of caution, to suspend the operation of all higher institutions in Cyprus. Following, the guidelines of the Ministry, FredU decided to suspend operations from March 11, 2020, two days after the first cases were confirmed on the island.

FredU is a vibrant private university operating in Cyprus. It was established in 2007 as a university under the legislation of the higher education sector in Cyprus and specifically, after a decision by the Council of Ministers of the Republic of Cyprus on 12th September 2007. However, FredU as a higher institution has a long history of more than 50 years. In particular, before its establishment, it was known under the name of Frederick Institute of Technology offering various diplomas. Nowadays, FredU offers a large number of undergraduate and graduate programs in the areas of Science, Engineering, Business, Arts, Architecture, Media, Humanities, Health, and Education and operates in two campuses with over 4,000 students. The main campus is in Nicosia, the capital of Cyprus, and the other campus in Limassol, the second largest city. Overall, FredU has a strong focus on academic research, as one of the leading research organizations on the island, and it is recognized both nationally and internationally.

4 Initiatives and Challenges for Adapting to an Online Learning Environment

Based on the pandemic crisis that hit the globe, a number of challenges were observed in various organizations, including the educational and business sectors, with consequences for the organizations' basic beliefs and expectations (Pauchant & Douville, 1993). James, Wooten and Dushek (2011), argued that many academics and scholars considered the organizational/business crisis as a strategic matte that will lead any organization to a negative outcome, unless a number of corrective actions are taken. Based on this unprecedented crisis, FredU, took specific initiatives and promoted specific actions in order to adapt to this new era successfully. First and foremost, the University has been fully in-line with governmental and other authorities' regulations in order to respond effectively and responsibly to this particular crisis, referring both to the pedagogical aspect, which covers the level of quality education offered to students, and the protection of the health of both staff and students. As Calogero and Yasin (2011) argued, a crisis influences heavily on the organization's functioning and this kind of situation requires a fast-decision-making process. Therefore, during times of uncertainty effective decisions in order to response to the crisis are crucial (Pasquini et al., 2019). Based on that reference, the University's Senate reacted to this crisis with various initiatives which included the adaptation of the new technologies for the efficient and effective execution of the final online examinations, as well as the development of alternative assessment methods with the use of technology. Of course, all these initiatives were in compliance with the guidelines of the Cyprus Agency of Quality Assurance and Accreditation in Higher Education (CYQAA).

Having said that, we are concentrating on how the university, following the closure of the campuses, adapted to the emergency remote teaching and learning environment along with the teaching staff support mechanisms. In general, based on this unexpected crisis, the university acted directly to support all its conventional programs into emergency remote teaching and learning within just three days, with the introduction of the "blended learning" pedagogical framework. As we mentioned earlier, the university offers distance online learning programs since 2013 and therefore the pedagogical and technical know-how and infrastructure to support this new online learning environment for the conventional programs were already available. Specifically, this knowledge has been accumulated over the last seven years through the fourteen distance learning programs that are offered at FredU. At the same time, gradually, the university technologically updated the classrooms and developed hybrid classrooms in both campuses (in Nicosia and Limassol) for bidirectional communication between students and the instructor in the class and those participating virtually. This initiative, was implemented as we moved from lockdown through to the gradual reopening of the universities and thus a blended/hybrid learning approach was followed.

5 Blended Learning @ Frederick University: The Philosophy of the Pedagogical Framework

FredU took advantage of the challenges and opportunities provided by the pandemic and besides infrastructure (hybrid classroom) it also developed a theoretical framework to guide and support the re-design of courses into a more blended/hybrid learning approach. FredU is at a stage where it requested its faculty members to see beyond the traditional approach and '*re-conceptualize what can be done in multiple delivery modes*' (Goeman et al., 2018, p. 50).

The blended learning pedagogical framework (as it was named) developed, serve as the backbone to guide the re-design of our courses intended to be delivered through the blended learning approach. The proposed framework is based on research evidence and contemporary theoretical and practical approaches to blended learning (Stein & Graham, 2020; Conole, 2013; Hirumi et al., 2011; Kerres & De Witt, 2003; Montrieux et al., 2015; Skill & Young, 2002) in higher education and capitalizes on the expertise gained by FredU from its distance learning programs of study and the 'Distance Learning Pedagogical Framework' developed and implemented for the past seven years (Eteokleous & Neophytou, 2019; Eteokleous et al., 2013).

The philosophy that underlies the pedagogical framework of blended learning at FredU calls for various elements to be taken into consideration. The pedagogical framework developed includes the elements needed in order to design student-centred learning environments that allow students as learners to experience guided independent learning and permanent student activity, through constant interaction of instructor-student, student-student, student-others, materials or resources. The pedagogical framework encompasses processes where they allow the development of student-controlled meaningful learning communities (both in person and virtual) (Skill & Young, 2002) which is the key to learner engagement (Boelens et al., 2017; McGee & Reis, 2012; Park et al., 2011; Song et al., 2004). It intends to develop online and face-to-face learning spaces and individual/collaborative learning processes where students will take responsibility of their own learning and increase their self-perceived knowledge. Quality control and assurance mechanisms were developed in order to support, guide and advise the instructors. Finally, a series of professional development courses aiming to pedagogically and technologically support the instructors planned and implemented during the academic year of 2020–2021. The blended learning framework consists of the following 3 main parameters (see Figure 1 in appendix):

1. **Learning and Teaching Spaces:** Localization of teaching and learning: *online and face-to-face*. The framework allows for flexibility between online and face-to-face learning space.

2. **Teaching Components and Learning Activities:** The thoughtful mix of the following pillars (teaching components), better specify BL arrangements: ***a) content and material delivery, b) participation and engagement, and c) assessment***. BL is expressed as a particular sequencing and proportion of online and face-to-face, synchronous or asynchronous learning activities such as: Read, watch and learn, Collaborate, Discuss, Investigate, Practice and Produce (see Figure 2 in appendix).

3. **Technological Tools:** Instructors are expected to select and integrate a mix of tools to deliver and scaffold learning activities. Strong and extensive use of the eLearn platform is required. Specifically, the instructors are encouraged to use build-in platform tools (i. e. zoom for teleconferencing sessions, discussion forums, chat rooms, wikis) as well as tools outside the platform (i. e. simulations, blogs, online collaborative documents, digital boards, interactive assessment tools). The technological tools are grouped in the following categories:

    - Communication tools
    - Collaboration, Interaction and Information Sharing tools
    - Content Development Authoring tools
    - Assessment and Feedback tools
    - Simulation, AR and VR tools

Therefore, all the theoretical courses were predominantly delivered online, and face-to-face communication has been restricted to laboratories and practicum (based on the pandemic situation). Yet, a particular challenge was the limited and in some cases non-existing experience of the instructors of the conventional programs of study in the field of the distance learning approach in designing, developing and delivering a course. Based on this fact, the university immediately began to formulate a particular action plan where the Distance Learning Committee (DLC) and the Open and Distance Learning Center (ODLC) played a leading role in guiding, steering, motivating and supporting all the teaching staff in various departments who had unexpectedly needed to employ emergency remote teaching and learning. In particular, two of the operational measures were: 1) the introduction of a professional development webinar series (during the months April–May 2020) entitled "Improving teaching in online times" to all the teaching staff from the university, with limited to non-existing experience in online teaching (instructors that teach in distance learning programs were also welcome to attend) and 2) the introduction of a coaching and mentoring scheme from experienced teaching staff who had already taught in the distance learning programs of our university and supported the teaching staff with limited/non-existing experience. Based on the aforementioned, we will now

present in a more detailed way the two operational measures for the support mechanisms of the teaching staff.

5.1 A Professional Development Series

As mentioned above, the pedagogical and technical know-how, and capacity for an online learning setting were available at FredU since various programs are offered via the distance learning mode. However, one particular impediment was the need for immediate support of the instructors, who taught in a traditional setting before being forced to immediately switch to emergency remote teaching and learning, implementing unknown online learning approaches and techniques. Based on that, the university introduced the aforementioned professional development webinar series (during the months April–May 2020), to all the instructors from five different schools and various departments, with limited to non-existing experience in online teaching (of course distance learning instructors were also welcome to attend). This particular training did not involve any technical aspects but the focus was given on practical and pedagogical points on how to improve teaching and engage in an exchange of ideas and best practices within this new online learning environment. The emergency remote teaching and learning was implemented via the learning management system, LMS_ Moodle, already in use for both the conventional and distance learning programs of study. Within Moodle, the ZOOM resource function (a software used for teleconferencing, telecommuting, distance education, and social relations) was activated. It was already in use for the distance learning programs of study. The Moodle-LMS and ZOOM were the two main tools immediately used to switch to emergency remote teaching. Given the experience and the extensive use of ZOOM in the distance learning programs of study, the technical parts which included issues related to license and accessibility were not an obstacle. However, a training framework for the teaching staff who would use this software and adjust their teaching mode in this new distance learning environment was an issue that had to be addressed.

Therefore, FredU addressed this challenge with an immediate response through the professional development series. During the months April and May 2020, instructors from five different schools and various departments, with no prior experience in online teaching, were invited to participate in these professional development series. Colleagues from the university with experience in the distance learning environment, as well as guest lectures were invited to deliver the online workshops. The professional development webinar series covered topics such as: best practices for online teaching delivery, online classroom management, student perspectives on online teaching and learning and how to support them, pedagogical design for online teaching, the use of simulations and learning scenarios, topics related to quality assurance in online teaching, as well as topics related to the reflection of online teaching and learning. In particular, Table 1 presents the topics and thematic areas that were covered by the training series.

Table 1: Topics of the training series "Improving teaching in online times"

1.	Best practices for online teaching delivery & engaging students for teleconferencing teaching – April 2020
2.	Online classroom management – April 2020
3.	Student perspectives about online teaching and learning: what they might be thinking and how to support them – May 2020
4.	Pedagogical design for online teaching: developing the appropriate educational material – May 2020
5.	The use of simulations and learning scenarios in the teaching and learning process – May 2020
6.	Quality Assurance and the Development of Community of Inquiry in Online Teaching and Learning – May 2020
7.	How to reflect on online teaching and learning – May 2020

In particular, the 1st training entitled "Best practices for online teaching delivery & engaging students for teleconferencing teaching", included important tips for starters, the interactive perspective so that students' engagement and attention in this new online setting could be increased, some "virtual" ice-breaking techniques and in general various important features of the ZOOM digital environment. The 2nd training entitled "Online classroom management" covered the important aspects of managing the ZOOM environment as the new digital classroom and included topics such as control screen sharing, safety locking the online environment, lecture course, the virtual background, as well as the reaction and communication tools that instructors could use in their interaction with students. The 3rd training session covered the topic of "Student perspectives about online teaching and learning: what they might be thinking and how to support them". Based on the available research data in literature, as well as based on a small research study conducted with students of the university, this training series presented information on how students were adapting to courses that had transitioned from in-person to remote delivery and overall to have a sense of what kind of obstacles and expectations students have from the implementation of emergency remote teaching. The 4th training entitled "Pedagogical design for online teaching: developing the appropriate educational material", covered the important aspect of the transition of conventional teaching materials to an online environment. In particular, this training series gave an overview to the teaching staff on how to adjust and use their existing educational material into this new online teaching approach. Following, the 5th training entitled "The use of simulations and learning scenarios in the teaching and learning process", in which all teaching staff were familiarized with the use of simulation software, learning scenarios and role playing as part of their teaching process in this new online learning environment. Various simulation software and applications were presented and explained. The 6th training series entitled "Quality Assurance and the Development of Community of Inquiry in Online Teaching and

Learning" discussed and explained the importance of quality assurance mechanisms and provided tips on how they can be implemented. Additionally, it presented and discussed the development of community of inquiry via blended and online learning environments covered the framework for optimizing learning experiences and the reflections in this new online learning environment. Finally, the 7th training entitled "How to reflect in online teaching and learning" presented and discussed the framework for optimizing learning experiences and the reflections in this new online learning environment. The training sessions were scheduled every Wednesday at 17:00 and their duration was one hour. In general, it is worth mentioning that instructors had open access to this particular training series on the University's platform under the course name "Online Technologies and Methodologies for Faculty" both by reading the slides and watching the recorded videos of the seminars.

