Karen Evans, Annette Ostendorf, Chompoonuh K. Permpoonwiwat (Eds.)

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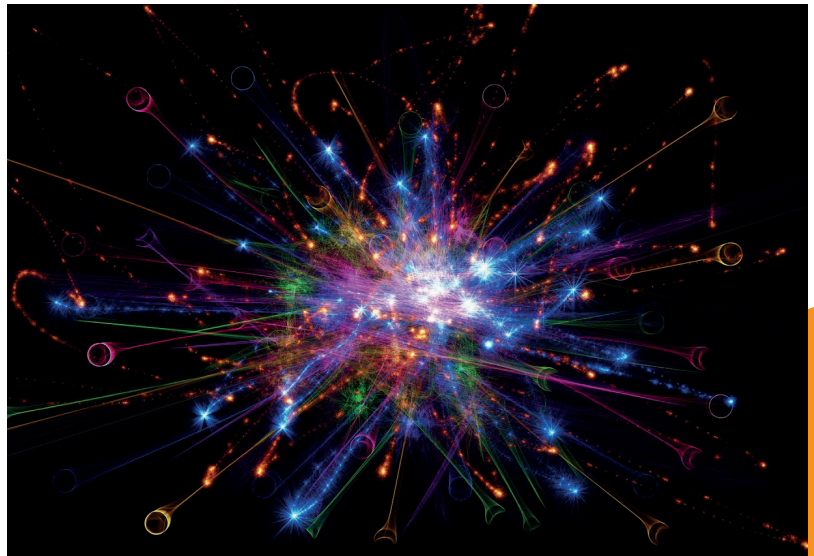

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Resilience of Vocational Education and Training in Phases of External Shock – Experiences from the Corona Pandemic in Asian and European Skill Eco Systems

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Table of Content

Introduction: Resilience of Vocational Education and Training in Phases of External Shock: Experiences from the Corona Pandemic in Asian and European Skill Eco Systems

Karen Evans, Annette Ostendorf and Chompoonuh K. Permpoonwiwat

The Research Network on Workplace Learning (RN2) focuses on learning in, for and through workplaces across Asia and Europe. Workplaces exist not simply in companies and public services, but equally across a wide range of organisational and social contexts, including in non-profit-making NGOs, voluntary work, and in diverse forms of self-employment, including under irregular and precarious conditions. They offer very different kinds of learning opportunities - some are learning-conducive, others are less so; some provide structured work-related education and training for employees, whereas in others, learning is integrated into the flow of working processes. Through exchange of information, workshop discussions and joint studies of how workplace learning is provided, practised and understood in Asia-Pacific and European countries, the network aims to build up a shared body of knowledge that is empirically-based, contextualised and theoretically-informed.

The network was established in 2005, and since then its membership has expanded to 21 countries: Austria, Australia, Brunei, Canada, the Czech Republic, Denmark, Finland, France, Hungary, India, Ireland, Japan, Latvia, Lithuania, Laos, Malaysia, PR China, Romania, Singapore, Thailand, United Kingdom. The work of the Research Network has shown how not only frameworks of meanings, but also socio-cultural and economic contexts vary considerably across the heterogeneous national contexts and organisational segments.

In the first network anthology, reviews of research on workplace learning in three Asian countries (China, Malaysia, Thailand) and five European countries (Austria, the Czech Republic, Denmark, Hungary, United Kingdom) were brought together in an initial mapping of the field.

Between 2009 and 2012, the network conducted a comparative study based on the use of survey questionnaires. The research explored questions like "How do objective opportunities and subjective perceptions influence employees' motivation to learn at work and their satisfaction with the learning they have undertaken?" The findings from this study were published in the second ASEM/University of Innsbruck book 'Decoding the meanings of learning at work in Asia and Europe'. (https://asemlllhub.org/wp-content/uploads/2021/06/decoding_meanings_web.pdf)

The 'Workplaces as Learning Spaces' collaborative inquiry was initiated in 2013. The research complemented the 2009-2012 study by taking the qualitative exploration of learning spaces at work as its point of departure, leading to publication of the third book in the IUP Series – Workplaces as Learning Spaces in 2017; a related study focused on Global Workers (Toiviainen et al. et al 2021) and a thematic issue of Hungarian Educational Research Journal (HERJ) on Workplace Learning in Changing Contexts was published in 2022.

The present VET resilience inquiry was launched at the start of the global coronavirus pandemic COVID-19, immediately following an RN2 Innsbruck seminar in November 2019. During the pandemic, network collaboration went online and creative ways had to found to advance our work. In spring 2020, it became apparent that in many countries the learning and working conditions of young people, students and trainees in particular would be severely affected by restrictions due to the Covid19 pandemic.

"The Covid-19 crisis is a systemic crisis that has created the largest disruption of education systems in history, impacting approximately 1.6 billion learners in more than 190 countries and all continents" (Symeonidis et al., 2021: 91)

Members of the ASEM Network 2 'workplace learning', all experts who research and teach at higher education institutions on topics of life-long learning and vocational education and training, decided to start a research project to record the developments of vocational education and training structures as well as workplace learning developments and trends in the pandemic. The special opportunity was that through these experts, the developments in the countries in the immediate situation of the shock triggered by the pandemic could be recorded over a longer period of time (March 2020 to August 2022). Specifically, the research questions focused on how resilient (in the sense of adaptable, flexible, resistant) the VET structures (in the broader sense) were in their reactions to the external shock and which conditions and measures contributed to positive coping. The term 'VET structures' refers to a very broad spectrum of phenomena, as different countries have different degrees of institutionalisation and characteristics. However, this emphasises structural features at the meso- (curricula, organisational settings at company and school level) and macro-level (overall architecture of the system, educational policy decision-making level).

As a theoretical framework guiding the whole project, the so-called Skill Ecosystem Approach (Buchanan et al. 2017) was used to describe regional or sectoral formations for the development of vocational skills. The approach was originally introduced in a rather elitist sense for 'high skill ecosystems' (Finegold 1999), but has since been used more generally to describe and design VET structures (Buchanan et al. 2017, Hall & Lansbury 2006, Grainger & Spours 2018).

"In essence, researchers and policymakers in this tradition seek to understand skills in context, and are concerned with the wider array of determinants associated with workforce development and how this is connected with particular trajectories of social and economic development" (Buchanan et al. 2017: p. 444).

According to Buchanan et al. (2017), it is not sufficient to look at VET systems in terms of their internal logic, but to recognise that it is precisely their embedding in the economic and social environment that is crucial for their functioning. During the pandemic, however, this environment was particularly affected by restrictions. In particular, the learning venues of formal and informal vocational education, namely schools, companies and other educational institutions, were especially affected by closures or other restrictions. In this respect, it is precisely this skill ecosystem perspective that lends itself to the study, as vocational education processes are not viewed in isolation from their environment. The central elements of a Skill Ecosystem are:

- Institutional/political framework conditions
- Modes of engaging labour
- Business settings and associated business models
- Structure of jobs
- Skill levels and systems for their formation

Our study focuses on "skill levels and systems for their formation". However, these elements must be considered and examined in their interconnectedness and interdependence in order to adequately understand an ecosystem that promotes and produces vocational skills. It is also about the connections between the elements.

The cultural and structural diversity of the international research community and the only vaguely definable research object made it necessary to develop a very specific design for the survey. An explicitly comparative study, which would meet the strict standards of comparative research, did not appear to be very feasible. In this respect, the international-comparative character of the study is only established through a juxtaposition of compressed country 'cases'. Rather, the inquiry has provided the basis for an extended dialogue between ideas and evidence, at the international level. We have carried out our

research through a qualitative-empirical design, employed by all partners in this multi-national study. The data collection was conducted via a qualitative open online questionnaire, which was completed twice, with time intervals of about 3 months. The survey was designed collaboratively, in the course of several online meetings of the research group, during which our key (project-specific) terminology was clarified. After the second round of the survey, the coordinating partner at the University of Innsbruck has undertaken an initial evaluation and created summary 'cases' for the individual countries.

It must be noted that the delimitation of the 'cases' according to national borders was made very arbitrarily. On the one hand, the experts are located in certain regions of their countries. Their knowledge is therefore also regionally shaped. On the other hand, the skill ecosystem perspective indicates that the focus should rather be on regions. However, this could not be fully implemented in this study, as the information on which the experts' statements were based tended to be published at the national level, specifically, at the beginning of the pandemic. Detailed analyses on regions etc. were not yet available, as the situation was unprecedented and highly disruptive for everyone.

The cases were sent back to the experts in the third round with the request to critically evaluate the information and adjust and amend it if necessary. In addition, three open questions were asked:

- what has the VET system learned from the crisis in my country?
- what remains in my country from the VET changes during the pandemic? (changes in the world of work)
- as an expert, how do you see the current development of your country?

The questions of the qualitative questionnaire were based on the categories of the skill ecosystem perspective and were divided into business settings, institutional/policy frameworks, modes of engaging labour, structure of jobs, skill formation and other aspects, each relating to developments that were triggered by the pandemic. The experts from the academic environment of the respective countries filled out the questionnaire, which was sent as an online form, and their responses were based on their expertise and assessment. This was done with varying intensity and also included information on sources/statistical data/policy papers, etc. In answering the questions, the experts were also prompted to provide reasons, examples, explanations or similar for their assessment/description.

The questionnaire tool had the function of motivation and standardisation. Because during the pandemic, all research processes had to be negotiated online across several

continents, also complicated by lockdowns. The three waves of the survey were not carried out with the intention of implementing in-depth qualitative social research in the classical sense. However, the procedure was very innovative in that the common tool was used to support the observations of the experts over a longer period of time in the midst of the change processes. For if one describes the situation during the pandemic scientifically retrospectively, as has been done in many cases in the meantime, immediate experiences are often lost. Therefore, the research tool should also be used to collect artifacts that describe an actual practice, such as newspaper reports, policy papers or reports from interest groups (grey literature).

Using these materials and written reflections, some of the contributions in this anthology were written. But in a final stage, participants were invited, in an open way, to focus on the influences of Covid-19 of significance in their respective contexts. At this stage new participants were welcomed to contribute to this anthology. But these authors also have used ecosystem ideas to explain and explore responses to the covid pandemic in selected contexts of VET and workplace learning.

The individual contributions address the question of the resilience of VET structures in different geographical regions:

- Adeline Goh looks in particular at the role of digitalisation in its importance for the resilience of the TVET system in Brunei. It is about the reactions of the TVET system during the pandemic, what could be learned from it and what consequences can also be drawn from it for coping with the digital transformation. She argues for the development of a robust digital learning ecosystem.

- With regard to France, Padma Ramsamy-Prat examines the learning opportunities and adaptability of future engineers (construction) during their training in times of pandemic, where practical phases in particular required creative adaptation. What can be derived from this for the further development of workplace learning is discussed.

- Ute-Maria Lang and Annette Ostendorf analysed resilience-promoting measures during the pandemic, focusing on the German VET system, demonstrating its resilience through historical institutional arrangements, coordinated efforts among social partners, supportive legislation, joint governance, and visible state involvement.

- Irina Maslo, Svetlana Surikov and Rita Birzina focus on Latvia's challenge-oriented innovation policy and identify the innovation needs in SES in Latvia. Taking into account organisational, political, regulatory and cultural aspects of workers' learning environments, it identifies the key normative, discursive and practical requirements for implementing challenge-based strategies.

- With regard to Singapore, Sahara Sadik looks at the significant changes in work processes triggered by digitalisation and automation. These have been driven forward very strongly by reactions to the pandemic, bring about new forms of the world of work and also relate to the group of highly qualified workers.

- The study done by Chompoonuh K. Permpoonwiwat and Chaturaphat Chantith aimed to analyse the adaptation of vocational students' professional skills through ICT integration during the COVID-19 pandemic in Thailand and assess the effectiveness of the vocational education system during this crisis, with the goal of informing policy decisions and enhancing vocational education's resilience and relevance in the job market.

- Natasha Kersh, Andrea Laczik, and Karen Evans explored the implications of the COVID-19 pandemic for VET and workplace learning policies and practices in England and the small islands in the British Isles, highlighting the challenges and valuable opportunities it has presented for lifelong learning in an evolving skills ecosystem. It further investigates how pandemic-induced shifts in organizational practices have become sustained, emphasizing the unique context of England and the small islands in the British Isles.

- The study by Sergiy Melnyk, Oleksii Oleksiuk, Vidmantas Tūtlys, Daiva Bukantaitė provides very special insights into the developments in vocational education and training in Ukraine. Here, two external shocks immediately follow each other, the pandemic and the war, which have extreme effects on the structures of vocational education and training. Incredible adaptations are demanded from the system of vocational skills production. A very high degree of flexibility is evident.

Through our experiences of carrying out these evidence-informed studies, we have been increasingly cognisant of the scale of the challenges faced by research on workplace learning between Asia and Europe. How spaces for learning are understood differs considerably between the countries represented in the network, or rather, between the societies and cultures these countries represent. Some of these differences may turn out to belong to the defining features of 'Asian' as opposed to 'European' civilisations and their contemporary economic and political structures. Others reflect variations in cultural economic, political and social features within Europe and within Asia. Accounting for these undoubtedly complex patterns is a matter of ongoing debate in the ASEM Lifelong Learning Hub.

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Response, Re-evaluate and Redesign: The role of digitalisation in Brunei's TVET resilience to Covid-19 pandemic

Adeline YS Goh

The advent of digitalisation and its potential impacts on jobs, education, training and skills are now central to many countries' research and policy priorities, including Brunei. Major disruptions like the coronavirus disease (Covid-19) pandemic have exponentially accelerated these impacts which are evidenced in innovative approaches to education and training, more specifically, digital learning. This chapter provides an opportunity to reflect on the resilience of Brunei technical vocational and education and training (TVET) sector leveraging of technology to support remote learning and digital learning as a response to Covid-19. Based on this premise, the chapter is driven by two framing questions within the Bruneian context: How did TVET respond to the pandemic and what are the lessons learned to foster an agile and resilient TVET learning ecosystem in the rapidly changing circumstances of digital transformation? The chapter starts with outlining the background for TVET which is one of the contributors to the workforce development in Brunei. It then provides insights into one of the main public TVET providers' journey in navigating the challenges during this time of disruption, specifically the shift of learning and teaching approaches towards more flexibility through the use of digital learning platforms. Whilst this shift might be a flexible and rapid solution, there remains a challenge to ensure the continuity of practical skills training and work-based learning which are essential components of a vocational program. In addition, this approach, to an extent, widened the digital gap because the question of equitable access to learning opportunities was not addressed. Hence, to promote learning continuity and to uphold equal access to quality education and training for all, the responses adduced suggest that we need to consider 1) innovative practice-based learning approaches and 2) preparedness and capacity of institutions and learners. One clear message to emerge from this discussion is that we need to build a robust digital learning ecosystem to remain agile and increase the resilience of TVET institutions. The chapter concludes with suggested future policy directions to strengthen the resilience of TVET in preparing a skilled workforce for the era of digitalisation.

Introduction

Technical and vocational education and training (TVET) in the world has been significantly disrupted by Covid-19 and the extent of the disruption has long lasting

implications on the learning and teaching approaches for the future. These disruptions have resulted in learning losses which are apparent in all education sectors due to school closures. The magnitude of these losses was exacerbated in TVET (OECD, 2021) due to the fact that the core curriculum of vocational learning is on practical skills training and work-based learning which was so difficult to do remotely. At the same time, the closure or reduced operations of many industries have made work-based learning that is so essential for the completion of vocational training difficult. In an attempt to promote continuity in learning and teaching, supranational organisations like UNESCO (2023) and the Organisation for Co-operation and Development (OECD, 2020) underscored the range and variety of TVET responses globally which included the increasing provision of digital learning and teaching to ensure continuity of their programmes. Countries without a robust digital learning ecosystem suffered the greatest disruptions resulting in students experiencing learning losses (UNESCO, 2021). Additionally, the lack of a robust digital learning ecosystem could have widened the digital divide within the country. For example, there were various barriers individuals faced when accessing and experiencing digital technologies such as the lack of digital literacy skills. Despite these challenges, the crisis accelerated the Brunei's digital transformation strategy which was already underway (Digital Economy Council, 2021). These issues formed the underpinning case for promoting a robust digital learning ecosystem to better respond to future disruptions and crisis. This chapter does not attempt to provide a comprehensive analysis of how Brunei TVET has responded to Covid-19 pandemic but rather it aims to engage in a discussion on the lessons learned from the use of digital learning platform for teaching and learning and other promising practices. The title "Response, Re-evaluate and Redesign" frames the structure of this chapter which is driven by two interrelated questions within the Bruneian context: 1) How did TVET respond to Covid-19? and 2) What are the lessons learned for TVET from this crisis? To address these questions, the chapter gives an overview of the position of TVET as one of main contributors to the workforce development in the country. It then presents Brunei's TVET journey in managing the pandemic. Following on, the chapter presents the lessons learned with possible recommendations to build a robust digital learning ecosystem as part of a resilient TVET system in Brunei. It then concludes by setting out suggested priorities and foci in policy and research for future directions.

Technical and Vocational Education and Training in Brunei

The nature and scope of TVET has shifted throughout its history but its focus remains unchanged. This focus has largely been orientated towards preparing individuals with relevant knowledge, skills and competencies for work and life through an overall lifelong learning framework. That is, TVET provisions are closely dependent on the demands of the labour market and the structure of the economy it serves. Thus, many countries

increasingly recognise that high-quality TVET plays an instrumental role in the economic and social development of a country (OECD, 2015a). Moreover, TVET has re-emerged as an important lever for many countries' human resource development policy discussions due to the advent of Industrial Revolution 4.0 (Spöttl and Windelband, 2020, Ahrens and Gessler, 2023). In Brunei, it provides an alternative pathway for a diverse range of learners who seek vocational and technical skills to enter the labour market and learners who wish to progress to higher education. Additionally, there has been a growing discussion on the pivotal role of TVET in extending opportunities for adult learners who wish to re-enter the labour market or to reskill or upskill to increase their employability. Despite being marginalised in the past, TVET has emerged as pivotal in contributing to skilling Brunei's workforce. Over the last two decades, the scope and nature of Brunei's TVET landscape has gradually changed (Goh, 2023a) to serve the needs of labour market. On one hand, the range and educational level of programmes offered have expanded and diversified according to the needs and requirements of the labour market. On the other hand, there has been a gradual increase in the uptake of these programmes (see MOE, 2020; Goh, 2022). In parallel, up to 15 per cent of the labour workforce in Brunei has been made up of TVET graduates based on the recent labour force survey (Department of Statistics, 2022).

Formal TVET in Brunei is considerably young compared to other countries but it has progressively grown since its establishment in 1971. Over the last decade, this growth has accelerated in response to Brunei's 2035 Vision or Brunei Wawasan 2035 which aims to create a nation that is widely recognised for its world-class education and highly educated and skilled workforce, high quality of life, and dynamic and sustainable economy by 2035 (National Task Force, n.d.). This vision, recognises and promotes the importance of a quality education system to be competitive in an increasingly integrated global market. The national education system which is now referred to the 'National Education System for the 21st Century' or Sistem Pendidikan Negara Abad Ke-21 (SPN 21) was reformed in 2019 as a response to fulfil the needs and challenges for the social and economic development of our country (MOE, 2013). There are three key changes made to the national education system, which are education structure, curriculum and assessment and the repositioning of TVET in the whole education system. The repositioning of TVET in the national education system is intended to widen the access to and increase the participation of students in post-secondary education which contributes further to the workforce development of the country.

In recent years, we have seen a decline in the employment of TVET graduates in the government sector due to limited job vacancies but an increase in the number of graduates who venture into starting their own business, where they are supported by the government, as part of the entrepreneurship development agenda (MOE, 2020). Another issue that has led to the unemployment of graduates is skills mismatch. As one

of the initiatives to address unemployment related issues, the Manpower Planning and Employment Council (MPEC) was established which is supported by the Manpower and Industry Steering Committees (MISC) at the Prime Minister's Office. One of the main role of the MISD is to strengthen the partnership between education and training sector and the industry, where it supports MPEC to ensure employability amongst the local graduates. It does this through identifying current and future sectoral jobs that are high in demand and assists in developing competency standards in the following five industrial sectors: Energy, Construction, Information and Communication Technology, Marine and Hospitality and Tourism. With the support of MPEC and MISC, the networks of TVET public and private training providers and training organisations (Figure 1), lifelong learning centre (L3C) and other industry organisations help in strengthening the country's skills ecosystem, as they collaborate to address issues and are responsive to industry needs. For example, TVET providers like the main public provider, Institute of Brunei Technical Education (IBTE) works closely with MISC and other stakeholders like the JobCentre Brunei to identify new training programmes to address issues related to skills mismatch and to prepare competent graduates for the industry.

- MOCYS – Ministry of Culture Youth and Sports
- PPB – Youth Development Centre
- MOE – Ministry of Education
- PB – Polytechnic Brunei
- IBTE – Institute of Brunei Technical Education
- DS – Department of Schools
- L3C–Lifelong Learning Centre

- PES – Private Education Section
- MIC – Micronet International College
- LCB – Laksamana College of Business
- KI – Kemuda Institute
- IGS – Kolej International Graduate Studies
- MKI – Mahakarya Institute of the Arts Asia
- CCCT – Cosmopolitan College of Commerce & Technology
- BICPA – Brunei Institute of Certified Public Accountants

- PMO – Prime Minister Office
- BAHC – Brunei Arts & Handicraft Centre
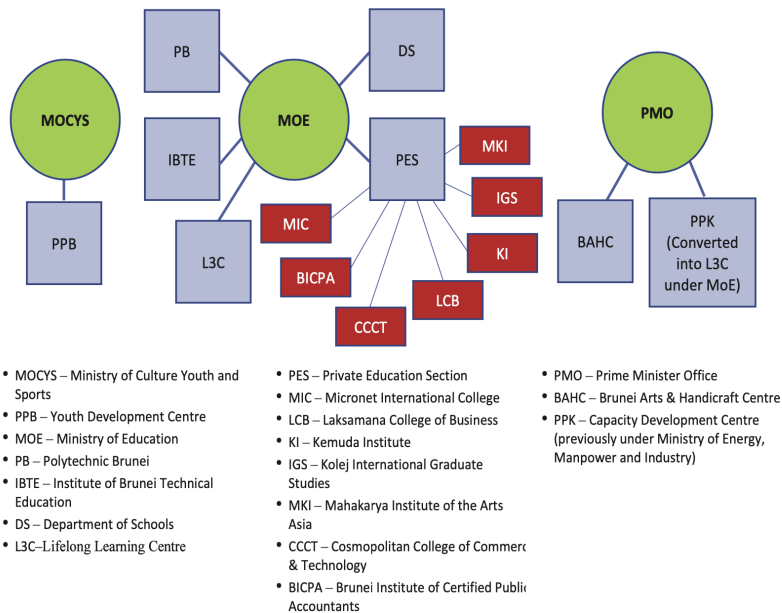- PPK – Capacity Development Centre (previously under Ministry of Energy, Manpower and Industry)

Figure 1: Network of TVET institutes in Brunei Darussalam. (MOE, 2020)

There are several TVET providers under the jurisdiction of different ministerial organisations: Prime Minister's Office, Ministry of Education and Ministry Culture Youth and Sports. Each of these providers (see Figure 1) offer programs that range from Brunei Darussalam Qualification Framework (BDQF) 1 to 5 or higher. Non-formal TVET programmes are also offered by the Youth Development Centre. In addition, L3C acts as a skills hub which coordinates and manages the upskilling and reskilling programmes offered by public TVET providers, higher education institutions and registered training organisations to the public.

Brunei's Journey in managing Covid-19 pandemic

Most countries across the world temporarily closed their educational premises in an attempt to mitigate the spread of Covid-19 pandemic. About 90% of the world's student population was affected during these closures (UNESCO, 2020a). Subsequently, there was a shift of learning from on-site settings to remote settings with the use of digital platforms or other media such as television and radio. The extent of success of this shift depended largely on the context and digital infrastructure of a country. Besides having a robust digital infrastructure, most countries' journeys in managing this pandemic, including Brunei, revealed the importance of digital inclusion to ensure equitable access to learning opportunities for all.