5.2 A Coaching and Mentoring Scheme

Beyond the professional development training series, FredU acknowledged the important aspect of collaboration and communication between experienced teaching staff in an online environment and teaching staff with limited or non-existing experience. In fact, an effective communication and collaboration system is a priority for all during a time of crisis (Ansell & Boin, 2019). Additionally, Castrogiovanni and colleagues (2011) highlighted the importance of maintaining close channels of communication along with personal relationships for dealing with crisis in the working environment. Therefore, a coaching and mentoring program was introduced for the online teaching delivery in an effort to continually improve the educational services offered throughout this pandemic period. As mentioned before, a particular challenge was the limited/non-existing experience of the teaching staff in the field of distance learning. Thus, beyond the professional development training series, in an effort to provide the best possible educational experience during this new online learning process, the university introduced a mentoring scheme for teaching colleagues.

In particular, ten colleagues with extensive and proven experience in teaching and coordinating distance learning programs had been assigned by the university as mentors to specific academic departments who offered their courses in a conventional setting including the School of Health Sciences, the School of Art, the Civil & Mechanical Engineering Department, the Law Department, the Psychology & Social Sciences Department, the Education Department & Sports Sciences, the Maritime Department, the Electrical Department, the Architecture Department and the Business Department.

This coaching and mentoring program was designed to help and guide colleagues through their new online teaching experience. Specifically, this scheme aimed to provide guidance on academic matters and best practices on educational delivery through e-learning tools, as well as specific tips that have been shown to enhance and improve the teaching and

learning process based on the experienced colleagues working in the distance learning framework. Therefore, this particular initiative covered mostly the online pedagogical support aspect, rather than the technical or administrative support, in which both the school secretariat as well as the computing services were supporting and assisting all the teaching staff.

The provision of this particular scheme included the setup of possible and needed training sessions between the mentor and the colleagues from the department, the establishment of a forum for Q&A, as well as the definition of certain hours within the week that the mentor will be available for feedback and overall, any type of communication for general guidance and assistance. In general, this particular coaching and mentoring scheme did not have any defined or specific framework. On the contrary, the heads of the departments, as well as teaching staff for the department were invited to co-communicate and discuss with the respective mentors the best way of delivering the mentoring scheme in order to have the support and assistance needed according to their needs and specific characteristics. Finally, it is worth mentioning that all ten mentors volunteered to offer their services and experiences in the online environment at the request of establishing the mentoring program by the university.

6 Reflections from the Case Study

Following, in order to reflect on the adaptation of emergency remote teaching in our university, we conducted a small-scale study. Its scope was to gain an initial understanding of the reflections and perspectives of the teaching staff that took part in the aforementioned professional development series. Attending the professional development series was not mandatory and any member of the teaching or administrative staff of the university could participate. At the same time, this study provided information on the effectiveness of the university measurers employed in order to deal with this unexpected change. In particular, the following research questions guided this study:

1. To what extent the online professional development series was important to the teaching staff?
2. To what extent did the teaching staff utilize the practices and tools from the professional development series in their courses?
3. What are the main challenges that arise from the online teaching environment and what other kinds of professional development are needed?

This predominantly quantitative assessment took place at the end of the spring academic semester 2020 and was based on a questionnaire format. The survey was developed with

closed-ended and open-ended questions and it was administered electronically to all the teaching staff, who had no experience or limited experience in online teaching, and who took part in the professional development series. The format of the questionnaires consisted of three sections. Each section covered one of the three research questions. The sample of the study was comprised of 24 teaching staff that took part in the professional development series. On average, 55 colleagues attended each of the 7 sessions of the professional development series.

With reference, to the 1st research question and the importance of the online professional development series that was implemented in the university, 87.5% of the participants supported that they had acquired professional online experience during the pandemic crisis due to the online professional development series. Moreover, 60% of the participants argued that they had advanced their online teaching experience and acquired skills based on the pandemic situation. In general, as it is shown in Table 2, all of the participants (100%) mentioned that the "best practices for online teaching delivery and engaging students for teleconferencing teaching" seminar was the most important one. Also, 86% of the participants supported that the "online classroom management" and the "pedagogical design for online teaching: developing the appropriate educational material" seminars were also important. Furthermore, to a lesser extent, 62%, the participants supported the importance of the following seminars: "student perspectives about online teaching and learning: what they might be thinking and how to support them"; "the use of simulations and learning scenarios in the teaching and learning process"; "quality assurance and the development of community of inquiry in online teaching". Finally, concerning the final webinar on "how to reflect on online and teaching learning", 57% found it helpful and interesting.

Table 2: Teaching staff responses to the online professional development series

Professional development series	**Percentage (%)**
Best practices for online teaching delivery & engaging students for teleconferencing teaching	100%
Online classroom management	86%
Student perspectives about online teaching and learning: what they might be thinking and how to support them; the use of simulations and learning scenarios in the teaching and learning process; quality assurance and the development of community of inquiry in online teaching	62%
How to reflect on online and teaching learning	57%

Concerning the 2nd research question as to what extent the teaching staff utilized the practices and tools from the professional development series in their courses, referring mostly to the tools used within the ZOOM environment, almost all of the participants argued about the importance of the chat rooms (97%), break out rooms (95%) and the polling feature (90%). To a lesser degree, the participants mentioned that they have used the problem solving/learning scenarios practices (60%) and the interactive games practice (40%), whilst none of the participants (0%) used the simulation technology practice as a result of the limited experience and training, as well as limited access to simulator software etc.

Finally, concerning the 3rd research question, no particular challenges were observed concerning the online teaching environment (95%). A small number of participants (5%) mentioned that too much information was given to them in combination with the general fatigue due to the particular difficulties of the pandemic period. Yet, in regards to what kind of professional development is needed, participants mentioned that further expertise for all ZOOM capabilities for the conventional study programs is required, as well as more information and support in order to further encourage student interaction. In addition, the teaching staff argued about the importance of further expertise on specialized resources/online interaction for various courses, the training on pro versions of software on simulators/simulation technology/environment, the training for further student motivation during ZOOM and finally, additional training for the creation of interactive videos.

7 Discussion

Undoubtedly, there is an increasing degree of reference in literature, about the concepts of crisis and uncertainty in educational organizations (e. g., Azorìn, 2020; Rapanta et al., 2020; Harris, 2020; Harris & Jones, 2020) due to the unprecedented change derived from the global pandemic that affected the various educational systems across the globe. In conjunction with the above, the aspects of online teaching and learning have also become prominent. Even if, in the past two decades, online learning has been used in various educational institutions around the world, most colleges and universities, and especially school organizations did not use this educational mode and thus the limited involvement of the teaching staff in an e-learning process was observed (Mahyoob, 2020). Yet, this global pandemic or this "supernova" force, as Azorìn (2020) described it, triggered a new era in the various educational contexts, which included higher institutions that were not prepared for this new education landscape.

Based on that assumption, in order to handle the pandemic crisis in educational organizations, the decision-making process was considered a fundamental aspect (Boin & Lagadec, 2000). In particular, any legitimate and effective decisions made through this process

could address any crisis in the short and long run (Ansell & Boin, 2019). Specifically, the aspects of *sense-making* (collection, analysis, and dissemination of information about the unfolding crisis), *coordinating* (motivating staff to work together and perform their tasks in an effective and legitimate way, based on the planned actions and strategic decisions), *meaning-making* (explaining to all staff and people involved what is going on, and offering information about the steps forward together with training and support), could actually limit the impact of a crisis (Ansell & Boin, 2019).

FredU, took concrete decisions in order to address this particular crisis. In fact, these decisions regarding the new distance learning concept demonstrate the university's immediacy in the pandemic crisis, as well as providing support and a smooth transition from a traditional setting to distance learning for both teaching staff and students. Based at the small-scale study that was conducted in our university, the results indicated the importance of the professional development training series for the teaching staff in order to address the challenges caused by this new distance learning environment. In general, most of the tools and practices that were introduced to the training, as part of the "classroom" management, were used throughout the online teaching and were deemed useful and important (e. g., polling, chat rooms, break out rooms). Also, it is worth mentioning that the coaching and mentoring schemes provided substantial support to all the unexperienced teaching staff and revealed the professional and digital capacity of experienced teaching staff who acted as mentors.

Yet, the results from the aforementioned small-scale study pointed out some further steps that needed to be addressed. In particular, the teaching staff described the need to further enhance their knowledge of using simulations and learning scenarios in their learning process, since they had limited experience and training, as well as limited access to simulator software. Moreover, the teaching staff acknowledged the important aspect of the interactive videos within their online teaching aspect and asked about further training. Finally, the teaching staff acknowledged the need for further training on how to motivate students, as well as how to promote student interaction during the online classes.

In general, it is important to recognize that even in times of uncertainty and crisis, and in particular in a situation where the lives of people are at stake, an interesting and well-prepared teaching and learning process should reduce the anxiety levels and stress of the people involved in the process (Dhawan, 2020). In addition, during times of uncertainty, such as that of the global pandemic, it could enable any organization to be more creative and provide an opportunity to change itself into a better one (Calogero & Yasin, 2011). FredU, demonstrated that through a closed collaboration among the teaching and administrative staff, as well as through an immediate respond to this matter, managed to provide proper support, as well as pedagogical and technical competences to successfully employ emergency remote teaching and learning (Dhawan, 2020). Also, strong communication was established, even through the online meetings. As Castrogiovanni and col-

leagues (2011) mentioned, a clear and effective communication system is a priority for all during times of uncertainty, along with personal relationships that could act as the basis for the creation of an appropriate working environment, and that was the case of FredU. As always, each initiative, decision and action was driven by the directions and guidelines defined by the Cyprus Agency of Quality Assurance and Accreditation in Higher Education (CYQAA) and the directions provided by the government and the Ministry of Health. Overall, FredU's commitment at that time was to ensure that all students followed a well-structured model learning environment that included the use of state-of-the art technologies and pedagogical practices within an online environment.

Concerning the implications that have been raised based on the aforementioned, it is important in each case (in any educational organization or any organization in general) to develop a particular professional development scheme based on the needs in order to enhance the capacities and capabilities of the teaching staff. For instance, in a study at the faculty of a university in Spain, Torres Martin and colleagues (2021) asked students' feedback regarding the pedagogical model adopted in the virtual learning environment during the pandemic crisis. The results revealed that the tutoring functions, tasks and beliefs of the teaching staff in e-learning were not satisfactory (Torres Martin et al., 2021). From that, we can argue that a lack of professional support affected teachers' ability to interact in this new virtual learning environment.

Furthermore, additional technological capacity (use of simulations, interactive videos, etc.) for higher teaching staff is needed together with access to reliable and sufficient digital learning resources in the form of open online courses, learning tools, e-books, e-notes and so on. In addition, it is important to broaden the digital capacity and support of teaching staff through training and seminars by engaging governmental and private stakeholders with expertise in digital competences (e. g., private companies, governmental bodies). Finally, additional research studies on higher teaching staff to assess the acceptance and needs of teaching conventional courses to an online/distance learning environment are needed. Based on these findings, we can have a holistic view of the current situation of the online learning process, not only in the higher education sector, but also in primary and secondary education too.

8 Conclusion

Professional development has been revealed to be an extremely important aspect in further promoting and advancing the processes and procedures in any organization. In order to keep up with the needs and demands of a globalized, rapidly changing, highly demanding interconnected world educators should be provided with those opportunities that help them advance and develop their knowledge, skills and competencies. The fact that FredU managed to address the challenges revealed due to the pandemic, calls for an action plan towards continuous professional development training for the academic as well as the administrative staff. The educational systems are more likely not to return to the conventional mode of delivery as we experienced so far (Chandasiri, 2020; Dubey & Pandey, 2020; El Firdoussi et al., 2020). It seems that distance education and specifically blended learning, open, flexible and personalized learning will dominate the education sector in the upcoming years. Therefore, educators in all educational levels need to realize the educational value, benefits and advantages of open, hybrid and flexible learning environments, as well as that there is a distinction and that there are several differences between emergency remote teaching and distance learning. Consequently, they need to develop those skills that will allow them to appropriately design and develop learning environments aligned to the requirements of the new trends: distance education, blended learning, open, flexible and personalized learning. It is also important to take advantage of the experiences and knowledge gained due to the pandemic in order for instructors to advance their teaching and learning practices by employing distance learning practices into conventional teaching and learning, thus moving towards the development of more hybrid, flexible and open learning environments.