We have learnt that it takes a whole-of-nation approach to produce a cohesive and rapid response (Omar and Halim, 2021). What follows provides an overview of Brunei's response to the pandemic at different levels. This will form the underpinning basis for our discussion about how to foster a resilient TVET leveraging the use of digitalisation. A joint survey was conducted to collate information in mitigating the effects of the pandemic in the areas of TVET and skills development (UNESCO-ILO, 2020). The survey which involved 126 countries, including Brunei, revealed that complete closure of TVET centres was common, which had disrupted the continuity of the provision of TVET. One of the key findings which resonates strongly with Brunei's TVET experience was the challenge in ensuring the continuity of the practical skills training and work-based learning for some vocational programmes.

A whole-nation approach: From national to institutional response

Brunei's first confirmed Covid-19 case was reported in March 9, 2020. Within a short time, the number of cases escalated. In parallel, the pandemic induced a decline in global oil and gas prices which could have buffeted Brunei's economy. However, with quick, prudent and decisive interventions, Brunei was able to control the first wave of outbreak through a unified 'Whole of Nation Approach' (see MoFE, 2020) which consisted

primarily of three areas: 1) Maintaining Public well-being; 2) Supporting Businesses/ Individuals; 3) Supporting the Labour Market. One initiative to support these interrelated areas was the provision of free online training related to business matters. MPEC also worked with the private sector by providing training to upskill and reskill for their local workers (Biz Brunei, 2020). Companies were encouraged to conduct upskilling and reskilling training for their local staff, as provided by MPEC. The apprentices' programme under the i-Ready scheme, which is a 3 -year apprenticeship programme aimed to expose unemployed graduates to various industries (JobCentre Brunei, 2021) was extended for half a year, especially for those which ended before September 2020 in the public and private sector. In addition, the number of apprenticeship programmes was also increased to expand the work-based learning programmes.

Swift responses to the disruption triggered by the pandemic were also manifested at the ministerial level. The Ministry of Education implemented measures to maintain continuity in teaching and learning from home during the three waves of pandemic. Amongst these measures was the use of online educational platforms and other non-face to face teaching and learning approaches such as educational television programmes and home-pack learning to ensure all students were included (MOE, 2020). The use of online educational platforms was not only central to support learning during the temporary closure of educational institutions but it also provided an impetus to maximise leverage on technology in learning (Abdullah, Almunawar, and Ali, 2021). Given the central use of online educational platforms, MOE recognised the need for a robust digital learning ecosystem required to conduct effective teaching and learning by first, providing students and teachers with the provision of sufficient bandwidth and data speed. However, this provision was not sufficient to support all groups of students, for example, one such group was the TVET student community (Sabli, 2020). Second, the public was encouraged to donate used or new computers, laptops and tablets to support underprivileged students (Ministry of Finance and Economy, 2020). These measures were crucial in reducing any further learning losses and minimising the digital divide or inequality gap amongst these students which might have existed before the pandemic (OECD, 2015b).

TVET response – harnessing the potential of digitalisation for teaching and learning

One of the main providers of TVET, the Institute of Brunei Technical Education (IBTE), under the jurisdiction of MOE responded to the Covid-19 by following a business continuity plan. Like many of other educational institutions in Brunei, TVET leveraged the use of digital learning platform to maintain continuity. On the one hand, shifting to online learning and teaching was mostly viable for some programmes. On the

other hand, the abrupt transition posed a major disruption to programmes which required practice-based training. In many circumstances, learning of these skills had been acquired in different physical settings where context was important, either in the college workshops or in the workplaces as part of the work-based learning provision. Many of these workplaces had to adapt to online work practices as a precautionary measure. To ensure safe working practices, work-based learning programmes such as industrial attachments and apprenticeships had to be postponed. In view of this, students were given project-based assignments to do which exacerbated the skills gap issue because of the loss of any context for their learning: 'context' remains pivotal in supporting students to experience the real world of work. Inevitably, IBTE also had to put formal procedures in place for social distancing by rescheduling some of the training workshops so as to accommodate smaller groups of students in order to uphold social distancing measures (IBTE, 2020). In addition, IBTE faced challenges due to a lack of a robust digital learning infrastructure. A robust technological infrastructure takes account of the availability of internet connectivity and devices, an online learning platform which can accommodate the diverse needs of the TVET student community such as students who are geographically remote or from a less privileged background and limited staff capacity to support online learning and teaching (Sabli, 2020). On a different note, a robust technological infrastructure is essential in pursuing the UN Sustainable Development Goal (SDG4) to ensure inclusive and equitable quality education and promote lifelong learning opportunities for all (UN 2015, p.4)

Looking ahead: A digital learning ecosystem for skilling the workforce in era of digitalisation

The challenges faced during Covid-19 raise implications for the pace and depth of digitalisation across the Brunei economy, labour market and the training sector such as TVET providers. As the Brunei Darussalam's Digital Economy Masterplan 2025 makes clear, the country has several critical milestones to achieve the country's vision, goals and strategies into a digitalised nation before the pandemic (see Figure 2).
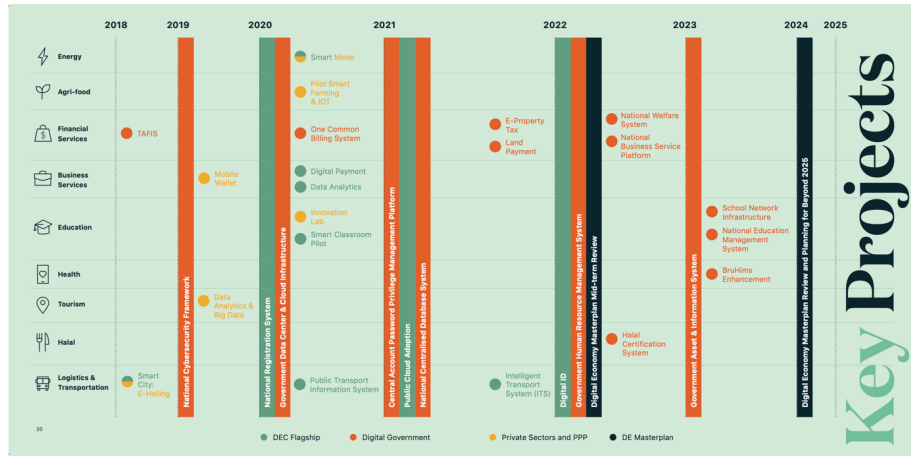
Figure 2: Brunei's Digital Economy Masterplan 2025 (Digital Economy Council, 2021. p.36-37)

Aligning to this plan and Brunei Vision 2035, the Ministry of Education recently published the Digital Transformation Plan 2023-2027 with its vision "quality education through digital transformation" where quality education refers to providing equitable quality education guided by the values of the Malay Islamic Monarchy to develop future-ready citizens who are equipped with knowledge and skills of the 21st century, developing learners to become positive and responsible individuals who can contribute positively to the nation" whilst digital transformation is the process by which processes are fundamentally changed or reorganized to obtain benefits through the adoption and integration of emerging digital technologies, and deliver values to our customers (educators, learners and the public) (MOE, 2023). Essentially, Covid-19 has become an integral catalyst for the digital transformation process in the educational sector but it also presents a new set of challenges in TVET institutions. These challenges forced TVET providers to rethink their learning and teaching practices to accommodate greater flexibility and to mitigate any challenges in a short period of time.

Despite the many favourable opportunities brought about by digital learning, depending on the availability of proper infrastructure and resources, Covid-19 perpetuated inequality amongst students from underprivileged background (Borneo Bulletin, 2022). These students experienced more acute challenges during the shift from physical to digital online learning. Therefore, in the context of the pandemic, a single-faceted educational solution such as digitalisation for disadvantaged groups can hardly be effective. Covid-19 pandemic has also revealed the lack of preparedness in IBTE on the transition to fully remote or online training environments. Teachers and students had to

adapt to these environments in a short span of time without having the appropriate level of the fundamental digital literacy skills i.e. the knowledge, skills and confidence required to use available technology and technological devices to perform work processes (Borneo Bulletin, 2022, Sabli, 2020). Furthermore, teachers had limited pedagogical knowledge and skills for online learning and teaching. Moreover, teachers also had to develop innovative ways to deliver vocational programmes which relied heavily on hands-on training.

Promote digital competence for lifelong learning

In my commentary (Goh, 2023b), I suggested shifting the TVET paradigm to move in tandem with the digital transformation in the country in order to stay relevant to the changing landscape of work. What we learnt from this pandemic is that Covid-19 has also accelerated the changing skills needs in the face of digital innovation which has direct and indirect implications for TVET and as a country. These changing skills needs include, firstly; digital skills within jobs that are not themselves primarily focused on or located within digital industries (Martin, 2017). For example, teachers were required to change their work practices such as renewing how they teach online and creating digital online learning resources. Secondly, they include digital literacy as a fundamental skill as the broader impact of innovation on skills needed in all forms of employment (Keep, 2021, Laar et al., 2017). Thirdly, new skills needs and jobs are emerging, directly related to the digital sector and digital technology, as in the case of cyber security. Such changing skills needs raise the implications of digital innovation which require TVET to redesign their programmes with the industry. In view of these changing and new set of skills, the TVET community and more specifically teachers as key agents need to continue to strengthen their capabilities to be agile and adapt to changing circumstances.

One potential approach to support the repositioning of TVET paradigm is to leverage the use of e-training platform, as a part of TVET teachers professional lifelong learning journey (Goh, 2022). One such example has been showcased through UNESCO-UNEVOC promising practices (UNESCO, 2021c). TVET providers could work collaboratively with industry to build this platform where teachers can learn during their own free time. This is also especially helpful for new TVET teachers where they can gain industrial knowledge and skills through this sort of partnership. In parallel, there is an emerging body of evidence that proposes the use of self-directed learning, self-determined and self-regulated learning to promote lifelong learning amongst adult learners (Banerjee, 2019). Subsequently, teachers can exercise their agency in learning than what they are told to do in traditional continuing professional development activities. Notably, this approach to digital lifelong learning suggests that there should be an online community where they could collectively reflect, provide motivation and to

involve the teachers in designing their learning. Having such learning spaces provide empowerment and autonomy to teachers in their own lifelong learning journey.

Innovative work-based learning

Covid-19 disrupted workplaces so it was difficult to implement work-based learning and prompted educators to think about other innovative ways to prepare students for work, as these students were not able to be physically present at the work premises. Based on the responses to Covid-19, it is important to find flexible solutions that could enable work-based learning and practical-based training to continue so that all students are able to progress in their studies, despite restrictions in their opportunities in the workplace. Although digital online learning was used to deliver some TVET programmes during the pandemic, there has not been much discussion on the innovative ways it could be used to facilitate work-based learning. Workplaces have been considered as potential learning sites (Hodkinson and Hodkinson, 2004; Goh, 2021; Goh and Zukas, 2016, Fuller and Unwin, 2003). Most work-based learning programmes, like apprenticeship schemes involve students in experiencing and learning to manage unpredictable work expectations in a workplace. Increasingly, work-based learning programmes are recognised as key to a functional and market-responsive TVET system as they have the potential to develop reflective (Faller, Lundgren and Marsick, 2020) and agentic individuals (Evans, 2017) to adapt to the constant changing workplaces.

Micro-credentials could be an innovative work-based learning approach to ensure better permeability between TVET and the labour market. They have been defined as an isolated demonstration of a learner's performance in a small, well-defined learning task. To ensure that students acquire the knowledge and skills at various learning levels for a particular vocational area, TVET teachers are required to work closely with supporting companies or stakeholders to develop the curriculum and resources to ensure that students get the most out learning through these micro-credentials. In essence, these micro-credentials should consist of theoretical and practical phases and where students would spend the practical phases at the workplaces (Bhoyrub et al., 2020) to learn the dispositions to working at each occupational sector respectively. Hence, collaboration between TVET teachers and supporting companies is seen as pivotal in providing online training for students as evidenced during the pandemic experienced by Finland (UNESCO-UNEVOC, 2021a, 2021b). In such aspects, micro-credentials can also act as a vehicle to support labour-market related and employment relevant training. However, more work needs to be done to integrate micro-credentials into the national qualification frameworks.