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Appendix

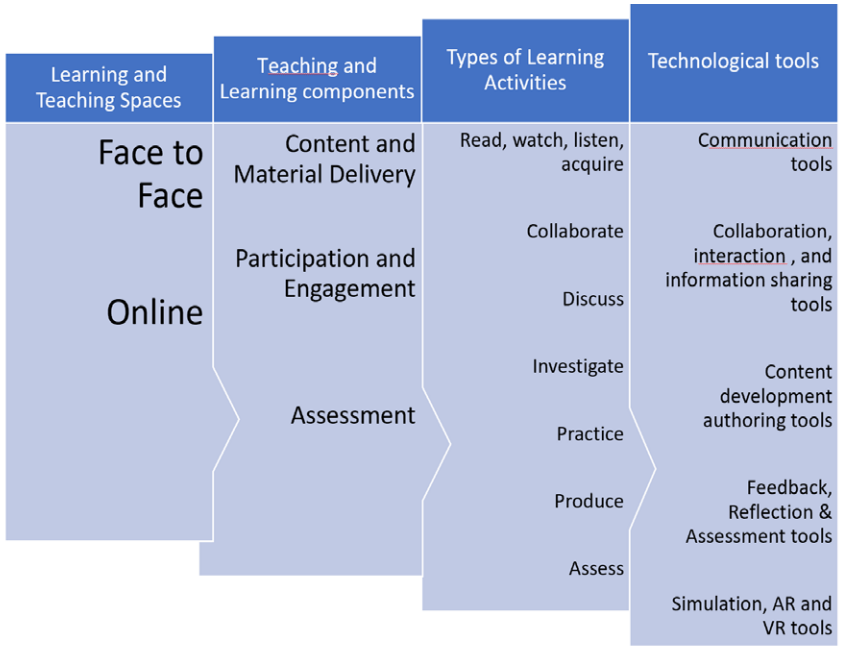

Figure 1: Blended Learning Pedagogical Framework Parameters

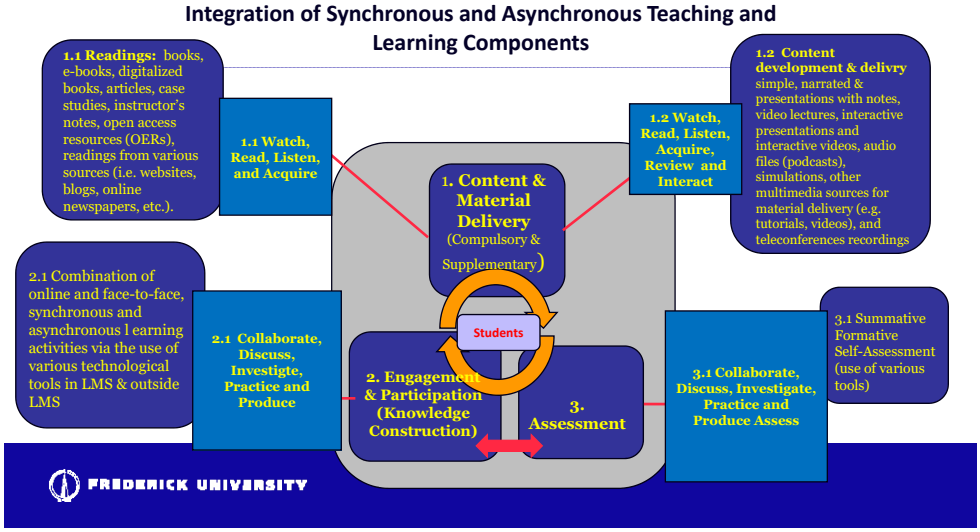

Figure 2: Teaching and Learning Components of Blended Learning Pedagogical Framework

Instructors' Stressors, Stress, and Resources During Remote Teaching in the COVID-19 Pandemic: the Role of Gender and Professional Status

Jannika Haase[1] *& Lysann Zander*[1]

Abstract

With the rapid transition to remote teaching during the pandemic, higher education instructors have been confronted with unprecedented challenges, particularly the management of interpersonal relationships in online formats. To date, little research investigated instructors' work experiences during the pandemic. This paper provides insights into a) aspects that instructors found stressful and aspects they reported as resources, b) instructors' levels of stress and stressors, and c) the extent to which instructors perceived personal and social resources to cope with stress. In two studies, we analyzed the data of a two-wave survey with independent samples of 157 (W1, Spring 2020) and 128 (W2, Fall/Winter 2020/2021) instructors, respectively. In Study 1 (qualitative), we identified specific stressors and resources reported by instructors finding that they most frequently mentioned interpersonal aspects as stressors *and* resources. In Study 2 (quantitative) we compared stress levels, stressors, and available resources at both waves considering instructors' gender and professional status. Unexpectedly, we found no gender differences in experienced stress levels. Yet, there were significant differences in perceived personal and social resources. At both times, female compared to male instructors reported a more positive social teaching self-concept and higher institutional support. At W1 and W2, mid-level staff perceived higher levels of stress compared to lecturers. After 9 months in the pandemic, mid-level staff reported higher online self-efficacy compared to professors. We discuss our findings in terms of their implications as the global digital transformation of teaching in higher education continues to unfold.

Keywords

higher education instructors, stressors, personal and social resources, remote teaching, COVID-19 pandemic

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1 Introduction

With the outbreak of the COVID-19 pandemic almost all business sectors and public services had to react to restrictions on social contact imposed by governments. To protect staff and students from the virus, higher education institutions quickly postponed or cancelled all campus related activities, including in-class teaching or (particularly) lab-based research. Instructors in higher education were confronted with unprecedented and uncommon challenges, such as the transition to online-tools on short-notice, the use of uncommon digital teaching tools and the need to establish relationships with students in digital learning environments. All this while instructors faced multiple challenges in private and family, e. g., home-schooling and taking care of children and relatives during working hours. These new occupational challenges can be considered as stressors, i. e., factors that are perceived as *too* demanding or even threatening – which may or may not exceed the person's resources. Job demands-resources (JD-R) theory (Bakker & Demerouti, 2017; Demerouti et al., 2001) presumes that individual stress reactions to challenges do not only depend on the quality of the event itself (e. g., intensity), but also on the available personal resources (e. g., self-efficacy) and (social) job resources (e. g., support from colleagues), potentially buffering challenging and highly stressful experiences. To date, little research investigated the aspects higher education instructors found particularly stressful or perceived as resources (for challenges see Zarei & Mohammadi, 2021), the extent to which instructors perceived stress, and which resources they could fall back on to cope with challenges considering the role of gender and professional status. The present study addresses this gap and examines instructors' work experiences and perspectives in the first (W1, Spring 2020) and the second online semester (W2, Fall/Winter 2020/2021) of the pandemic with independent samples at each wave. Using a mixed-method approach, we first present precise descriptions of the stressors and resources perceived by instructors (qualitative, Study 1) and then describe stress levels, stressors, and resources at two times separated by different groups of instructors considering gender and professional status (quantitative, Study 2).

2 Instructors' Perceived Stressors, Stress, and Resources During Remote Teaching: the Role of Gender and Professional Status

2.1. Defining Stress

A common feature of established stress theories is that stress occurs as a combination of external stimuli (sources of stress or stressors) and individual responses (outcome or manifestation of stress or strain; Lazarus, 1966). Within the transactional model of stress and coping, individuals appraise challenges and events as demanding or threatening in relation to their individual resources to cope with the problem (Lazarus, 1966; Lazarus & Cohen, 1977). In this process, individuals first appraise the stressor and then appraise

their own ability to cope with it (Lazarus & Folkman, 1984). Negative stressors are expected to occur when a situation is perceived as *too* demanding or threatening for prolonged time periods, i. e., when people believe that they lack the resources needed to cope with the situation. Similarly, person-environment fit theories (P-E Fit) suggest that stress arises from a misfit between a person's abilities or resources and environmental demands. While there can be a misfit between objective demands in the environment and objective abilities it is the fit of subjectively perceived demands and fit that predicts perceived strains and experiences of stress (Edwards et al., 1998). Thus, there is consensus across models that stress is the result of a highly subjective process: Given similar stressors, some employees can perceive high levels of stress while others do not. In the present research we focused on describing the subjective stressors and levels of stress that instructors reported during the two first semesters during the pandemic.

2.2 Environmental Stressors and Stress Experiences During the Pandemic

In higher education, the rapid transition to remote teaching and online research-related activities have resulted in unexpected occupational challenges for academic staff. Current research on stress experiences in academic settings has focused primarily on students' (e. g., Cao et al., 2020; Planchuelo-Gómez et al., 2020) or school teachers' (e. g., Košir et al., 2020) stress levels during the COVID-19 pandemic. To date, only little research has investigated higher education instructors' perceived stressors and stress experiences. The few studies on academic staff's experiences during the pandemic found that academic employees reported difficulties to combine work with family, an increased workload, technical challenges, little time for research and difficulties to communicate with and meet the needs of students including those with mental health issues (see Chang & Fang, 2020; Navarro-Espinosa et al., 2021; Watermeyer et al., 2020; Zarei & Mohammadi, 2021), all signaling a mismatch between objective and subjectively perceived environmental demands and objective and subjectively perceived abilities and resources.

Rosen et al. (2010) developed a taxonomy of *work stressors* based on Jex (1998) and the National Institute for Occupational Safety and Health (NIOSH, 1999). The taxonomy includes the dimensions 1) work role stressors, 2) workload, 3) situational constraints, 4) job control, 5) social characteristics of the workplace, 6) career-related norms, and 7) job conditions. In the academic context during the pandemic, *work role stressors* could include role ambiguity, role conflict, and role overload, e. g., acting as an instructor, researcher and parent simultaneously. *Workload* in the academic context could include both objective quantitative information such as amount of work to be completed (e. g., the number of lectures that need to be transformed into digital learning formats while adapting to the challenges of continuing research projects under pandemic conditions) and subjective qualitative perceptions about the workload (e. g., difficulty of tasks, again depending on individual abilities and perceived standards). *Situational constraints* could consist of organizational factors such as bureaucracy, equipment and fittings or the degree of insti-

tutional digitalization (e. g., the extent to which the institution provides or has prepared the opportunity to switch to digital forms and procedures). *Job control* in the university could include the extent to which instructors have had the opportunity to make autonomous decisions or to participate in the decision-making processes. *Social characteristics* in the academic settings could include interpersonal conflicts, the lack of cooperation in the exchange of material and support among colleagues but also relationships to students. *Career-related norms* in the university setting could refer to levels of job insecurity (which often differ depending on the professional status), advancement opportunities, and the perceived interference of academic work with nonwork domains (e. g., family), the latter of which includes formalized or unspoken institutional policies in supporting compatibility of work and family life. *Job conditions* in the academic settings during the pandemic could include physical aspects (e. g., shared working space at home), the nature of job tasks (e. g., primarily teaching or research), or the time structure (e. g., long working hours, break schedules, necessity of working unpaid overtime).

In the present study, the seven dimensions were applied in the qualitative analysis to explore stressors that instructors experienced in the first online semester. A growing body of research has been investigating work-specific stressors for academic staff in higher education suggesting the usefulness of the model by categorizing instructors' perceived stressors using the model by Rosen et al. (2010). For example, role overload and variability in different demands through the academic year, long working hours (on and off campus), little time available for research, paperwork, administration, and feelings of being underappreciated have been reported as work-specific stressors for academics (see Brown et al., 1986; Curran & Prottas, 2017; Johnson et al., 2019; Kinman, 2001; Lease, 1999) and can be assigned to the categories postulated by Rosen et al. (2010). Considering the particular characteristics of remote teaching and working we identified specific stressors perceived by our respondents in the first online semester in the qualitative Study 1.