As mentioned, there is a limit to online learning when it comes to incorporating the development of practical skills for many occupations. For many occupations (for

example in the healthcare sectors) practice-based learning is considered essential as part of the training (Bhoyrub et al., 2020), requiring students to be in the workplace where they learn a range of skills required to perform a job well. Researchers have argued for the importance of a social dimension of learning in these work contexts which draws on the notion of situated learning (Hodkinson et al., 2007, Goh, 2021, Lave and Wenger, 1991). One complementary way is to replicate the workplace experience with virtual reality (VR) and augmented reality (AR) simulator technology. These simulated experiences, which replicate the authentic work contexts allow students to experience real life situations, reflect on their decisions and improve for their future actions (Goh, 2019). This can also develop their evaluative judgement capabilities (Boud, 2023) for the ever-changing workplace.

Conclusion and moving forward

This chapter shared the journey of one of the main public TVET providers, IBTE in managing the pandemic and the lessons learnt to build a strong and resilient system. This learning journey has provided us with an opportunity to consider the preparedness and adaptive capabilities to any future disruptions. That is, the Covid-19 pandemic has exemplified the direct and indirect impacts of digitalisation that could support in planning TVET for the digital era. Based on the aforementioned challenges, there are many lessons learnt throughout the pandemic but this chapter attempts to focus on the implications of digitalisation in TVET. One of the key lessons learnt which resonates with the TVET sector in other regional and international countries (UNESCO, 2023) is the importance of a robust digital learning ecosystem. A robust digital learning ecosystem is required to uphold digital inclusion, which is defined as "equitable, meaningful, and safe access to use, lead, and design of digital technologies, services, and associated opportunities for *everyone, everywhere*". (United Nations, n.d.) [italics mine]. Equally important, well-planned strategic initiatives such as curriculum evaluation and teacher professional learning should be enhanced to stay relevant with the changing skill sets required in workplaces. In hindsight, Covid-19 provided the opportunities to re-evaluate the TVET system as an early preparation for the digitalisation era. From this brief commentary, there are several implications for practice or policy directions in view of redesigning a resilient TVET system for a digitalised era:

(1) Develop a policy that places emphasis on TVET teachers' and learners' digital competence
(2) Promote TVET digitalisation to strengthen the digital learning ecosystem.
(3) Strengthen the collaboration with industry to develop micro-credentials for flexibility in vocational programmes.

Above all, as the Covid-19 pandemic makes clear, a concerted effort which involves a collaborative partnership between TVET and all stakeholders is quintessential to build and strengthen a resilient system for any future disruptions (OECD, 2020).

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Resilience as a process that opens space for learning opportunities: Insights from French experiences in the pandemic

Padma Ramsamy-Prat

Relying on Buchanan's skill eco-system, this three-year study observes how engineer students studied and augmented skills during the pandemic. It explains the resilience process used as opportunities for learning in diverse spaces. It describes augmented communication skills through horizontal and vertical discourse resulting in quality time and stronger relationship.

Key words: implicit and explicit resilience, horizontal and vertical discourse

Introduction

Skill eco-system helps define the context where new skills are developed and used (Buchanan 2017) and can be classified (Buchanan & al. 2010). The authors argue that initiatives shape demand and utilisation of skills. Understanding and acknowledging private initiatives encourage workers to perform better and boost their confidence. When put into practice, this process also facilitates the organisation of proper training at the workplace. The learning space created by the pandemic brought challenges for learning processes and skills.

Changes and adaptation stemmed from learners, but also from organisations and policy makers. Thus, teaching was provided on platforms, governments set up new rules and policies, and organisations were compelled to adopt new forms of work. In France, government policies were also designed for young people e.g., providing meals for 1 euro, offering support "Un jeune, une solution"[1]. Service-oriented professions were at a halt and alternatives had to be found. Our Parisian engineer school focused on organising technical and human support. Emails of support or encouragement were sent on a regular basis. Extra one-to-one online sessions with teachers were planned and each professor was in charge of some students, thus becoming a resilience tutor.

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[1] Launched in 2020, enabling youngsters to link directly to companies for jobs/internships.

The present research displays learning opportunities and adaptation from engineers-to-be in construction. Their studies require them to perform an internship for graduation which involves working with a site manager. Some had the opportunity to join the Grand Paris project. Some chose a regular building construction, others opted for old building renovation or even historic monuments. A small group are part of a "sandwich programme" where they alternate between school and company[2]. It requires they actually reflect and work on an ongoing construction project for a whole year.

Studying online at home enabled students to develop stock of skills which I call skill capital. The latter may provide hope for the workplace. What and how networks of connection at the school and outside took place? Can we foresee some use in skill capital for the future? How and under which conditions will future professionals apply the transformative learning taking place? Such are the questions I have in mind focusing on Buchanan's skill eco-system.

Learning in times of crisis have been theorized in numerous trends. I will rely on the theoretical context of resilience and learning through communication skills and discourse. I will describe the method and discuss some results.

Resilience

Implicit and explicit resilience

French neuropsychiatrist and ethologist Cyrulnik has developed the concept of resilience from his own life experience and therapy practice for 50 years. He explains how resilience emerges, grows, and takes various forms. Explicit resilience comes from the outside and offers guidance whereas implicit resilience is transmitted through friends (Cyrulnik 2002, 2012, 2014). He draws a line between help provided by professionals and advice shared with chosen individuals in the intimate sphere. The educator replaces the parent whereas the friend holds your hand. If resilience comes from the physical world meaning a metal's resistance from shocks, Cyrulnik brings resilience to the general public as a possibility for self-reconstruction, where trauma halts and breaks normal development. In social sciences, resilience expresses the capacity to develop in a positive and socially acceptable manner despite stress or adversity (Cyrulnik 2002 :8). The author explains (:185-186) how school turns out to be a reconstruction space. In times of crisis, intellectual awakening becomes possible only when affective security forms a base. Resilience is more than

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[2] Used to concern poorly qualified youngsters now available for graduates and engineers. Companies receive grants and tax reductions to enrol apprentices providing salary and experience. Tuition (€6,200), travel card (€900), meal vouchers are paid for.

merely resisting, it is learning to survive. Resilience emphasises the adaptive and evolving character of self. "The future looks less gloomy when children are provided and surrounded by a few development tutors... Then, children can become better, wiser, and stronger" (Cyrulnik 2012). The author advances resilience theories following research concerning attachment in animals by Konrad Lorenz and children by John Bowlby (Cyrulnik 1989).

I understand attachment as providing possibilities for growth and progress through other individuals who show empathy and care. The person, being surrounded by a constellation of tutors, develops social skills to accept and relate to others. In that respect, school mates become friends; special bonding ensures connection. The secure environment suggests individuals become capable of opening up, accepting, taking for their own sakes. The school constitutes a network of resilience tutors. Whether professors, administrators, school mates, everyone may add to the niche. Both implicit and explicit tutors form a security base the individual can rely on.

Resilience can be found not only within and outside self, but in-between because it connects with an intimate becoming and a social future. It emphasises the adaptive and evolving character of self.

Resilient narrative and acceptance

Resilience starts with a process that enables the person or group to grasp outside and inside resources. It relies on an interactive process. Cyrulnik (2012) states two key words in resilience are support and meaning. Support appears before speech as preverbal support. Through implicit or explicit tutors, physical actions can bring strong effects in resilience, especially when support networks are present.

Interactions involve sharing, relying on available listeners. Sharing opens paths to conciliatory effects and structures the resilient narrative. Resilience is understood through eco-systemic perspectives as a process that progresses through concentric cylinders. The first circle comprises natural tutors surrounding the family members the person counts on. The second circle regroups attachment figures in the intimate sphere, those who support and bring comfort in ways that give rise to meaning. The third circle represents networks, whether friends (implicit tutors) or professionals (explicit tutors). Institutions, schools, government must represent reliable figures as they may become a fourth circle impacting a whole community. To start a resilient process, there must be open pathways to meaning.

In early attachment a form of resilience-weaving takes place; it is solid and resistant to traumatic situations. However, attachment does not necessarily endure. A change in

affection can create a resilience factor. Positive benevolent individuals provide a secure and good environment for further development. Acceptance which relies on empathy can enable individuals to travel through trauma and paves the way to larger consciousness.

Speech

Understanding within conversation

Sharing, listening, accepting constitute phases and acts that are developed through speech. Reynaud (1989, 2016) insists on rules performed by protagonists as a means for social regulation. Whether at work or in the private sphere, rules and regulations remain a social fact and defines relations. Rules call for negotiations and even battle. The sociologist claims social life should be analysed through multiple systems influencing each other. What's more, the core of social life does not represent a balanced and stable system but depends on reiterated negotiations.

Billet & Choy (2013) emphasise the social relationship that individuals rely on to develop competences in an active manner, seizing opportunities to learn during interactions.

In counselling, human interactions represent central activities. Through dialogues understanding and connection with others take place. Professional help requires listening, questioning, and being available. Affording space for counselling involves responding to the problem and providing a solution through dialogue (Cohen-Scali & Ramsamy-Prat 2017). Accepting the solution opens doors to learning opportunities.

A dialogue produces language acts respecting conventions. Grice (1975) develops the theory of logic of conversation where a minimum effort is required. The listener cooperates through four maxims: quality, quantity, maxim of relation and manner. When conventions are respected, cooperation is eased thus establishing a stable relationship.

Horizontal and vertical discourse

"…horizontal discourse functions to selectively distribute knowledge through day-to-day contact in families, communities and particular student cohorts" (Merrill & al. 2019:25). Living and studying at home offer horizontal discourse with different communities. Students shared their studies on a regular basis, parents could talk about the realities of office work and current projects in a more open manner. Time and availability added to the situation being in the same space and taking meals together. "…horizontal discourse is oral, local, context dependent and specific, tacit, multi-

layered". If through horizontal discourse, students access vertical discourse, that would mean informal chats could structure social relations in horizontal discourse while vertical discourse could open doors to multiple strategies. Access to knowledge, differing learning or learning in steps, power relationships are reflected upon and constructed. Students could then communicate strategies, procedures, methods, and knowledge because they form a group, part of the shared learning space.

One can observe this space brings about safety and comfort. The latter conveying freedom of speech during interactions in the educational context. That would imply that students' vertical discourse with teachers and professors become possible allowing them to flourish and increase knowledge.

Meanwhile, boundaries between domestic and professional life are blurred. Thanks to technology distance appears unclear. Friends and school mates are available whenever needed thus offering a particular context and defining group identity.

Discourse and pedagogical model

Reflecting on Bernstein's works, Merrill & al. (2019:26-27) state "The pedagogic device refers to how social discourses are appropriated, regulated, contested, and controlled in order to become *pedagogised*". Creating new knowledge requires being able to "think the unthinkable" and that "gives people power and control over their lives". Three interrelated rules are distributive, recontextualising, and evaluating.

Discourse also suggests understanding, sympathy, and empathy. Embedded in the rites and rhythm in conversation, there are signs of acknowledgments that can be heard or seen (Ramsamy-Prat 2016). A smile or nod reinforce encouragement and resilience processes. A soft voice carries understanding and empathy.

One can observe how living and studying in the same domestic space enables students' extra learning and creativity, as learning and transformation open paths to learning in other settings. The need to plan with family shows efficiency that can be repeated or failures that can be discarded. The bedroom space can be adapted to multiple situations. Students become aware of their learning processes, styles and possibilities which produce "new social norms".

The following paragraphs will explain the inquiry method and provide some results.

Method

The research involves construction engineers-to-be (58 undergraduates, 30 graduate students) in the Parisian *Ecole[3] d'Ingénieurs* de la Construction3 during their studies from 2020 to 2022. They receive technical education related to construction, equipment and material for buildings. A secondary focus (minor subject) comprises teachings in communication. Questionnaires were emailed to all during three planned phases. *Round 1* was related to online learning and learning at home. This first data collection identified changes in learning and adaptation to the new learning space. It was also rich in details concerning work in a family environment. *Round 2* depicted situations during their internship on a construction worksite -2 months for undergraduates – 4 to 6 months for graduates. The students were fortunate they could find an internship as French employees were limited in office environments. Working in the open accounts for this. Most businesses slowed but construction companies thrived. This was the time numerous companies chose renovation work and interns were required. Along with learning opportunities, those with some experience cover for cheap labour and appear very valuable on construction sites. "Skill utilization" (Buchanan & al. 2011) was required as students assisted workers in carrying equipment, finishing paint work, polishing, tidying or scheduling site work. Meanwhile, students found a relief in being outside home and useful. This time was beneficial in many ways. Their morale was uplifted; they could see professionals at work and interact with them. Permission granted to work increased their hopes that they would pass their degree.

Graduates' follow-up after internship helped to complete some answers. Back to the classroom, *round 3* focused on a small group (10 students) in the sandwich programme for extra data collection which was precious; they experienced study and work. All 88 students were required to deliver and write additional information. I then looked into it and questioned each during the following classes.

Data was collected in French. I opted for classifying the results into sections related to family, school, friends and internship to ease translation process. The following section focuses on three main findings.

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[3] *Ecole* is similar to College.

Results

Finding 1: learning opportunities

I classify learning in 5 different situations. It is worth noticing the process is transferable to required and non-required situations. Indeed, while it is understandable that learning first takes place with their new conditions in studying at home, one can spot other unexpected circumstances.

<u>Learning process</u>

"we learned to work with more autonomy and more often alone…" (Wandrille-doc2)

This represented time for self-discovery. Students adopted method and were keen on learning to classify, file documents, and become aware on long term crisis and its requirements. Listening skills were developed focusing on classes delivered. Accessing and reading documents on the platform were regular. Deutero learning (self-learning and reflection) became more systematic opening ways to meta learning and behavioural adaptation. Help available at home did not concern studies but took other forms. Awareness about being fortunate was also mentioned as studying covered some wearisome time. Other routines were necessary. Studying replaced anxious spaces in the mind. New learning opportunities arose in different areas. Shows were offered on French television; the audience grew with "Top Chef". Cooking created awareness on healthy food and health issues. In addition, performed with other family members it mirrors team building. Horizontal and vertical discourse (Merrill & al. 2019) led to processing of ideas and arguments, leading to compromises and formation of stable relationships between members (Grice 1975).

YouTube channels allowed more sports practice as professionals coaches delivered videos which shaped growing awareness in healthy habits. Time was made for movies. Watching non-French versions encouraged and developed language learning.

<u>At home: spatial adaptation and family</u>

This section highlights the learning taking place for all protagonists involved. In most cases, learning in context comprises a progressive and dynamic phenomenon (Merill & al. 2019). Context considers atmosphere, space and interrelated spaces, it adapts to perceptions inside and outside. There are interactions between spaces forming a whole network of rules in context. The situation does not call for mere adaptation but for reflexive action. I observe the circumstances look similar to collaborative learning.

"I was in my bedroom, my sister in hers, my father had his computer in the living room. My mother had more work to adapt, she had to work online in the kitchen…then she moves her things when we had dinner…and we all helped…" (William-doc3)

"we learned to adapt with the noise from my little brother… it was hard at times…" (Pierre-doc3)

The pronoun *We* stand for all members of the family. One television report showed a family celebrating a birthday party with little ones online as a cheer-up/learning experience[4].

Challenges: technical and other

In order to enable schools and companies to function, extra technical equipment was installed and paid for (desks, computer, better Wi-Fi connections, screens, new Apps…). Working from home, everyone was challenged by space, Wi-Fi connections and other unpleasant factors.

"concentration was challenging at times…my parents teleworked too so internet connection was bad and sometimes I had to move to the kitchen to keep in touch with class online…" (Margot-doc3)

Buchanan's eco-system describes the moves from protagonists involved. One notices the organisations' requirements for technical equipment installation. Some French companies covered extra expenses regarding heating or lunch. School paid for new learning Apps and trained students to use Google Meet, Google drive, and Teams. One system pulling another, families "managed" an office at home. Professors scheduled differently and new pedagogical experiences were adopted (Dennery & Douat 2020). More oral communication was planned enabling students to pursue group work online to keep in touch with other classmates. The lessons were available on a platform well beforehand and interactive activities were planned on a regular basis.

On social regulation I note the families' organisation. During the first lockdown, foreign students had no option but remain in their tiny study-bedroom. The second lockdown allowed everyone back home.

The usual forum with construction companies and meetup sessions for internship was cancelled. Students were compelled to tune in for interviews on Zoom. Most were ill prepared and did not appreciate the exercise.

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[4] TF1 News-10 March 2020

"I really didn't like the recruitment process online…when face to face you show emotions…here you couldn't tell if it was good or not" Félicien-doc3 "I didn't know if it went well…" (Pierre-doc3)

Nevertheless, most companies accepted interns. The need to cover their anxiety about undersupply of workers in their field should not be underestimated given the numerous building projects the city of Paris undertook. In charge of building and improving transport projects *Grand Paris* progressed with metro line extensions. *Rebâtir Notre Dame de Paris* was founded after the spire caught fire in 2019. The ambitious 2024 Olympic Game stadium at the *Stade de France* aims at becoming a green-friendly environment using bio-sourced material, photovoltaic panels, and recycled equipment. Those three projects are still in progress.

Communication and co-operation

"I realised how important communication was…this is what I needed to progress…it was good to have my parents and spend more time together. We could talk, share our meals…I knew I could count on them…" (Anthony- doc2)

Even though communication was designated as a 'minor' focus in the programme, it seemed obvious that additional communication skills were deployed. Some behavioural changes were noticeable later in class: further cooperation, openness, lively attitudes, courage and willing to learn.

Speech acts encouraged growing, prioritizing, refining relationships with loved ones. The parents improved understanding and empathy for their teens' lives and difficulties on a daily basis. Choices revealed closeness and bonding. All 88 students mentioned support and quality exchange with their parents. Expressions concern bonding, love, emotion. All 88 students describe deeper relationships with friends and classmates.

Time was granted for vertical discourse: parents and children could listen about friends, projects and interact. Less time was spent in the bedroom-office. Less time was needed for isolation. Seeing and being with family produced some "normality". The outside world was virtual.

Time for resilience

Resilience becomes a natural process where interweaving with the environment becomes a must for all protagonists involved. Whether the environment is ecological, affective or verbal; should one strand fall all crumbles. Should there be cooperation, then construction emerges "I have, I am, I can" (Cyrulnik 2002:13).

The Covid situation brought extensive stress among young people. Students feared of "losing" a year, not being able to pass their exams. Implicit resilience helped create a circle of old and new friends holding each other's hands. They could express their feelings, share their misery. More attention was paid to words and voice tones (Ramsamy-Prat 2016) creating empathy.

"It was nice to be able to talk…funny I realised there were other nice guys in my class…I didn't know them well but we shared a lot…I know I can talk to them anytime…we are friends now…I benefited a lot working with my friends and others. I received more from those who weren't friends because they could tell me what was wrong…they gave me new ideas and possibilities…" (cf. Paul-doc)

Casual behaviours such as a smile, open hand, email, text or phone call are encrypted in our memories for their regularity in interactions. They offer a stable and secure base; they are available; they become vital. Whether implicit or explicit, they form a development resilient tutors' capital for regular use. In non-routine encounters, they help build and consolidate resilience.

Learning on a construction site

This section describes the students performing internship on a construction site starting for all in the summer. The normal situation requires individual equipment for safety: helmet, glasses, gloves, overall, and boots. Undergraduates found it hard to learn while wearing masks or being compelled to be in the heat whereas graduate students relied on previous experience to learn despite the difficulties. They indicated new rules such as compulsory hygiene and security sessions, taking separate stairs, eating alone while lunch break represents a precious time for socialising and questioning. Learning time and learning opportunities were challenged and shortened. Moreover, professional work was hard to perform because equipment and material suffered delays and shortage which resulted in late delivery of buildings. Adaptive working and learning took place in different forms.

"I learnt a lot by looking because I am a dancer. I learnt to look to learn, so I kept the habit here…" (Marion-doc4)

"Because of asbestos we had FFP2 masks another mask, workers complained the elastic hurt their ears…I had to deal with their stubborn attitude. " (Lucas-doc4)

While the French news reported the difficulties in finding internship, being outdoors, students in construction were advantaged. All of them performed their required internship; the school postponed project defence; everyone graduated. Site managers

became 'resilience tutors' enabling students to overcome their difficulties in learning new tasks.

Finding 2: skill acquisition

This segment is an attempt to classify skills and distinguish between technical, behavioural and cognitive ones (Buchanan & al. 2010). The pandemic has revealed the shortcomings online learning brings forward. Challenges emerged in adaptability, flexibility, creativity, but brought collaborative work and acceptance. Deutero learning takes a high status, as students find out how they study and how efficient they can be, and learn from and with others. The process enables a focus on emerging skills for team work. Consequently, computer skills were developed, testing new Apps became a habit, collaborative virtual work forms were requirements. Table 1 provides some insight in skill acquisition displaying the skills that matter, interrelation between technical skills and soft skills. It illustrates global skills students mentioned; then analysed and classified. One notices the demand for quick moves in flexibility and adaptability. Extending their network of friends means reaching out to someone whenever necessary, requiring help, asking for new information, sharing skills.

Technical	Behavioural	Cognitive
Using new Apps	Motivation to learn	Learning to do differently
Using new Apps	Working faster	Improving computer skills
Using new Apps	Getting organised	Classifying, sorting files
Filing documents on platform	Being flexible	Quick moves in flexibility
Video conference	Less travel/commute	More efficient, available
Video conference	Sit for long hours	Keep concentration
Mapping	Extending network of friends	Team work with strangers
Designing	Accepting new situations	Learning acceptance

Table 1: Buchanan's global skill acquisition

This classification is designed to clarify the learning processes and skills acquired. It could be useful in helping design of skills demand, improvement, and utilisation. Moreover, it can be used "to examine ways in which creative thinking and design processes could be harnessed to improve productivity" (Buchanan & al. 2010). Then, it would account for workers in keeping some skills after experience, i.e. in team work with strangers.

Finding 3: keeping some skills

This section highlights the 'skill capital' students claim they will keep, underlying three domains: exercising, eating healthy food and therefore cooking, finding balance between work and private life. The last of these clearly calls for rethinking job design in future work and employability. If the students claim they keep certain skills, one can assume they become part of the skill capital even if only known by them. Self-confidence and self-growth are at stake, here intertwined with taking good care. Many express deeper concerns with well-being and good health. Awareness is raised as to what appears significant in personal development. Those skills can help in improving behavioural skills and have positive impact at the workplace, within teams and cooperation between supervisors and employees (Buchanan & al. 2010).

Healthy life: exercising, cooking, and sleeping

Beyond the healthy habit, exercising and cooking open paths to creativity. Youngsters accepted the need to diversify their nutrional intake, understood the benefits of vegetables and learnt about combination. Cooking and sharing brings about a different kind of bonding. It accounts for pleasing a loved one and displaying affection.

"I took the habit to cook…also it was nice to cook for my parents…" (Salomé-doc5)

At college, students claim there is no time for sports. Most of them have dropped their regular practice let alone competition. Skills display "planning" meaning scheduling and prioritizing (Billet & Choy 2013) while paying attention to one's needs, here relaxing after work.

"I fixed one day in the week and practise sports…I could spend energy…or I would take a YouTube video and I do yoga…I find it relaxing…" (Lina-doc5)

Skills analysis and the application of experience prompt needs to make changes and choices.

"I didn't waste time in transport…I used my time differently I had time for cooking…also for my hobbies drawing and knitting…" (Laurine-doc3)

This finding refers to development in other equally significant activities such as personal growth. The commute gain was very much appreciated. Awareness gives way to healthy routines and personal needs. Options become clear; prioritizing personal growth is put

forward. Time for hobbies makes way for stress relief when overwhelmed. Awareness appreciates the need to rest more.

Balance between family and work

Another learning opportunity was distribution between personal and professional life. Covid time has offered space and reflexion on how/what/when to learn or work. Thus, this learning makes space for Vygoski's Proximal Development Zone, where prioritizing has the utmost importance. In proximal development, each system moves, sometimes simultaneously. All rely on a context which challenges effort and adaptability. Reference is made to quality time:

"I appreciated spending time with my family, we ate together also watched movies…" (cf. Laurine-doc3)

The need for balance and splitting:

"I could take a break and not talk about work all the time…also speaking with my family means I had other stuff on my mind…" (Pierre-doc5)

This line reveals how the practice of 'lunch break' is challenged, when it leaves little time for socialising. Lunch hour often becomes meeting time or time to catch up on a project. The same applies to coffee breaks which should be called 'filling-in time'. The students reckon they did not expect this negative side which accounts for exhaustion at the end of the day.