2.3. The Role of Gender and Professional Status for Perceived Stressors and Stress Experiences

Only a few pre-pandemic studies have examined university employees' work stressors and stress and reported their results considering gender or professional status. In the studies reporting these characteristics, there are some inconsistent findings regarding higher education instructors' experience of stressors and stress by gender. While some studies show no gender differences in stress levels of higher education staff (e. g., Abouserie, 1996), other studies report higher levels of stress among female compared to male academics (Archibong et al., 2010; Brown et al., 1986; McInnis, 1999; Richard & Krieshok, 1989; Thorsen, 1996) which are typical findings of studies on stress experiences outside the academic setting (e. g., Kneavel, 2021; Matud, 2004). There are various factors related to female instructors' higher levels of stress, such as academia being a male dominated occupation still, the lack of female role models, or stressors such as difficulties to balance professional

and child care duties, the latter of which still have been found to more frequently affect women (e. g., Doyle & Hind, 1998), particularly during the pandemic (Krukowski et al., 2021; Langin, 2021; Morgan et al., 2021; Yildirim & Eslen-Ziya, 2021). Indeed, current research investigating the impacts of the pandemic on female and male academics found notable career-related disadvantages for women. For example, female academics' productivity decreased by 13.2% relative to their male counterparts (Cui et al., 2021). Another study investigating manuscript submissions and the ability to meet deadlines found that regarding these career aspects male academics were less affected by the pandemic circumstances than women (Staniscuaski et al., 2021). Indirectly, these findings suggest higher experiences of stress among female instructors.

In terms of professional status, some pre-pandemic studies found that lecturers have the highest stress levels, followed by research assistants and tutors. For example, in a mixed-method study published in 1996, Abouserie reported the lowest stress levels among professors and the highest stress levels among lecturers. Yet, it can be expected that there are considerable variations across academic settings and countries.

Overall, there is a scarcity of research exploring the role of gender and professional status on the perception of stressors and stress during the pandemic. We therefore systematically examined stress levels as well as levels of different stressors (i. e., technical challenges, teaching effort, little time for research) during the pandemic in the quantitative analysis considering gender and professional status (Study 2).

2.4 Psychological Personal and Social Resources

As noted, stress will typically be the result of a highly individualized process of weighing environmental demands or stressors and a person's abilities to meet these demands. Yet, previous research has found that there are personal and social resources that are generally associated with lower levels of stress.

Challenging job situations like the COVID-19 pandemic are not necessarily perceived as negative workplace stressors (Faragher et al., 2004). Stress reactions to challenges can vary depending on subjective personal resources (i. e., self-efficacy) and (social) job resources (i. e., colleague and supervisor support; see Bakker & Demerouti, 2017; Demerouti et al., 2001).

Personal resources. In the present chapter we apply the concept of *psychological capital* (Luthans & Youssef, 2004) as an overarching framework for personal resources. It distinguishes four subdimensions self-efficacy, hope, resilience, and optimism. *Self-efficacy* is defined as people's confidence in their ability to mobilize the motivation, cognitive resources, and courses of action necessary to execute a specific course of action within a given context (Bandura, 1977). *Hope* is defined as a motivational state that is based on the interaction between goals, agency, and pathways. Hopeful people are driven to achieve

their goals by their sense of agency, which provides them with a determination and willpower to invest the energy necessary to accomplish their goals (Snyder, 1994). *Resilience* in people results when they show the capacity to bounce back from adversity, uncertainty and failure. Resilient people have been found to make use of individual and environmental protective mechanisms enhancing the assets and/or reducing risk factors within a situation (e. g., Masten, 2001). *Optimist* people respond to adversity by interpreting adverse events in a positive way, often attributing positive events to internal and permanent causes and negative events to external and situation-specific ones (Seligman, 1998). Individuals with such high psychological capital have been found to engage in behaviors that benefit the organization and are less likely to think about quitting their job (Avey et al., 2010).

Considering the specific situation of instructors during the first two semesters of remote teaching in the pandemic, we applied the four subdimensions of psychological capital (Luthans & Youssef, 2004) to explore personal resources in the qualitative analysis (Study 1). Additionally, we considered instructors' academic online self-efficacy, social teaching self-concept, and teaching joy as personal resources in the quantitative analysis (Study 2). So far, there are some inconsistent findings regarding higher education instructors' personal resources such as self-efficacy beliefs by gender and professional status depending on the domain under consideration. Research investigating self-efficacy beliefs among university staff found that male instructors report significantly higher values than women (e. g., Landino & Owen, 1988; Vasil, 1992). While some studies found significant gender differences regarding computer self-efficacy with female faculty reporting lower values (e. g., Kagima & Hausafus, 2000), other studies showed no gender differences in self-efficacy beliefs for internet usage (cf. Gültekin et al., 2020).

Social resources. A large body of research shows that social support is a valuable means to counteract stress. It has been found to be generally relevant for physiological and psychological health outcomes (e. g., Taylor, 2007, see also Taylor et al., 2010), and – in organizational contexts – to lower overall stress, perceived stressors and to increase job satisfaction (for reviews see Taylor, 2011; Viswesvaran et al., 1999; for school teachers see Košir et al., 2020, for relationships between work and family see Kossek et al., 2011). Whereas definitions vary widely, social support can be distinguished into four types of supportive behaviors, namely *emotional support* (i. e., providing empathy, caring, love, trust, esteem, concern, and listening), *instrumental support* (i. e., providing aid in kind, money, labor, time, or any direct help), *informational support* (i. e., providing advice, suggestions, directives, and information for use in coping with personal and environmental problems), and *appraisal support* (i. e., providing affirmation, feedback, social comparison, and self-evaluation; see House, 1981). Research found that, overall, academics in higher education were satisfied with the level of social support they obtained from their colleagues (e. g., Daniels & Guppy, 1994). Recent research in the school setting has found that teachers reported different social resources as helpful during the pandemic, particularly the support of their

supervisor, their colleagues, and their family (e. g., Hatzichristou et al., 2021; Košir et al., 2020).

To explore the importance of different social resources during the pandemic, we categorized instructors' perceived resources according to the four types of supportive behaviors (House, 1981) in the qualitative analysis (Study 1). In the quantitative analysis (Study 2) social resources were considered in the form of a cooperative and supportive climate among colleagues and institutional support.

In general, women tend to have stronger social goal orientations than men (Eagly & Crowley, 1986; see also Taniguchi, 2006; Teoh et al., 2015) and have been found to be more effective in eliciting social support (Sarason et al., 1985; Shumaker & Hill, 1991; for the likelihood of providing support depending on challenges, see Neff & Karney, 2005; for an overview, see Barbee et al., 1993). Because to our knowledge there is, at the moment, no research investigating the extent of social support perceived by male and female higher education instructors nor differences depending on professional status (for an exception of a study on academic staff in South Africa that reveals no significant gender differences, see Rothmann & Jordaan, 2006) we systematically explored differences in the present study.

2.5 The Present Research

In our study we aimed to provide detailed insights into instructors' stress experiences during the first two semesters in the pandemic where all teaching was done remote. In a qualitative (Study 1) and quantitative study (Study 2), we investigated a) stressors that instructors encountered, their stress experiences, and (b) personal and social resources they could draw on. While in our qualitative study we identified instructors' stressors and resources in the first online semester of the pandemic (W1, Spring 2020), in our quantitative study we made use of two cross-sectional data sets of the first and second online semester of the pandemic (W1, Spring 2020 and W2, Fall/Winter 2020/21).

Our research was guided by two goals: 1) to describe the stressors, personal, and social resources that university instructors perceived during the onset of the pandemic (W1) and 2) to quantify differences in perceived stress, stressors, and resources between an earlier stage of the pandemic (W1) and half a year later (W2) considering instructors' gender and professional status.

3 Material and Methods

3.1 Data Analytic Strategy

Qualitative content analysis (Study 1). To identify and explore stressors and resources we conducted a theory-based qualitative content analysis in the form of a frequency analysis using the program MAXQDA (VERBI Software, 2021; for frequency analyses see Mayring, 2015, p. 13ff.). To identify stressors during the pandemic we used seven of the eight-category taxonomy of work stressors developed by Rosen et al. (2010) and coded the reported aspects into these categories. To examine personal resources, we adopted the theoretical framework of psychological capital with the four subdimensions hope, self-efficacy, resilience, and optimism (Luthans & Youssef, 2004) and allocated the statements to these definitions. To determine social resources, we focused on aspects related to social support based on the four supportive behaviors according to House (1981). We deduced a category system based on these concepts while not excluding the possibility to inductively introducing new categories during the analysis, as proposed by Mayring (2015). In particular, we applied a deductive use of categories, operationalizing key categories based on definitions identified in the literature. We further specified definitions and introduced categories to the coding system (see Mayring, 2015, p. 97ff.). For example, during the coding process we added the category *digital teaching and working* including additional relieving factors for instructors during the pandemic. In the next step, we structured the data based on the category system (Kuckartz, 2016; Mayring, 2015, p. 103). During the analysis, we followed four steps (see Mayring, 2015): (1) As recommended, to guarantee objectivity and reliability we developed a coding manual for coders with an introduction and a list of categories combined with definitions, examples and respective coding rules. (2) We examined the data and sorted the answers in relation to their relevance to our research questions. (3) Using sense units as basic coding units, we then coded the data filtering out certain text components. Thus, we make statements about the relative weight of these text components per frequency. (4) We paraphrased the coded sections, structured and summarized each category. To analyze our data regarding stressors as well as personal and social resources, we examined each paraphrase with regard to the definitions mentioned above (see Kuckartz, 2016; Mayring, 2015). At the beginning of the analysis, two coders coded 20% of the answers to our two open questions, respectively (see Wirtz & Caspar, 2002). In case of disagreement, clarification by discussion followed before conducting the whole analysis. We conducted the test of intercoder reliability which produced a coefficient of $rH = .80$. Thus, overall, the two independent coders evaluated the data in a similar way and reached the same conclusions (see Bos, 1989). Because no aspects were mentioned with regard to personal resources in terms of psychological capital in the open responses, the original dimensions and coding rules of psychological capital are not depicted in the results section, but in an additional table (see Table 2, Supplement). Regarding resources and relieving factors, we have inductively extracted further catego-

ries from the material and highlighted them with "additional" in each case (see Table 2; Table 1, Supplement).

Quantitative analyses (Study 2). Data analyses were run using SPSS (version 26.0; IBM Corp., 2019). To assess instructors' stress levels, as well as perceived stressors and resources in the first and second semester of the pandemic, at first, descriptive statistics were calculated, separated by gender and professional status (see Table 3 and 4, Supplement). In order to assess potential differences between the groups, one-way between-subjects ANOVA were conducted to compare the means of each variable of interest, separated by gender (0 = female, 1 = male) and professional status (0 = mid-level staff, 1 = professors, 2 = lecturers), for each wave, respectively. To assess potential significant mean differences between each of the professional status groups post hoc comparisons using the Tukey HSD test and the Games-Howell test were computed.

3.2 Participants

157 (W1, Spring 2020) and 128 (W2, Fall/Winter 2020/21) instructors at a large German university (about 30.000 enrolled students) participated in this multi-wave survey with independent samples at each wave. At W1, 81 females, 59 males and 4 diverse instructors (n = 13 not stated) participated. At W2 78 females, 39 males and 2 diverse instructors (n = 9 not stated) participated. 89 instructors of academic mid-level staff, 38 professors and 29 associate lecturers (n = 1 not stated) participated at W1. 77 instructors of academic mid-level staff, 25 professors and 23 associate lecturers (n = 3 not stated) responded to our survey at W2. Instructors' average age was 41.54 years (SD = 10.93) at W1 and 39.79 years at W2 (SD = 11.83). There was a positive correlation between age and professional status [$r_{W1}(138) = .518, p = .001$]; [$r_{W2}(113) = .597, p = .001$], showing that, on average, lecturers and professors were older than mid-level staff.

3.3 Procedure

Questionnaires were distributed via email with an included link to the survey program Unipark (QuestBack Ltd., 2020); participants completed the questionnaire online. Instructors were asked to describe their experiences in teaching-related and research-related activities at the end of the semester. Before starting the survey, instructors read a statement informing them about the voluntary character of the study and the anonymity of their data, and were assured that the research would be carried out following the *Guidelines for Safeguarding Good Research Practice* by the German Research Foundation (German Research Foundation (DFG), 2019).

3.4 Measures

To identify potential stressors and resources in the qualitative Study 1, we included two self-developed open-ended questions in the survey. For the quantitative Study 2, several constructs were derived from existing literature identifying prominent stressors and resources, and measuring stress. Other measures were self-developed building on a study by Watermeyer et al. (2020).

3.4.1 Stressors and stress

Open question regarding afflicting factors (Qualitative Study 1). To identify potential stressors, at W1, we introduced an open question regarding afflicting factors during the first online semester. Respondents were asked the following open-ended question: "Which factors in the past online semester did you experience as more afflicting compared to semesters in presence?".