Discussion

This paper has aimed at describing learning processes that were at stake during the pandemic, with a focus on French engineering students in construction. Describing learning opportunities in the process, it suggests resilient factors and defines implicit and explicit resilience. Furthermore, horizontal and vertical discourse give way to augment communication skills through daily dialogues with family, friends and teachers.

Workers attain skills which appear more detail oriented and specific if divided into tasks performed. The conditions for acquiring new skills could bring additional value in the learning process as training can be scheduled accordingly.

Regarding learning

It can be argued that those changes may persist in the long run after graduation. It remains to be seen how and under which conditions the skill capital is called upon and whether all skills are equally considered. One can reason that if the new learning is acknowledged therefore the learning process is acquired and stored for future use. Resilience entails a development that opens space for learning opportunities.

Construction companies, in later stages of the pandemic, are offering more hiring opportunities but face challenges with delays and high-priced materials and equipment. This implies that customer service can no longer be guaranteed and acceptance is requested. Changes are reported for other professions. Hotel and restaurant work have had to adapt as cooks remain unavailable. Waiters become quick adaptable learners. Managers are disposed to hire non-professionals, increase salaries, and offer accommodation as a perk. Besides, awareness related to finding balance between personal growth and work may produce additional changes at the workplace. Keeping one telework day has become the rule for numerous French companies.

Regarding skills

Skills are usually measured by employers and unions. Students acknowledged skills that were developed and utilised. They claim they will transfer the skills in other situations. I identify personal experience acknowledgment as integral to skill improvement in the workplace. The table presented in section 3 could be extended; additional skills used as reference and tool, displaying personal and professional accomplishment.

Construction companies employ foreign workers who cannot speak French. Masons, painters, carpenters work with their hands and perform silently. The engineer's work consists on scheduling their tasks while respecting the rite showing respect for their trade. Therefore, particular attention and communication skills become essential.

It can be argued that assessment of skills and competencies have an impact on long term policies. The school did not take time to assess the skills but paid close attention to those who accomplished their assignment. Some faced family issues that were not considered; others were allowed on campus and organised their lives making arrangement. Referring to complexity in French mathematicians and philosophers Descartes and Pascal, Morin describes the necessity to understand part in order to grab the whole problem (Cyrulnik & Morin 2010). I notice each protagonist mentions dividing his work into tasks while undertaking the whole labour. Each problem was tackled one by one to face one and the same problem.

Regarding identity

This exploratory research in learning opportunities seems conducive to the development of other investigations. Progress in learning boost's identity, particularly in improving self-confidence. Re-studying the data should enable the extraction of further findings concerning identity. More focus on that dimension would bring extra insight into learning opportunities and could bring new insights into the development skill capital, thus contributing to my second research question.

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Shared worry and action: VET resilience and the role of solidarity and institutional action in the German skill ecosystem during the pandemic

Ute-Maria Lang and Annette Ostendorf

From 2020 to 2023, the systemic Covid-19 pandemic severely affected vocational education. Vocational education and training (VET) systems have shown a heterogeneous response to the crisis. This circumstance brings a country-specific and a contextual view into focus. For example, the German VET system was able to withstand the threat comparatively well. This paper constitutes an analysis of resilience-promoting measures during the Covid-19 pandemic. The use of the skill ecosystem model according to Buchanan et al. (2017) and the recourse to the view of German vocational training from a political economy perspective according to Thelen (2004) allows for a holistic view of the structures and coping strategies of the German VET system during the pandemic. The document analysis method has been used to answer the research question. It can be seen that the historically evolved institutional arrangement of the German VET system has proven resilient, at least in the short to medium term. Simplifying the inherent complexity, it is evident that political, social and market measures have been put in place. In particular, the high degree of coordination among the social partners, sensitive legislation that promotes VET, joint governance and a relatively visible state steering function led the German VET system to be resilient.

Keywords: German VET system, resilience, pandemic, political economy, skill ecosystem, external shock

Introduction

The Covid-19 pandemic affected many socio-political arenas beyond the health system, particularly the economy and education. It acted as an external shock to established systems worldwide. Vocational training, especially for the younger population, was massively affected. Apprenticeship training, school-based vocational education and training (VET), continuing education and company placements were all severely hit by the partial shutdown, closures, social distancing, travel restrictions, etc.

The case of the pandemic as an example of an external shock to a VET system can be used to gain more insight into how VET systems have behaved and how resilient they

have shown themselves to be. The term 'resilience' here is not related to individuals and their resilience capabilities but to a socio-economic collective and an ensemble of institutional structures (in a broader sense). The term is used in different scientific contexts, yet a common core can be identified. Bhamra et al. (2011, p. 5376) state in their comprehensive literature review that 'Although the context of the term may change, across all of these fields the concept of resilience is closely related with the capability and ability of an element to return to a stable state after a disruption'.

As early as May 2020, a published Organisation for Economic Co-operation and Development policy brief (OECD 2020) focused on this resilience in relation to VET structures and referred to initial best practice models. For Germany, the short-term work scheme (Kurzarbeit) was particularly highlighted as promoting resilience. It became clear that the pandemic forced digitalisation in teaching and distance learning (Pedone, 2021). The evidence regarding these instruments and effects is still very singular and isolated. According to Thelen (2004, p. 215), external shocks in particular leave lasting traces in the institutional framework of VET. The author states 'In most treatments, innovation occurs as a result of some kind of exogenous shock that disrupts the stable reproduction of institutions and provides an opening for substantial institutional reconfiguration.'

The German VET system is dominated by the so-called dual system of VET in which companies play an important training role and pursue a joint educational mission together with vocational schools. In addition, there are also rather marginal forms of full-time school-based VET, especially for specific sectors (e.g. social professions, health professions). Therefore, in addition to the dual form, there is not very strongly developed school-based VET in Germany (as in Austria, for example). Consequently, we concentrate mainly on dual training but also look at continuing education and training, the third pillar of the German VET system.

During the pandemic, it became particularly clear that VET is linked to social and economic environmental factors. In this respect, it is not possible to look at VET structures in isolation. Instead, these references should be explicitly included. Therefore, a viewpoint that emphasises these contextual factors in their interplay with VET structures, which is referred to in the literature as the 'skill ecosystem approach', seems to be particularly appropriate for our analysis.

The skill ecosystem approach (Finegold, 1999; Buchanan et al., 2017; Hall & Lansbury, 2006; Grainger & Spours, 2018; Ostendorf, 2019) includes institutional/political framework conditions, modes of workforce employment, economic framework conditions and business models, job structures and skill levels and systems for job training as interdependent variables (Buchanan et al., 2017, p. 444) to explain the phenomenon of 'skills'. Skills can be viewed from different perspectives (Bryson, 2017)

and can also be interpreted against a specific cultural background. In Germany, skills are associated with the concepts of vocation (Beruf) and education (Bildung). This means that two basic assumptions are made—that skills are embedded in a bundle of vocational activities and abilities and that education is possible in the interplay of learning at the workplace and in vocational schools.

In this paper, we look at the German VET system and its context from a political economy perspective. This means that we also focus on institutional changes and vocational training policy measures. As Bryson (2017, p. 20) outlines, 'The political economy of skill examines the range of institutions and actors of modern economies (particularly varieties of capitalism) in relation to skill formation, utilization, and value.' This paper therefore pays particular attention to emerging patterns, institutionalisation and context. It grew out of the idea underlying the overall ASEM RN2 project entitled VET resilience in the pandemic, which is that from the perspective of VET research, conclusions regarding the resilience of VET structures can be drawn from the coping strategies during the pandemic period (2020–2022).

In the ASEM RN2 project, VET experts tried to collect various materials, such as policy papers, academic texts, journal articles, during the pandemic to get a picture of the situation in different countries and, using the skill ecosystem approach, to identify factors that contributed to the robustness and flexibility of VET systems in the face of this external shock. For this article, the German case will be elaborated. The research question for this paper is:

How resilient (in the sense of adaptable, robust, flexible) did the VET structures in Germany prove to be when it came to coping with the external shock triggered by the pandemic, and what measures and institutional actions proved to be particularly beneficial in this regard?

In answering this question, resilience factors will be identified and the sustainability of measures taken to strengthen German VET structures will be examined. The German situation appears to be of particular importance because it is a very strongly institutionalised system that is similar (but not identical) to the structures in Austria and Switzerland (Ostendorf et al., 2019). This paper is therefore a study of a system that is historically strongly anchored in institutions in the country (Thelen, 2004). In this respect, the German system stands as an example of strongly institutionalised VET structures and must also be considered against this background.

This paper explores two critical theoretical starting points in detail. Firstly, it introduces the perspective of the 'skill ecosystem.' Secondly, it presents the findings of Kathleen Thelen (2004), who has extensively examined resilience factors within vocational training systems from a political economy perspective. These two theories will serve as essential references throughout the subsequent document analysis.

Theoretical frameworks

The skill ecosystem perspective

As a theoretical framework guiding our perspective on VET resilience in Germany, the so-called skill ecosystem approach (Buchanan et al., 2017, Hall & Lansbury, 2006; Grainger & Spours, 2018). Originally introduced for so-called 'high skill ecosystems' by Finegold (1999), this perspective was subsequently transferred to the general description of regional vocational training structures and their development.

Buchanan et al. (2017, p. 444) state that 'In essence, researchers and policymakers in this tradition seek to understand skills in context and are concerned with the wider array of determinants associated with workforce development and how this is connected with particular trajectories of social and economic development'. If these contextual factors are considered in relation to the structures of VET, then indicators for their relative reliability can be derived.
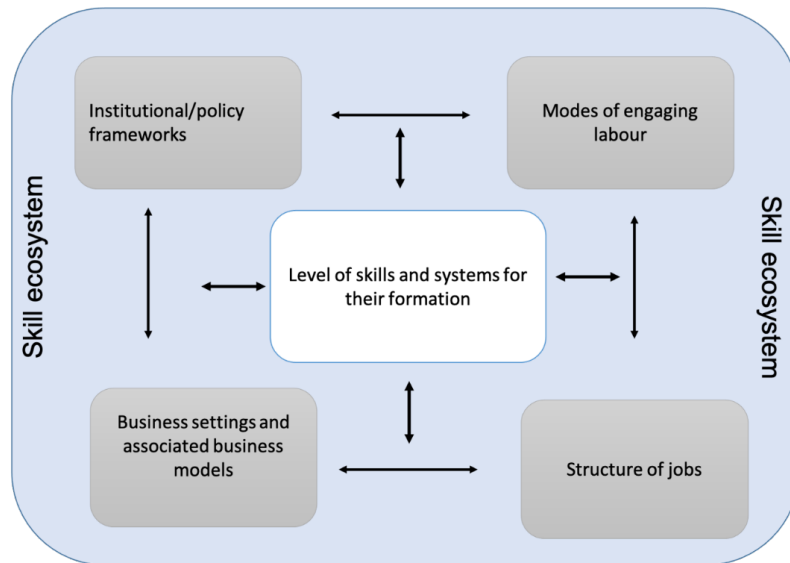

Figure. 1: Skill ecosystem: basic elements (based on Buchanan et al., 2017, p. 444)

No statements can be made in this study about quality in the processes of training. However, it can be assumed that there were considerable problems in distance learning during the pandemic, including psychological stress for the trainees and their trainers, which certainly influenced the quality of competence development. Sector differences were also clear. For example, the food, hotel and aviation industries were particularly affected (Wilke, 2021; cf. Flottau, 2020). In da first step, the Skill Ecosystem (SES) elements should be briefly outlined for the case of the German system.

Level of skills and systems for their formation	The German VET system is based on three pillars: dual VET, full-time school-based VET and continuing education and training. According to the typology of Busemeyer and Trampusch (2012, p. 12), the German vocational training system can be classified as a system with a high degree of public commitment to vocational training and a high degree of company involvement in initial vocational training. Looking at the cohort of young people aged 20–24, the distribution for Germany is as follows: higher education (HE), 30%; school-based vocational training, 4%; dual vocational training, 13%; employed people without formal qualifications, 8%; and employed people with formal qualifications (VET and HE), 21% (BIBB Data Report, 2023, p. 77). Interestingly, the supply of training places was constant during the pandemic and significantly higher than the demand for training places (+62930 in 2020 and +89330 in 2021 compared to +34300 in 2018) (Statistisches Bundesamt o.J.).
Business settings and associated business models	Germany is considered the prototype of a coordinated market economy. In this respect, companies operate freely in the market but are accompanied by the state through legal requirements. Germany's gross domestic product (BIP) experienced a sharp slump during the pandemic in 2020 but had already recovered so well by 2022 that pre-Covid-19 levels were surpassed (see Statistisches Bundesamt o.J.). Overall, the German economy came through the pandemic well.
Institutional/policy frameworks	Vocational training in dual form is regulated for the company-based part mainly by the Vocational Training Act

	(BBiG), and school laws apply to vocational school. There is contractual freedom of contract for the companies. The school partner in dual training is financed and ruled by the federal states. This also applies to full-time vocational schools (e.g. for the training of healthcare personnel or educators). A very prominent feature of the German VET system is the sophisticated corporatism that permeates the entire structure (from the creation of curricula to examination procedures). The social partners (employers' and employees' representative bodies) and the state play an interdependent role in shaping VET.
Modes of engaging labour	The dual form of vocational training enables the relatively protected transition of young people into the world of work. Most of them are taken on by companies after completing their training. The overall rate for 2020 is 72%, with large companies at 88% and small companies (1–9 employees) having the lowest rate at 55% (BIBB Data Report, 2022, p. 253). The rate of unemployed people aged 18–24 was 5.0% in 2021 (5.5% in 2020 and 4.5% in 2019), which is comparatively low and stable (BIBB Data Report, 2023, p. 263).
Structure of jobs	In 2023, most employees in Germany work in the service sector (75.2%), followed by the production sector (23.6%) and the primary sector (1.2%) (Statista, 2023). Vocational training in Germany is aimed at the skilled worker or clerk level. However, within the spectrum of trained occupations (dual and full-time school-based), there are differences, including in the qualitative aspirations of the occupations. For example, within the dual training system, there is a two-year and thus shortened version for simpler job profiles. With further training opportunities, even very demanding positions can be achieved (including self-employment, master craftsman and technician). The vast majority of training companies are small and medium-sized enterprises (1–249 employees) (2021:

	402,585, training company ratio: 18.6%). In 2021, 14,108 training companies (training company ratio 81.5%) were large companies (>250 employees) (Berufsbildungsbericht, 2023, p. 35).

Table 1: Features of the German skill ecosystem

Historical institutionalism

The second theoretical starting point of our investigation relates to the work of Kathleen Thelen. Thelen (2004, 2014) looks at vocational education systems, especially the German system, from the perspective of political economy. This is an obvious perspective, as vocational education systems are central institutions of political economies (Trampusch & Busemeyer, 2010, p. 1). Thelen has developed a specific approach called 'historical institutionalism', which is her attempt to conceptualise country-specific institutional change in terms of the ways and conditions under which institutions have historically changed, often gradually. The focus is on general statements about country-specific variables associated with institutional change. In particular, the focus is often on the transformation of labour institutions (Mahoney, 2017, p. 115). Historical institutionalism is therefore appropriate, as it deals with the development of organisational structures and the institutional anchoring of the VET system in Germany (Thelen, 2004, p. 1).

Like Thelen (2004, p. 35), we assume that *"Institutional survival in the face of shifts in the social and political environment often involves a renegotiation of the coalitional base on which specific arrangements rest, even as such renegotiations drive important changes in the form these institutions take and in the functions they perform in politics and in markets."*

The following five assumptions about the political-economic context of the German VET system (Thelen, 2004) serve to examine the capacity to respond and adapt in terms of resilience during the Covid-19 pandemic, depending on inherent characteristics or peculiarities. These were identified in the analysis of Thelen's (2004) historical discourse as being particularly characteristic of the German VET system. The focus was on the conciseness of the description of resilience-promoting framework conditions. Specifically, the five basic aspects are as follows:

(1) It can be said that the characteristics of the German VET system have grown out of coalitions and political dynamics. The maintenance of (initially rather involuntary) industrial relations was facilitated by regulatory systems based on **legislation** (e.g. Thelen, 2004, p. 70).

(2) The emergence of a coordinated qualification ecosystem occurred through an institutional stratification of work with regard to the craft sector and caused interaction effects in coexistence, which led to advancing the standardisation of German VET with social partnerships. This was of great importance for the **functioning of the industrial relations of the social partnership** (e.g. Thelen, 2004, p. 40).

(3) Political will in combination with the employers as the most important supporters of the German VET system led to institutional reproduction in times of crisis. This emphasises the importance of **the political and economic integration of VET stakeholders.**

(4) The joint cooperation with the system of employers' associations and trade unions in the context of a publicly supported VET system puts pressure on large companies to participate in the system, which reduces the free-rider problem with regard to training issues. This shows **the importance of a high degree of social partnership coordination for more responsiveness and adaptability.**

(5) In this context, trade unions have the capacity to monitor the training system, provide guidance, negotiate training quotas, etc., which allows for the emergence of governance, especially to resolve conflicts over the governance and content of VET. Therefore, one can **say that institutionalisation and shared concern as a basis for governance measures in times of crisis is essential.**

In the following qualitative–empirical document analysis (Lang, 2023), the theoretical concepts of Buchanan et al. (2017) and Thelen (2004) are used as a search basis. First, an attempt is made to sort and classify the statements on crisis management in the documents vis-à-vis the SES elements. Second, the basic characteristics of the German VET system elaborated by Thelen (2004) are used as a heuristic basis to identify institutional changes. Causal statements cannot be made using this approach. Rather, the aim is to identify coping patterns and their possible contribution to the resilience of the system.

Institutional and political measurements during the pandemic and their meaning for VET structures – a qualitative–empirical study

Method

The problem in the research is to scientifically record the resilience-promoting factors that arose in the qualification ecosystem during the Covid-19 pandemic as a result of appropriate reactions or measures. In the interest of capturing the complex interrelationships, it was decided to conduct empirical work in the form of a document analysis of selected documents from various (vocational) institutions in the German vocational training system. For the theoretical underpinning of the document analysis— due to its embedding in the political science context with regard to the skills ecosystem— reference was made to the document analysis of policy research in the history of ideas (Salzborn, 2018). The focus was on the content analysis of descriptive (discussing facts) and prescriptive (describing norms) documents (Salzborn, 2018, p. 26).

To obtain as holistic an overview as possible of the measures taken during the Covid-19 pandemic, a stakeholder-centred approach was followed. This means that documents from the various stakeholders of the German VET system (state, trade unions, companies/business associations) were considered for the document analysis (Lang, 2023). In addition, documents from international institutions related to VET, such as the European Centre for the Development of Vocational Training (CEDEFOP), were also included. The documents were found exclusively via web-based research. The criteria listed in Table 2 were used to select the documents.

Document types	Descriptive documents Prescriptive documents
Authors	Primarily national players in the dual VET system (state/trade unions/companies), in addition to international actors (e.g. CEDEFOP)
Regions	National origin, documents at the federal level, Extended to include international, European documents that refer to the German vocational training system
Time frame	March 2020–August 2022
Document form	No determination, primarily search for press releases, position papers, regulations or guidelines
Profundity	No determination

Table 2: Selection criteria for documents

The documents are not necessarily scientific but are contemporary. The four documents in Table 3 became the focus of analysis.

Stakeholder	Number of documents	Documents
Bundesinstitut für Berufsbildung (BIBB) (Federal Institute for Vocational Education and Training)	2	Bundesinstitut für Berufsbildung 2022: Effects of the COVID-19 pandemic on vocational education and training: International perspectives of policy makers and practitioners Bundesinstitut für Berufsbildung 2022: Berufsbildungsbericht 2022 (Vocational Education and Training Report, 2022)
Allianz für Aus- und Weiterbildung (AAW) (Alliance for education and training – state, trade unions, companies)	1	Allianz für Aus- und Weiterbildung 2020: Gemeinsame Erklärung der Allianz für Aus- und Weiterbildung: Gemeinsam den aktuellen Herausforderungen durch die Corona-krise auf dem Ausbildungsmarkt begegnen - Gemeinsam den Ausbildungsmarkt stabilisieren (Joint declaration by the Alliance for Initial and Continuing Training: Working together to meet the current challenges posed by the Corona crisis on the training market - Working together to stabilise the training market)
International vocational institutions	1	European Centre for the Development of Vocational Training (CEDEFOP) 2020: Germany: Multiple VET stakeholder responses to Covid-19 outbreak

Table 3: Selected documents

As documents from trainees, parents' associations or youth representatives of trade unions are always reactions to governmental or semi-governmental measures and not descriptions of the measures themselves, they were excluded from the actual document analysis, although these groups are also actors in the vocational training system.

In addition to the formal analysis, which is negligible for the purposes of this study, the main component of the document analysis was an examination of the content. This was done in the following way. The system for examining the documents is roughly based on Salzborn (Salzborn, 2018, p. 26) and Mayring (Mayring, 2016, p. 72). The actual content analysis, which consists of the three stages of text structure (1), text content (2) and final

evaluation (3), was extended in the area of text content to include classification in terms of the logic of the skill ecosystem categories. In addition, the assumptions made regarding the political–economic context of the German VET system were checked.

Components of the content document analysis	Aspects to be examined	
1. Text structure	Structure, type of thought leadership Clarification structure	
2. Text content	Central theses

Arguments and conclusions of the texts

Elaboration of the key concepts | Extended to include classification in terms of the skill ecosystem elements:
• Institutional/political framework conditions
• Modes of workforce employment
• Economic framework conditions and related business models
• Structure of jobs
• Skill levels and systems for their training |
| 3. Final evaluation | Inconsistencies

Intentions/Interests Author

Appropriateness of author's context

Review of the research question | Expanded to include classification terms of the political economy context:
• Legislation affecting VET as a resilience-promoting framework condition
• The importance of the functioning of the industrial relations of the social partnership
• The importance of the political and economic integration of VET institutions
• The importance of a high level of social partnership coordination for increased responsiveness and adaptability
• Institutionalisation and shared concern as a basis for governance measures in times of crisis |

Table 4: Aspects of the study

To increase the validity and reliability of the research method, complete documentation of the document analysis was carried out in tabular form using a predefined scheme for

maximum transparency. Below is an excerpt from the document analysis of the document titled Effects of the COVID-19 pandemic on vocational education and training: International perspectives of policy makers and practitioners (Bundesinstitut für Berufsbildung [BIBB], 2022).

The two-pronged approach can be seen in figure one—first, the classification into the skills ecosystem categories (SE 1–SE 5) and second, the final evaluation by comparison with the assumptions made through the analysis of Thelen's work (U1–U5).