Stressors: Technical challenges. Instructors' perceived technical challenges were assessed using a self-developed scale consisting of two items (e. g., "In the last semester, I was frequently occupied with technical difficulties.") building on a study by Watermeyer et al. (2020). Both items used a 5-point Likert response scale (1 = strongly disagree, 5 = strongly agree) and were found to be internally consistent (α = .995 at W1; α = .876 at W2).

Stressors: Teaching effort. To assess instructors' perceived effort in remote teaching compared to the previous semesters (W1)/to the first online semester (W2) we used four items in the form of continuous visual analogue scales (e. g., "The amount of work required to prepare my courses in the online semester was ..."). At W1, respondents rated their teaching effort with remote teaching-related activities with a slider where a value of 0 implied markedly lower effort in online teaching, a value of 50 the same effort as in previous semesters and 100 markedly higher effort than in presence teaching. At W2, participants rated their teaching effort with remote teaching-related activities with a slider where 0 implied markedly lower effort than in the first online semester, 50 just as in the first online semester and 100 markedly higher effort than in the first online semester. The four items formed an acceptable scale (α = .594 at W1; α = .694 at W2).

Stressors: Time for research. To assess time for research activities, we developed a measure to assess the amount of time available for conducting research compared to the previous semesters (W1)/to the first online semester (W2). The scale consisted of two items (e. g., "The available amount of time for research-related activities in the online semester was ..."). At W1, instructors reported their time for research with a slider where 0 implied markedly less time for research in the online semester, 50 the same time as in previous semesters and 100 markedly more time for research activities than in presence semesters. At W2, instructors reported their time for research with a slider where 0 implied less time for research than in the first online semester, 50 the same time as in the first online semes-

ter and 100 markedly more time for research than in the first online semester. The 2-item scale was found to be internally consistent (α = .814 at W1; α = .860 at W2).

Stress. The extent to which situations in instructors' life during the pandemic were perceived as stressful was assessed using a well-established measure by Cohen et al. (1983) consisting of five items (e. g., "In the last month, how often have you felt nervous and 'stressed'"?). Instructors indicated their level of stress on a 5-point Likert scale (1 = never, 5 = very often), with higher values reflecting higher levels of stress. All five items formed an internally consistent scale (α = .818 at W1; α = .873 at W2).

3.4.2 Personal and social resources, additional relieving factors

Open question regarding relieving factors (Qualitative Study 1). An open question was designed to identify personal and social resources at W1. It read "Which factors in the past online semester did you experience as relieving compared to semesters in presence?".

Personal resources: Academic online self-efficacy. Instructors' beliefs in their own ability to teach and motivate students online was assessed using a measure by Shen et al. (2013), adapted for higher education instructors and consisting of three items (e. g., "I think I can teach students complex concepts online."; "I can motivate students to successfully complete required online tasks to achieve competence goals."). All items had the format of a 5-point Likert response scale (1 = strongly disagree, 5 = strongly agree) and were found to form an internally consistent scale (α = .668 at W1; α = .654 at W2).

Personal resources: Social teaching self-concept. To create a measure tapping into instructors' perceived ability to manage interpersonal aspects in teaching, such as self-perceived accessibility, kindness, and approachability for students, but also into their own ability of considering students' perspectives and individual competences in guiding them to achieve good learning outcomes we adapted a measure by Adams and Christenson (2000), consisting of 12 items, for higher education instructors. Example items were: "I can guide my students on how to work constructively with their fellow students."; "I am easy to reach when my students have difficulties or questions."; "I am friendly and approachable."; "I am receptive to my students' input and suggestions."; "I can act in the interest of students' learning success."; (for the overall scale see Table 5 in the supplement). Instructors indicated their answers on a 5-point Likert scale (1 = strongly disagree, 5 = strongly agree), with greater values reflecting a more positive social teaching self-concept. The scale was found to be internally consistent (α = .897 at W1; α = .870 at W2).

Personal resources: Teaching joy. To assess instructors' teaching joy compared to the previous semesters (W1)/to the first online semester (W2) we used a self-developed measure consisting of three items (e. g., "My overall joy to conduct teaching during the online semester was ..."). At W1, respondents rated their teaching joy with a slider where 0 implied markedly lower joy in online teaching, 50 just as in previous semesters and 100 markedly

greater joy than in presence teaching. At W2, participants rated their joy of teaching with a slider where 0 implied markedly lower joy in online teaching than in the first online semester, 50 just as in the first online semester and 100 markedly greater joy than in the first online semester. The three items formed an internally consistent scale (α = .821 at W1; α = .841 at W2).

Social resources: Cooperative climate among colleagues. We used an adapted measure by Eder (1998) to assess instructors' perceived supportive climate among colleagues consisting of four items (e. g., "When someone in our institute needed help in dealing with technology and media, other colleagues were glad to help her/him."). All items used a 5-point Likert response scale (1 = strongly disagree, 5 = strongly agree) and the scale was found to be internally consistent (α = .797 at W1; α = .797 at W2).

Social resources: Institutional support. Building on the research by Watermeyer et al. (2020) we developed a scale to identify the extent to which instructors perceived their university as supportive regarding their teaching-related and research-related issues during the pandemic. The scale consisted of three items (e. g., "In the last semester, I felt very well supported by the university in planning remote teaching (e. g., through further training offers)."). All items had the form of 5-point Likert response scales (1 = strongly disagree, 5 = strongly agree); the overall scale was found to be internally consistent (α = .790 at W1; α = .811 at W2).

Socio-demographic data. At the very end of the questionnaire, participants were asked to provide information on their gender, age and professional status.

4 Results

4.1 Study 1: Perceived Stressors and Resources During the First Online Semester of the Pandemic

Table 1 and 2 show the categories with their respective definitions, examples and coding rules, as well as the results in terms of the number of mentions and proportions within the total number of statements. As shown in Table 1, the most frequent utterances of academics' occupational stressors were those related to social characteristics of the workplace in the first semester of the pandemic (137 nominations). In particular, instructors highlighted the *lack of (face-to-face) communication with students and colleagues*. For example, someone reported: *There was a permanent lack of communication channels such as gestures, facial expressions, proxemics, and thus, no feedback was possible* (even from students to instructors). At the same time instructors reported to feel like *fighting against windmills when trying to involve passive students during seminars*. Instructors also reported to be stressed by students who did not turn on their cameras because it felt like *facing a black wall*. Instructors reported that this behavior by students (*not turning on microphone or*

camera) was associated with high levels of uncertainty regarding content transfer: *I was very insecure whether certain aspects of the text-based self-study have been understood*. Some instructors also report their *lack of ability to become aware of students' problems and to meet their needs in online learning environments*. The second highest number of mentions were stressors related to increased workload (75 nominations). Particularly burdening were *extremely much mail traffic* and the *high effort required for planning and conducting teaching*. Interestingly, regarding job control, three respondents reported *suddenly having too much autonomy* while *losing control* resulting in difficulties to find the *way to their own online format*. 32 participants did not answer to the open question and 2 wrote *no factors*.

Interestingly, as in stressors, the most frequent mentions of resources and relieving factors were related to contact and interaction with students (18 nominations). In addition to the statements listed in Table 2, one instructor reported that the *fast and immediate communication with the students during the seminar sessions via the chat function was relieving*. Another instructor stated that the new form of communication allowed students asking *even little questions that might not have been asked in a face-to-face seminar*, instructors could *refer to and guide students in much greater detail*, had *more options to provide feedback to quiet and introverted students* and that fewer students got *lost*. Three other instructors reported students' commitment as relieving, that students *were motivated*, *well-organized,* and *made the best out of it*. Another instructor stated that there was a *surprisingly high quality of prepared contributions by students*. Interestingly, there were only a few nominations related to the four dimensions of social support (House, 1981; 6 nominations in total, see Table 2). As shown in the supplementary material (Table 1), the most frequent mentions regarding relieving factors were related to three additional new categories, namely digital teaching and working, home office (and related time savings), and flexibility. For many academics, digital teaching and working (50 nominations in total) included advantages, *particularly new digital tools which made the work more efficient*. Regarding home office (35 nominations), academics perceived working at home without commuting as relieving given this allowed savings time for work. One respondent even expressed the wish to *continue home office*, stating that in the long term, *more opportunities should be created for this after the pandemic*. Some respondents appreciated the increased flexibility (18 nominations) and that they were able to manage their time freely (and in five cases very effectively). A relatively high number of respondents answered *nothing* (n = 23) or did not answer the question (n = 42).

4.2 Study 2: Levels of Stress, Perceived Stressors and Resources Depending on Gender, and Professional Status

The descriptive statistics for all variables at W1 and at W2 can be found in Table 3 and 4 in the supplement. Levels of stress, stressors and resources by gender, and professional status are shown in Figure 1, 2, 3, 4 and 5.

4.2.1 Levels of Stress and Stressors by Gender, and Professional Status

Stress and stressors by gender. There was no significant difference in stress levels between female and male instructors, neither at W1 nor at W2. Overall, we found no significant differences in stressors between female and male instructors at both times.

Stress and stressors by professional status. A one-way between-subjects ANOVA at W1 and at W2 showed significant differences in instructors' stress levels depending on their professional status [$F_{W1}(2, 150) = 3.25$, $p = .041$, partial $\eta^2 = .042$]; [$F_{W2}(2, 117) = 3.61$, $p = .030$, partial $\eta^2 = .058$]. Both at W1 and at W2, post hoc comparisons using the Tukey HSD test indicated that mid-level staff's levels of stress ($M_{W1} = 3.18$, $SD = 0.82$; $M_{W2} = 3.26$, $SD = 0.80$) were significantly higher than lecturers' levels of stress ($M_{W1} = 2.76$, $SD = 0.73$; $M_{W2} = 2.72$, $SD = 0.90$; see Figure 1).

For teaching effort, Levene's Test for Equality of Variances identified unequal variances between the professional status groups at W2. We thus conducted a Welch's ANOVA and found a significant difference in instructors' teaching effort depending on their professional status [$F_{W2}(2, 48.43) = 5.39$, $p = .008$, $\omega^2 = .064$]. Post hoc comparisons using the Games-Howell test indicated that professors reported significantly higher teaching effort ($M = 66.53$, $SD = 14.98$) than lecturers ($M = 54.21$, $SD = 8.86$; see Figure 2).

4.2.2 Levels of Personal and Social Resources by Gender, and Professional Status

Personal and social resources by gender. A one-way between-subjects ANOVA at W1 and at W2 showed significant differences in levels of instructors' social teaching self-concept depending on their gender [$F_{W1}(1, 134) = 10.23$, $p = .002$, partial $\eta^2 = .071$]; [$F_{W2}(1, 113) = 6.13$, $p = .015$, partial $\eta^2 = .051$; see Figure 4] with female instructors reporting more positive social teaching self-concepts than male instructors. We also found significant gender differences in perceived institutional support [$F_{W1}(1, 137) = 3.90$, $p = .050$, partial $\eta^2 = .028$]; [$F_{W2}(1, 113) = 5.34$, $p = .023$, partial $\eta^2 = .045$; see Figure 5] with women reporting higher institutional support than men.

Personal and social resources by professional status. At W2, a one-way between-subjects ANOVA showed significant differences in instructors' levels of academic online self-efficacy depending on their professional status [$F_{W2}(2, 120) = 5.57$, $p = .005$, partial $\eta^2 = .085$]. Post hoc comparisons using Tukey's HSD test indicated higher levels of academic online self-efficacy for mid-level staff ($M = 4.12$, $SD = 0.54$) than for professors ($M =$

3.68, *SD* = 0.67; see Figure 3). Also, at W2, a one-way between-subjects ANOVA showed significant differences in instructors' levels of institutional support [$F_{W2}(2, 117) = 4.80$, $p = .010$, partial $\eta^2 = .076$]. Post hoc comparisons using the Tukey HSD test indicated that professors perceived lower levels of institutional support (*M* = 2.59, *SD* = 1.09) than mid-level staff (*M* = 3.04, *SD* = 0.87) and lecturers (*M* = 3.35, *SD* = 0.92; see Figure 4 and 5).

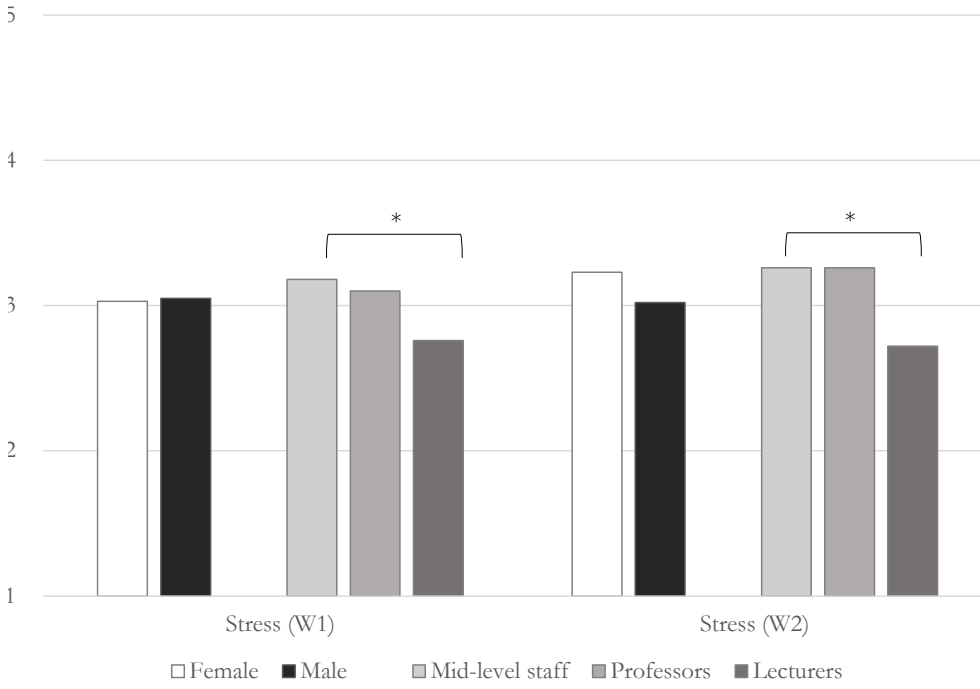

Figure 1: Levels of stress by gender, and professional status at W1 and W2
Note: Gender: 0 = female, 1 = male; Professional status: 0 = mid-level staff, 1 = professors, 2 = lecturers. Gender: W1: 0 = 80, 1 = 59; W2: 0 = 77, 1 = 38; Professional status: W1: 0 = 88, 1 = 36, 2 = 29; W2: 0 = 76, 1 = 23, 2 = 21. *$p \leq 0.05$. **$p \leq 0.01$. ***$p \leq 0.001$.

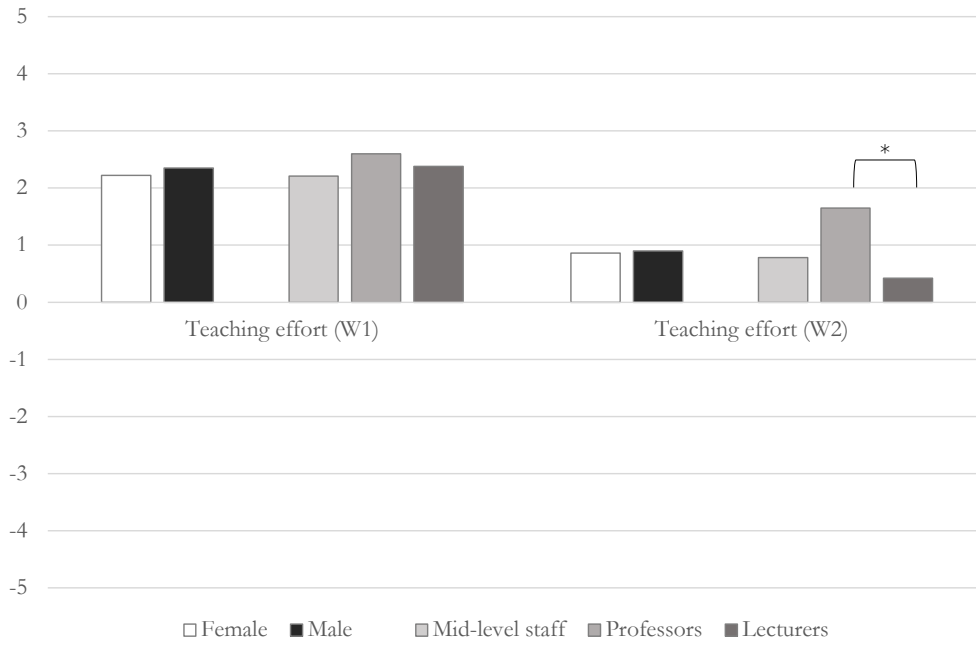

Figure 2: Stressors: Levels of teaching effort by gender, and professional status at W1 and W2
Note: Gender: 0 = female, 1 = male; Professional status: 0 = mid-level staff, 1 = professors, 2 = lecturers. Gender: W1: 0 = 80, 1 = 57; W2: 0 = 70, 1 = 36; Professional status: W1: 0 = 87, 1 = 36, 2 = 28; W2: 0 = 69, 1 = 23, 2 = 19. $^{*}p \leq 0.05$. $^{**}p \leq 0.01$. $^{***}p \leq 0.001$.
The value 50 represents the middle of the continuous visual analogue scale and thus the same effort in online teaching as in previous semesters in presence (W1) or as in the first online semester (W2). To ensure clarity, the value 50 was subtracted from each of the indicated values (original scale: values 0–100) and then divided by 10.

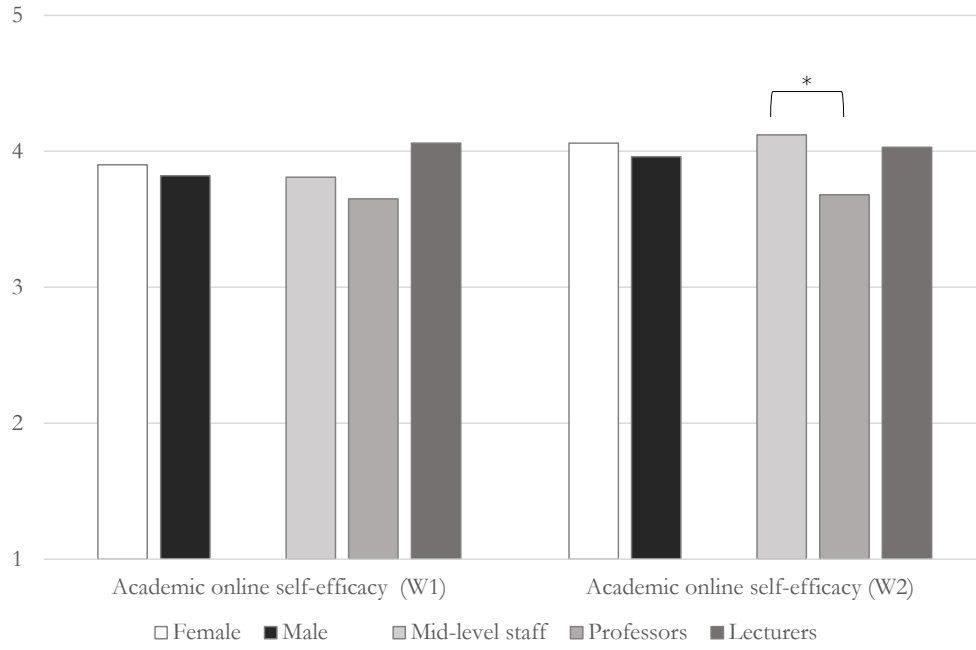

Figure 3: Personal resources: Levels of academic online self-efficacy by gender, and professional status at W1 and W2

Note: Gender: 0 = female, 1 = male; Professional status: 0 = mid-level staff, 1 = professors, 2 = lecturers. Gender: W1: 0 = 79, 1 = 58; W2: 0 = 78, 1 = 38; Professional status: W1: 0 = 88, 1 = 36, 2 = 28; W2: 0 = 77, 1 = 24, 2 = 22. $^{*}p \leq 0.05$. $^{**}p \leq 0.01$. $^{***}p \leq 0.001$.

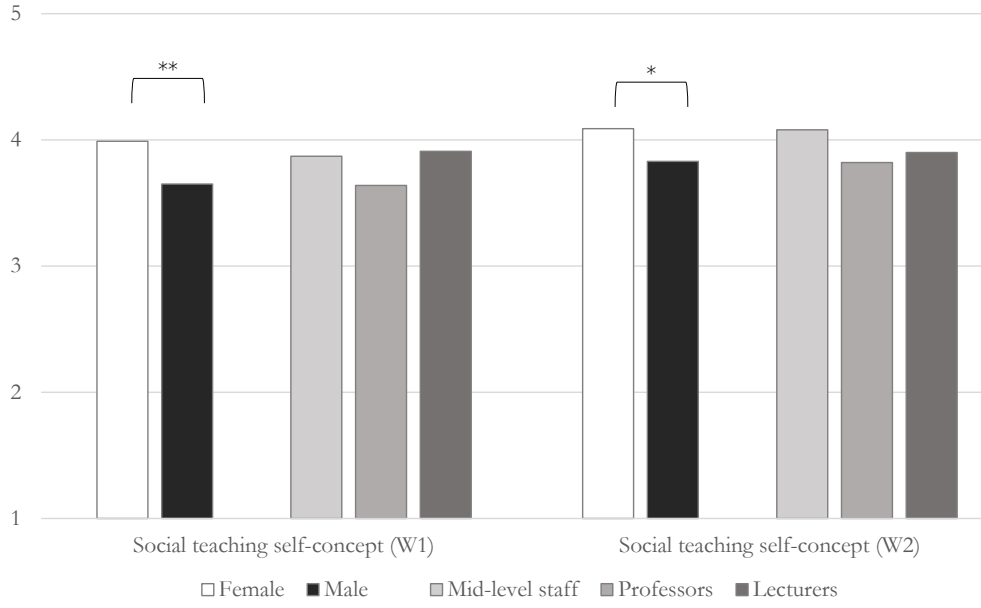

Figure 4: Personal resources: Levels of social teaching self-concept by gender, and professional status at W1 and W2
Note: Gender: 0 = female, 1 = male; Professional status: 0 = mid-level staff, 1 = professors, 2 = lecturers. Gender: W1: 0 = 79, 1 = 57; W2: 0 = 77, 1 = 38; Professional status: W1: 0 = 87, 1 = 35, 2 = 28; W2: 0 = 76, 1 = 23, 2 = 21. $^{*}p \leq 0.05$. $^{**}p \leq 0.01$. $^{***}p \leq 0.001$.

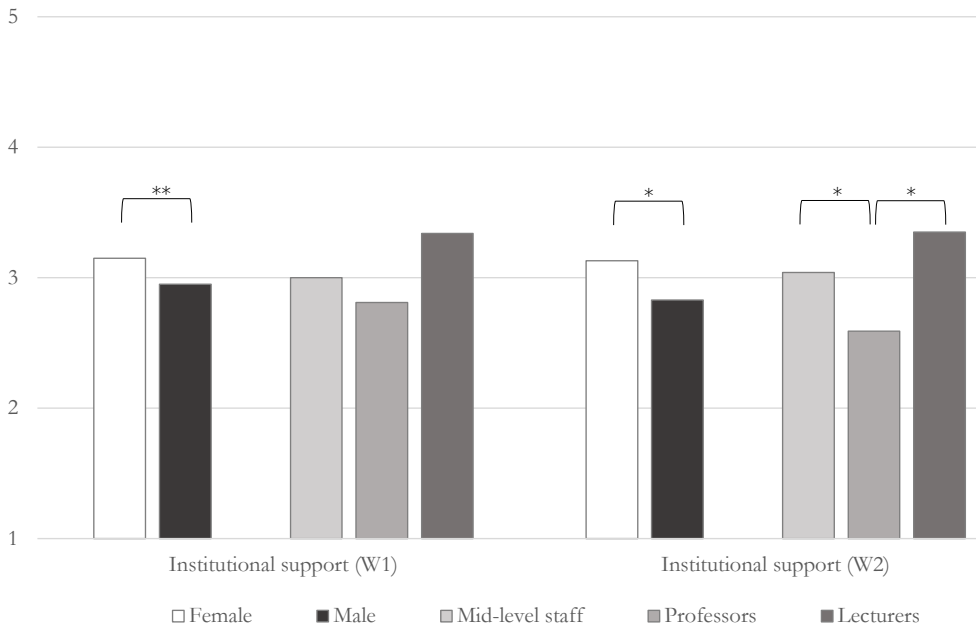

Figure 5: Social resources: Levels of institutional support by gender, and professional status at W1 and W2

Note: Gender: 0 = female, 1 = male; Professional status: 0 = mid-level staff, 1 = professors, 2 = lecturers. Gender: W1: 0 = 81, 1 = 58; W2: 0 = 77, 1 = 38; Professional status: W1: 0 = 87, 1 = 37, 2 = 28; W2: 0 = 76, 1 = 23, 2 = 21. $^{*}p \leq 0.05$. $^{**}p \leq 0.01$. $^{***}p \leq 0.001$.

Table 1: Stressors perceived by instructors at W1, including number of mentions and proportions within the total number of statements[2]

Category	Definition	Examples *(verbatim)*	Coding rules	*N* (%)
1) Work Role Stressors	Uncertainty about role expectations; Incompatibility of role expectations; Role expectations exceed resources or time available	*The additional supervision of students and technical efforts; Instructors were administrators of study affairs*	Different work factors are perceived as conflicting (sense units)	3 (1.0%)
2) Workload	Objective information and subjective perceptions; Quantitative workload (i. e., the amount of work) and qualitative workload (i. e., difficulty of tasks)	*There is a significantly increased effort in preparation and follow-up in teaching; Keeping track is exhausting and drained me out*	All (also newly evolved) work elements related to teaching and research and perceived as an effort (sense units)	75 (25.6%)
3) Situational Constraints	Organizational factors such as bureaucracy, faculty equipment or inaccurate given information	*There were new technical requirements (such as shoot and edit videos), uncertain technical conditions and increased screen time with no frame of reference of what works; The changeover without assistance, guidance or communication by the university; Frequent uncertainties and changes in processes*	All aspects related to direct burdens resulting from the new situation, but also indirectly reflect management practices of the respective institute or university (sense units)	32 (10.9%)
4) Job Control	Little autonomy given; Feelings of being excluded from decision-making processes	-	Other instances such as the supervisor, the institute or the presidium are mentioned related to a lack of respondents' autonomy (sense units)	0 (0%)

2 Note: For the definitions see Rosen et al. (2010). The overall number of mentions were 293 (including missing values and the answer *no factors*).

5) Social Characteristics of the Workplace	Interpersonal conflict; Organizational politics	*No (face-to-face) communication with students; There were no nonverbal cues; I was facing a black wall; Fighting against windmills when trying to involve passive students during seminars; No feedback from students; Students could opt out whenever they wanted; Insecurity about how the seminar content will be received by the students; Students are more easily distracted from work at home; Limited exchange with colleagues*	All elements related to conflicts in interpersonal contact and communication and feelings of not being valued by students and by the workplace (sense units)	137 (46.7%)
6) Career-Related Norms	Job insecurity; Lack of learning or advancement opportunities; Work interference with nonwork domains (e. g., family).	*Managing child and work in the same space; Triple burden (job, household, children); Lack of time for research*	All aspects related to job insecurity, career advancement, research-related burdens and the management of competing demands of career and family life (sense units)	5 (1.7%)
7) Job Conditions	Physical dimensions (e. g., temperature); Nature of job tasks (e. g., emotional labour); Design of how tasks must be performed (e. g., break schedule, work hours, shift work)	*Unstable tools, weak internet, and thus constant disconnects; Compliance with hygiene regulations and requirements related to exams; Significantly more work on the computer (while sitting); Disinfecting and the break between runs needed in seminars or exams*	Work conditions related to the nature of online teaching and conducting research during the pandemic (sense units)	7 (2.3%)

Table 2: Social resources perceived by instructors at W1, including number of mentions and proportions within the total number of statements[3]

Category	Definition	Examples *(verbatim)*	Coding rules	N (%)
1) Emotional support	Receiving empathy, caring, love, trust, esteem, concern, and listening from others	-	When emotional support is mentioned and/or all aspects related to the definition (sense units)	0
2) Instrumental support	Receiving aid in kind, money, labor, time, or any direct help	*A lot of honest collegial exchange and mutual solidarity emergency assistance; More technical support*	When instrumental support is mentioned and/or all aspects related to the definition (sense units)	2 (1.0%)
3) Informational support	Receiving advice, suggestions, directives, and information for use in coping with personal and environmental problems	*The responsiveness of all services of the university were excellent; The online service employees were competent and flexible and I always received a friendly and constructive answer*	When informational support is mentioned and/or all aspects related to the definition (sense units)	2 (1.0%)
4) Appraisal support	Receiving affirmation, feedback, social comparison, and self-evaluation	*Very open and extensive feedback from students*	When appraisal support is mentioned and/or all aspects related to the definition (sense units)	2 (1.0%)

3 Note: For the definitions see House (1981). Additional categories were added during the analysis, highlighted by "additional". The overall number of mentions were 193 (including missing values and the answer *nothing*).

5) Contact and interaction with students (additional)	Meeting and communicating with students online	*I had more personal contact with the students who had actively participated; Students' understanding that we all have to adapt to circumstances and find our way around the situation; Students could watch videos of online seminars as many times as they wanted and I got asked fewer questions and had to explain less; Students' time commitment and punctuality who had to prepare for each topic/session and thus learned more than usual; Students worked a lot independently*	When contact and interaction with students are mentioned and/or all aspects related to the definition (sense units)	18 (9.3%)
6) Colleagues' and supervisors' behavior (additional)	Colleagues' and supervisors' activities, including objectively observable activities, introspectively observable activities and nonconscious processes	*My supervisor gave us employees a lot of freedom*	When colleagues' and supervisors' behavior are mentioned and/or all aspects related to the definition (sense units)	1 (0.5%)

5 Discussion and Conclusion

With the beginning of the pandemic, instructors in higher education have been facing the task to suddenly perform all teaching and advisory activities in online contexts while simultaneously struggling with the intense personal restrictions imposed by the spread of COVID-19. In the present paper we sought to take a closer look at university instructors' experiences during the first two semesters in the pandemic. Its purpose was fourfold: We aimed to provide detailed insights into a) aspects that instructors found particularly stressful, b) instructors' overall levels of stress and stressors one and two semesters into the pandemic, c) aspects that instructors described as personal and social resources, and d) instructors' overall levels of personal and social resources they could fall back on to cope with stress in the pandemic. To reach these goals we performed two studies: a qualitative content analysis in which we examined instructors' written statements about perceived stressors and resources during the first pandemic semester (Study 1) and a quantitative study in which we analyzed instructors' stress, stressors, and resources in two independent waves considering their gender and professional status (Study 2). Our studies show that while the perception of stress is a highly individualized process contingent on objective environmental demands, subjectively experienced stressors, and perceived resources, there are overall differences in perceived stress, stressors, and resources for female and male instructors but also for instructors in different professional groups (i. e., mid-level staff, professors, lecturers).

Perceived Stressors: (the Lack of) Social Relations and Communication as Linchpin

A central finding of our analyses is the accentuated role of social factors in instructors' experiences. When asked about factors experienced as more afflicting compared to semesters in presence during the first remote teaching semester, instructors frequently mentioned aspects related to communication, social interaction, and social support – many of which were strongly related to teaching and interaction with students such as the lack of *(face-to-face) communication with students; There were no nonverbal cues; I was facing a black wall; Fighting against windmills when trying to involve passive students during seminars; No feedback from students; Students could opt out whenever they wanted; Insecurity about how the seminar content will be received by the students* while some related to *limited exchange with colleagues*. Interestingly, as in stressors, when asked about factors experienced as more relieving compared to semesters in presence during the first remote teaching semester, the most frequent mentions were related to contact and interaction with students.

Very broadly, the remarks related to perceived stressors describe the lack of social support (see Jolly et al., 2021) and contact. Previous research has found that the psychological and physiological effects of such experiences can be profound. For example, in a study by Taylor and colleagues (2010), participants were contacted several times a day over the course of 9 days. In every contact, they were asked to indicate the level of perceived social support

in their last interaction. Following this, brains were scanned while participants were engaging in several tasks. For example, participants underwent the Trier Social Stress Test (TSST) in which they had to deliver a speech to different types of audiences (for example to an unresponsive audience - a situation quite similar to giving a synchronous online lecture with students having their cameras turned off). The researchers found that in a negative audience condition (negative feedback from the audience), social resources facilitated cortisol recovery which highlights the buffering role of social resources in stressful situations. This should be kept in mind when designing the digital transformation in higher education. The teaching situation in digital environments should be set up in such a way that social support is mutual – a task of both instructors and students – allowing resonance, feedback, engagement, and commitment. This may include the ex-ante provision of institutionally supported class participation agreements. Teaching and learning crucially depends on interaction and identification of learning progress and active participation – in highly interactive courses and semesters this necessitates some form of non-verbal cues for both students and instructors alike. This is of particular relevance for students studying to become teachers, who – at least in Germany – constitute a large share of a university's student body. Interactions between higher education instructors and students may further include possibilities for instructors to support students' opportunities to interact with each other (see Elmer et al., 2020) and with instructors in informal social settings, e. g., by organizing online events at the beginning of the semester.

The possibilities for interaction in informal settings may relate positively to various students' learning and performance-related outcomes. For instance, current research found that higher education students' reported lack of interaction with other students during the pandemic was negatively related to motivation for learning and performance (e. g., Krammer et al., 2020). This, in turn, could negatively affect the digital classroom climate (for general classroom climate see Lerdpornkulrat et al., 2018). "Investing" in these social relations at the beginning of the semester can facilitate classroom activities and interaction throughout the semesters by involving peers as co-teachers and sources of academic and emotional support. Our findings also support universities' efforts to sustain a critical share of teaching and exchange in presence and installing new forms of digital and remote teaching in higher education as an essential but complementary element to in-class teaching (see Han & Ellis, 2019).

A gendered view on instructors' stress, stressors, and resources during the pandemic?

As several theoretical models underscore, negative stressors are expected to occur when a situation is perceived as *too* demanding or threatening for prolonged time periods, i. e., when people believe that they lack the resources needed to cope with the situation. Numerous studies identified gender differences in stress experiences. For example, in a sample of 2816 between 18- and 65-years old men and women, Matud (2004) found that women scored significantly higher in chronic stress and minor daily stressors than men.

In our quantitative study we did not find any differences in perceived stress and stressors. This is particularly notable given the scale we used measured generalized levels rather than occupational levels of stress. How can this be explained? One possible account is that during these semesters female instructors have been more efficient in soliciting adaptive social support (for gender differences in social support during challenges e. g., Neff & Karney, 2005) and subjectively more successful in creating positive relationships to their students. For example, we found that female instructors not only reported significantly higher levels of institutional support than their male colleagues, but also reported markedly higher social teaching self-concepts. Because there was no gender difference in perceived exchange climate among colleagues in the respective institutes, we think that it was rather institutional support and perceived relationship to students that worked as relieving factors.

Clearly, more research is needed to ascertain the actual impact of these factors on instructors' levels of perceived stress. Further, future studies may wish to specify subdimensions of institutional support (including e. g., the provision of platforms for exchange, allocable technical support desks, well-organized teaching resources, or child care). Surveys conducted during the pandemic suggested gendered COVID-19 faculty experiences (e. g., Stanford COVID-19 Faculty Survey, O'Connell et al., 2020) with conditions being particularly adversely for women with children. Studies have found that female academics compared to their male colleagues have been more strongly involved in activities less valued by an academic system emphasizing productivity in terms of publications or research grants (see Kasymova et al., 2021; Morgan et al., 2021). Already before the pandemic, female scientists have been shown to put more effort in teaching, mentoring, and responding to the needs of (disadvantaged) students (Gibney, 2017) and faculty service loads (Guarino & Borden, 2017). While this has led to the well-documented productivity penalty, particularly for women with children (Morgan et al., 2021), the extra-effort in creating and maintaining these positive relationships may be responsible for the positive social teaching self-concept, a psychosocial resource we found to be significantly higher among female instructors at both waves. At this point it should be noted that our results are based on the responses of only those instructors that found the time to participate in our survey during the pandemic. Thus, it is well possible that our study underestimates the levels of stress among male and female faculty (particularly those with child care responsibilities) in the first two semesters of the pandemic.

The role of professional status for perceived stress, stressors, and resources

In the first and second semester of the pandemic, mid-level staff reported significantly higher levels of stress than lecturers. Although our data does not allow to explore the reasons for this difference more thoroughly, it seems plausible that different role expectations may be responsible for the higher stress levels among mid-level staff. Particularly, in addition to teaching, mid-level staff are usually involved in their dissertation projects and

other research projects while feeling a strong responsibility to be approachable for students as instructors. Possibly, the management of these different work roles was perceived as particularly stressful during the pandemic. The difference could also be strengthened by fixed-term employment contracts of mid-level staff. Yet, this information is not available in our survey and should be considered in future research.

Interestingly, mid-level staff reported higher levels of academic online self-efficacy compared to professors during the second semester in the pandemic. This suggests that mid-level staff has been able to gain competences in handling digital teaching formats. On the other hand, professors reported significantly lower levels of institutional support than mid-level staff. Although our data does not allow us to draw inferences about causal relationships, it seems plausible that professors had higher expectations regarding the support they would obtain from their institution. Future research might want to investigate the specific situation of the particular resources and stressors for early-, mid-, and late career instructors, accounting for gender, contract, and the impact of parenthood. Such research will be important in helping university and faculty management to provide target group specific support that will help academics to attain the productivity they are striving for.

5.1 Conclusion

It has been long known that social factors are profoundly related to individuals' stress experiences. There have been abundant studies investigating these relations in a wide variety of samples with university students being a particularly well examined group. Yet, few studies so far have been addressing the situation of instructors. In this paper we briefly reviewed existent theoretical and empirical research regarding stress, stressors, and personal as well as social resources. We further offered unpublished data underscoring the important role of social factors as both poison and cure in the challenging times of the incipient pandemic.

By forcing all instructors to rapidly transform their teaching activities into online learning formats, the pandemic drastically accelerated higher educations' digital transformation. With the results presented here we hope to show that when trying to reduce the cost of rapid adaptions to such grave transformations institutions have to take these social factors seriously. University and faculty management can importantly contribute by providing instructors with helpful structures to support their self-organization and exchange, by creating a culture in which collegial support and close exchange with students is genuinely valued, and by co-creating functional (digital) infrastructure in which instructors can voice needs and exchange support to cope with uncertain future challenges.

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Supplement

Table 1: Additional relieving factors perceived by instructors at W1, including number of mentions and proportions within the total number of statements

Category	Definition	Examples *(verbatim)*	Coding rules	*N* (%)
1) Digital teaching and working (additional)	Teaching and working material are provided and exchanged digitally synchronously and/or asynchronously and all teaching-related and work-related meetings take place digitally synchronously and/or asynchronously	*Creative development of instructional videos: precise control over one's own word selection and presentation; Videos allow a fixed point of reference and an assurance of results that gives students security and can be self-relieving; I have been forced to learn and use some new digital helpful tools of our university learning platform (e. g., automated online exams); Meetings (faculty, institute, committees) were more efficient online (but less personal)*	When digital teaching and working are mentioned and/or all elements related to digital teaching and working (sense units)	50 (25,9%)
2) Home office (and related time savings) (additional)	Working at home (teaching-related and research-related work) and time savings because of home office	*No commuting; no travelling; No time loss while travelling; No hectic changes of location for meeting appointments*	When home-office and/or time-savings are mentioned and all elements related to this (sense units)	35 (18,1%)
3) Flexibility (additional)	Possibilities of autonomous free availability of time and content	*Unbound to weekly time slots in asynchronous phases; I have never been able to manage my time so effectively and freely*	When flexibility is mentioned and all elements related to flexibility in terms of time and content (sense units)	18 (9,3%)

Table 2: Categories, definitions and coding rules regarding potential personal resources at W1 based on psychological capital (no instructors' statements in the material regarding these categories)[4]

Category	Definition	Coding rules	*N* (%)
1) Hope	The drive to achieve one's goals by a sense of agency, which provides someone with a determination and willpower to invest the energy necessary to accomplish his or her goals	When hope is mentioned and all statements related to a drive to cope with the challenges due to the pandemic (sense units)	0 (0%)
2) Self-Efficacy	One's confidence in his or her ability to mobilize the motivation, cognitive resources, and courses of action necessary to execute a specific course of action within a given context	When self-efficacy is mentioned and all mentions with regard to one's confidence in perform the necessary actions in teaching and research during the pandemic (sense units)	0 (0%)
3) Resilience	The use of individual and environmental protective mechanisms to operate through enhancing the assets and/or reducing risk factors within a situation for individuals or their environment	When resilience is mentioned and all factors related to self-related protecting mechanisms described by instructors (sense units)	0 (0%)
4) Optimism	Attributing adverse events in a positive way and thus changing feelings to be more hopeful	When optimism is mentioned and all statements related to instructors' positive attributions about current challenges (sense units)	0 (0%)

4 Note: For definitions see Bandura, 1977; 1982; Masten, 1990; 2001; Seligman, 1990; Snyder, 1994.

Table 3: Means and standard deviations of stress and stressors in total and separated by gender, and professional status at W1 and W2

Characteristic		Stress W1	Technical challenges W1	Teaching effort W1	Time for research W1		Stress W2	Technical challenges W2	Teaching effort W2	Time for research W2
	N	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*N*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*
Gender										
Female	81	3.03 (0.78)	3.08 (1.08)	72.25 (13.60)	28.72 (19.46)	78	3.23 (0.83)	2.41 (1.04)	58.64 (15.54)	42.39 (19.31)
Male	59	3.05 (0.83)	3.07 (1.09)	73.54 (14.10)	31.12 (15.49)	39	3.02 (0.89)	2.18 (1.01)	58.98 (16.89)	38.39 (20.76)
Diverse	4	4.00 (0.61)	4.38 (0.48)	75.06 (3.48)	8.88 (1.31)	2	4.38 (0.18)	5.00 (0.00)	64.50 (18.74)	26.00 (10.61)
Professional Status										
Mid-level staff	89	3.18 (0.82)	3.05 (1.04)	72.13 (13.20)	28.34 (18.50)	77	3.26 (0.80)	2.21 (0.99)	57.81 (16.99)	44.53 (18.18)
Professors	38	3.10 (0.74)	3.54 (1.07)	76.00 (14.17)	24.77 (16.73)	25	3.26 (0.89)	2.67 (1.17)	66.53 (14.98)	30.81 (20.02)
Lecturers	29	2.76 (0.73)	2.92 (1.17)	73.81 (13.14)	33.08 (18.50)	23	2.72 (0.90)	2.45 (1.09)	54.21 (8.86)	41.13 (18.38)
Total	157	3.08 (0.80)	3.14 (1.09)	73.37 (13.43)	28.43 (18.18)	128	3.17 (0.85)	2.37 (1.07)	59.14 (15.79)	40.61 (19.47)

Note: Gender: W1: $n = 13$ not stated, W2: $n = 9$ not stated; 2. Professional status: W1: $n = 1$ not stated; W2: $n = 3$ not stated.

Table 4: Means and standard deviations of the personal and social resources in total and separated by gender, and professional status at W1 and W2

Characteristic		Academic online self-efficacy W1	Social teaching self-concept W1	Teaching joy W1	Climate among colleagues W1	Institutional support W1		Academic online self-efficacy W2	Teaching self-concept W2	Teaching joy W2	Climate among colleagues W2	Institutional support W2
	N	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	*M (SD)*	N	M (SD)	M (SD)	M (SD)	M (SD)	M (SD)
Gender												
Female	81	3.90 (0.69)	3.99 (0.58)	41.04 (14.92)	3.38 (0.83)	3.15 (0.99)	78	4.06 (0.52)	4.09 (0.46)	55.40 (19.50)	3.26 (0.86)	3.13 (0.86)
Male	59	3.82 (0.73)	3.65 (0.66)	36.52 (18.26)	3.47 (0.92)	2.95 (1.00)	39	3.96 (0.67)	3.83 (0.62)	50.63 (13.93)	3.26 (0.92)	2.83 (1.02)
Diverse	4	3.25 (0.69)	3.94 (0.39)	33.08 (24.64)	3.13 (1.18)	1.67 (0.38)	2	3.33 (0.47)	3.20 (0.41)	17.50 (11.55)	2.13 (1.24)	2.33 (0.94)
Professional Status												
Mid-level staff	89	3.81 (0.67)	3.87 (0.65)	38.63 (17.27)	3.41 (0.83)	3.00 (1.00)	77	4.12 (0.54)	4.08 (0.44)	57.20 (18.81)	3.27 (0.89)	3.04 (0.87)
Professors	38	3.65 (0.77)	3.64 (0.63)	35.69 (16.02)	3.49 (1.01)	2.81 (1.05)	25	3.68 (0.67)	3.82 (0.68)	47.87 (18.94)	2.90 (0.92)	2.59 (1.09)
Lecturers	29	4.06 (0.83)	3.91 (0.78)	45.68 (14.71)	3.32 (0.75)	3.34 (0.92)	23	4.03 (0.54)	3.90 (0.63)	48.06 (13.23)	3.42 (0.77)	3.35 (0.92)
Total	157	3.82 (0.73)	3.82 (0.68)	39.28 (16.76)	3.41 (0.86)	3.01 (1.01)	128	4.00 (0.62)	4.00 (0.53)	53.63 (18.39)	3.23 (0.88)	3.00 (0.94)

Note: Gender: W1: $n = 13$ not stated, W2: $n = 9$ not stated; 2. Professional status: W1: $n = 1$ not stated; W2: $n = 3$ not stated.

Table 5: Items of the scale of instructors' social teaching self-concept used in our study 2

Items of the German version adapted for higher education context	Items of the English version adapted for higher education context	Original items
Ich bin sicher, dass ich...	I am confident that...	I am confident that teachers...
... meinen Studierenden die Lehrinhalte meines Faches vermitteln kann.	... I can teach my students the academic contents of my subject.	... are doing a good job teaching my child academic subjects.
... meine Studierenden anleiten kann, sodass sie gute Lernergebnisse erreichen können.	... I can guide my students so that they can achieve good learning outcomes.	-
... meinen Studierenden Anleitung für die konstruktive Zusammenarbeit mit ihren Kommilitoninnen und Kommilitonen geben kann.	... I can guide my students on how to work constructively with their fellow students.	... are doing a good job helping my child resolve conflicts with peers.
... meine Studierenden gut informiert über ihre Lernfortschritte halten kann.	... I can keep my students well-informed of their learning progress.	... are doing a good job keeping me well-informed of my child's progress.
... für meine Studierenden gut erreichbar bin, wenn sie Schwierigkeiten oder Fragen haben.	... I am easy to reach when my students have difficulties or questions.	... are easy to reach when I have a problem or question.
... meinen Studierenden alle Informationen zugänglich machen kann, die sie für den erfolgreichen Besuch der Veranstaltung benötigen.	... I can keep my students aware of all the information they need to successfully attend the course.	... keep me aware of all the information I need related to school.
... die Perspektive der Studierenden und deren Wohlbefinden im Blick behalten kann.	... I can keep in mind students' perspectives and well-being.	... are doing a good job encouraging my child's sense of self-esteem. ... care about my child.
... den Studierenden eine positive Einstellung zum Lernen vermitteln kann.	... I can encourage my students to have a positive attitude toward learning.	... are doing a good job encouraging my child to have a positive attitude toward learning.
... freundlich und nahbar bin.	... I am friendly and approachable.	... are friendly and approachable.
... offen für Anregungen und Vorschläge meiner Studierenden bin.	... I am receptive to my students' input and suggestions.	... are receptive to my input and suggestions.

... die individuellen Kompetenzen der Studierenden wahrnehmen kann.	... I can perceive students' individual competences.	-
... im Sinne des Lernerfolgs der Studierenden handeln kann.	... I can act in the interest of students' learning success.	... have my child's best interests at heart. ... will do what is best for my child in the classroom.

Note: Items not adapted: I am confident that teachers...

... are doing a good job encouraging my participation in my child's education

... are doing a good job disciplining my child.

... are doing a good job helping my child understand his/her moral and ethical responsibilities.

... are sensitive to cultural differences.

... respect me as a competent parent.

... are worthy of my respect.