Allgemeines	e Ananlyse								
Titel							Abschlussbewertung		
	SE-Kategorien					Überprüfung der Untersuchungsaspekte			
	SE 1: Wirtschaftliches Umfeld, Geschäftsmodell, Rahmenbedingungen	SE 2: Strukturen der Arbeitsplätze, Berufsstrukturen	SE 3: Arbeitsmarkt-zugang	SE 4: Institutioneller, politischer Rahmen	SE 5: Niveau und Art der Qualifizierung hinsichtlich beruflicher Kompetenzen	(U1): Die deutsche Berufsbildung betreffende Gesetzgebung lässt resilienzfördeliche Rahmenbedingungen entstehen.	(U2): Die Resilienz des deutschen Berufsbildungssystems ist vom Funktionieren der Arbeitsbeziehungen der SozialpartnerInnenschaft	(U3): Wenn Institutionen der Berufsbildung politisch und wirtschaftlich integriert sind, so steigert dies die	(U4): Je höher der Koordinierungsgrad der SozialpartnerInnen, desto reaktions- un anpassungsfähiger i
Effects of the COVID-19 Pandemic on Vocational Education and Training: International Perspectives of Policy Makers and Practitioners	Text Shahin/ Hermann: Gut angebautes u. funktionierendes Gesundheitssystem (Zahl Intensivbetten, … S.25) Unterstützung selbständiger in allen Branchen zum Erhalt eines stabilen wirtschaftlichen Umfelds (KünstlerInnen, HandwerkerInnen, … S.28=	Text Shahin/ Hermann: Zeitlich und Ort des Arbeitens > Flexibilisierung > Reduzierung der Arbeitszeit und auch des Örtes (Kurzarbeit + Homeoffice -> zeit- und raumgeändertes Arbeiten?) (S.27) Damit einhergehend: Anpassung	Text Shahin/ Hermann: Finanzielle Förderung Studierende, zur geringfügigen Beschäftigung/ Studienfinanzier ung (S.29, 30)	Text Shahin/ Hermann: soziale Marktwirtschaft (polit. Maßnahmen Regulierung, Stabilisierung, Förderung Wirtschaftstätigkeit; aktive Unterstützung Bereitstellung Arbeitskraft, Gewährleistung soz. Sicherheit; S.25); Bonuszahlungen KMU Ausbildungsanstrengungen; Ordnungspolitik: Breit angelegte Tests, konsequente Kontaktbeschränkungen (S.25); Bundesprogramm zur Bewahrung von Ausbildungsplätzen vom Bundesministerium für Bildung und Forschung (BMBF) -> Einführung von Kurzarbeit = Reduzierung der Arbeitszeit statt Entlassungen; staatliche Ersatzzahlungen für Einkommensverluste (S.25, 26); Eingang AAW Bundesprogramm für KMU -> 2 TE pro Auszubildende, die Plätze stabil halten, 3 TE für	Text Shahin/ Hermann: Förderung Digitalisierung (berufliche) Bildung (S.29); Digitalisierung und Bildung, IT-Infrastruktur, Digitalpaket Schule, Förderung bspw. "HPI-Schulcloud" (S.29) Text Carancho: Schulung- und	"Likewise, for Vocational Education and Training, measures specifically responding to the COVID crisis could be built on the solid basis of the dual VET system, particularly its legal and regulatory framework, and funding of training, and the permanent research and monitoring of economic, labour and training developments" (S.26)	"Likewise, for Vocational Education and Training, measures specifically responding to the COVID crisis could be built on the solid basis of the dual VET system, particularly its legal and regulatory framework, and funding of training, and the permanent research and monitoring of economic, labour and training developments" (S.26) "Unions, social organizations, sector representatives, pupils' and parents' bodies		Text Carancho: Anpassungsfähigke durch übermittlicho Zusammenschlüsse zur Aufrechterhaltu der Ausbildung (S. "During the course the coronavirus pandemic, some companies that wer no longer able to provide parts of training have transferred these p to other companies to inter-company educational institutions" (S.44)

Figure 1: Sample excerpt from the document analysis (for illustration purposes)

Changes in the German SES during the pandemic

Governmental reactions

Regarding the economic environment, the business model and the framework conditions, the documents refer to the German social market economy as the 'backbone' of VET in times of crisis with a fundamentally well-developed healthcare system (BIBB, 2022, p. 25), which has already been able to gain experience with legal and regulatory measures in times of crisis (such as the economic and financial crisis of 2008). As far as the institutional and political framework is concerned, the comprehensive package of economic, social and labour policy measures from the year 2020 is cited as an argument, the financial support for which in the form of the so-called Kurzarbeitergeld (short-time allowance) and bonus schemes helped in maintaining training places, especially in

companies in crisis. A legal amendment to the short-time allowance extended trainees' entitlement to this allowance after a six-week reduction in working hours due to the pandemic. In addition to financial support, for example through the federal programme Sicherung von Ausbildungsplätzen (Securing Training Places) (Bundesministerium für Bildung und Forschung [BMBF], 2022, p. 7), various instruments for the 'inclusion' of people without recognised vocational qualifications were introduced. A further strengthening of VET around higher qualifications was achieved during the Covid-19 pandemic in 2020 through the Aufstiegsfortbildungsförderungsgesetz (Upgrading Training Assistance Act). A change in the structure of jobs occurred on one hand due to the sudden increase in the importance of professions in the social and health sectors (BMBF, 2022, p. 12). On the other hand, the increasing digitalisation of processes and the flexibilisation of time and place also led to a change in qualification levels and systems for training through new online tools, learning pacts by mail or a 'DigitalPakt Schule' ('DigitalPact School'), which, depending on the federal state, involved equipping students with digital technology and learning infrastructure (BIBB, 2022, p. 29, p. 43). Regarding forms of access to the labour market, significant adjustments were made through digital innovations in the area of career guidance, as well as telephone or video applicant training and 'Skype speed dating' for training places (BIBB, 2022, p. 42).

Reactions from the stakeholder network (Alliance for Education and Training)

The Allianz für Aus- und Weiterbildung (AAW) (Alliance for Education and Training) can be cited as an important example of action coordination between stakeholders in the German VET system, as it consists of representatives of the Länder (Federal Government), companies and trade unions.
Regarding the institutional and political framework, in addition to the above-mentioned Ausbildungsplätze Sichern (Securing Training Places) programme, the federal programme JOBSTARTER plus is described as an attempt to win back small and micro enterprises for training (AAW, 2020, p. 4). In addition to the DigitalPakt Schule (DigitalPact School), which has already been described, the Digital Education Campaign with corresponding funding for digital/digitally supported teaching is also planned (AAW, 2021, p. 3).
The modes of employment of the workforce go hand in hand with the economic environment in that generally more difficult conditions for the implementation of training (also with regard to the filling of positions, with an 11% decrease in training contracts in 2020) have been described (AAW, 2021, p. 2). In this context, it was agreed within the AAW partnership to increasingly address young people digitally with regard to career orientation and the initiation of training contracts, which went hand in hand with the targeted addressing of schoolchildren and non-schoolchildren, a digital learning platform with career guidance services, the establishment of training ambassadors, digital career counselling and even digital career matching services, such as career speed dating

(AAW, 2021, pp. 3–6). Job structures have also changed in terms of agreements to implement company orientation formats such as student internships in digital form. Changes in the economic environment, access to the labour market and job structures have also had an impact on qualification levels and systems for their training; in addition to digital exam preparation, the use of inter-company vocational training facilities has become possible (AAW, 2021, p. 6).

International reactions

The international document confirms the importance of the following measures in relation to the economic and political framework, the levels and types of qualification and access to the labour market: the short-time allowance for apprentices and the facilitation of final examinations through modified examination settings and increased precautions. In this context, to increase the likelihood of participation in final examinations, face masks were made compulsory in all vocational schools, examination groups were kept small and younger examiners were required to minimise health risks (CEDEFOP, 2020). Considerations of the economic environment or the framework conditions of the German VET system are largely omitted.

Vocational training policy measures during the pandemic and their importance for the resilience of the overall system

The respective documents exemplarily reflect the pandemic-related measures and reactions of the German VET system stakeholders. Following the measures identified during the Covid-19 pandemic and allocated to the skill ecosystem, we will now answer the question of the extent to which Thelen's four assumptions about the resilience of the German VET system apply.

Legislation affecting VET as a resilience-promoting framework condition

"Likewise, for Vocational Education and Training, measures specifically responding to the COVID crisis could be built on the solid basis of the dual VET system, particularly its legal and regulatory framework, the state and businesses' cooperation in the provision and funding of training, and the permanent research and monitoring of economic, labour and training developments." (BIBB, 2022, p. 26).

This quote suggests that the legal and regulatory framework for VET in Germany can be considered significant. The Federal Institute for Vocational Education and Training

refers to the cooperation of the social partners in researching, providing and monitoring training. An important example is the regulations on short-time work allowances, which were relaxed in the context of the Covid-19 pandemic (CEDEFOP), 2020). As far as continuing vocational training is concerned, we can cite the Arbeit-von-morgen-Gesetz (Work of Tomorrow Act), which covers the entitlement of low-skilled workers to subsidies on one hand and the recognition of foreign vocational qualifications on the other and is thus a classic instrument of labour market policy (Bundesministerium für Arbeit und Soziales [BMAS], 2020). In addition, the Fourth Amendment to the Upgrading Training Assistance Act was enacted in 2020 to strengthen higher-quality VET and maintain its competitiveness vis-à-vis academic education (BMBF, 2022, p. 20). As measures, these two laws cannot be directly linked to the Covid-19 pandemic, but they were enacted during the pandemic and can be described as stabilising.

The importance of the functioning of the industrial relations of the social partnership

Here, too, the quote from point 3.3.1. could be added. In addition, however, not only the cooperation between the state and enterprises is emphasised but also that of trade unions, students, parents, civil society and social organisations during the pandemic (BIBB, 2022, p. 30). The Report on Vocational Education and Training 2022 also describes the importance of functioning industrial relations. This was particularly evident in the prevention of further declines in the number of new training contracts concluded in 2021 (cf. BMBF, 2022, p. 7). Other examples cited are the maintenance of as many training relationships as possible and the completion of final examinations (BMBF, 2022, p. 18, p. 90). The emphasis is repeatedly placed on the joint efforts of the various players in the system (trade unions, companies, chambers, enterprises, trainees, etc.).

The importance of the political and economic integration of VET institutions

"Unions, social organizations, sector representatives, pupils' and parents' bodies, and other civil society voices campaigned for their respective interests to be considered." (BIBB, 2022, p. 30).

Based on this statement, the integration of VET institutions can, in principle, be described as beneficial. However, this is not necessarily only about political and economic integration but much more about integration in society itself. One example of political and economic integration is the joint public relations work of the AAW to promote dual training. Here, training and skilled labour campaigns, some of which are country-specific, are supported by role models, such as influencers, or classic advertisements (AAW, 2021, p. 8)

The importance of a high level of social partnership coordination for increased responsiveness and adaptability

Due to its composition, the Alliance for Education and Training can be described as a collective with a high degree of coordination, as it addresses the structural challenges of the training market from different perspectives. Basically, it deals with demand-side problems, such as the shortage of applicants, and related measures. However, in special situations such as the Covid-19 pandemic, supply-side problems also come to the fore, as reported in the Report on Vocational Education and Training for the Year 2022 (BMBF, 2022, p. 12) The BIBB document also makes clear that the adaptability offered by inter-company training networks promoted the resilience and maintenance of training during the pandemic:

"*During the course of the coronavirus pandemic, some companies that were no longer able to provide parts of training have transferred these parts to other companies or to inter-company educational institutions.*" (BIBB, 2022, p. 44).

The example mentioned is about companies that join forces to outsource training to several companies or inter-company training facilities. This was dealt with in the form of training alliances, which improve not only the training but also the trainees' chances of being taken on by changing the place of learning and the associated different work organisations, equipment and contacts. This division of training requires a high degree of joint coordination. A high degree of coordination can also be seen around final examinations. Here companies, the state and the chambers had to work together to make this possible.

Institutionalisation and common concern as a basis for governance measures in times of crisis

Here too, the AAW can be cited as an example of the phenomenon of collective action. Already at the beginning of the pandemic, the joint declaration 'Tackling the current challenges of the training market crisis together–stabilising the training market together!' (AAW, 2020) was a response to the emerging problems. This was followed by the federal programme Securing Training Places (AAW, 2020, p. 2) and the joint approach to digital career guidance. Both measures reveal the emergence of steering and regulatory systems in the sense of pandemic structural measures (i.e. governance):

"*To this end, it is of paramount importance to provide young people with comprehensive access to all vocational orientation opportunities and to use digital formats in particular for this purpose. Federal and state governments, employment agencies, business associations, chambers and trade unions have responded to this challenge with great flexibility and creativity. The Alliance partners have expanded their digital careers guidance services in many ways. They support young people and companies with a growing and*

regionally differentiated range of digital careers advice services, virtual company placements, digital insights into the world of work and vocational training, virtual careers interviews and training fairs - supplemented by social media campaigns." (Own translation according to AAW, 2021, p. 3)

Shared concern is also evident, for example, in inter-company training (BIBB, 2022, p. 44) and in the already described measures for conducting final examinations.

Conclusion: resilience-promoting patterns

Based on this document analysis, it can be seen—in very broad terms, of course—that the institutional arrangements of the German VET system are proving to be resilient in the face of exogenous shocks. It is complex to trace and understand the stability of the elements of the system. However, the German VET system has undergone a form of adjustment during the Covid-19 crisis. This manifests itself in political, social and market changes in the form of various measures that were ordered based on the qualification ecosystem. It is also evident that the system is not self-sustaining but depends in its institutional design on an interplay of action logics, public policies, and organisational structure.

In summary and in principle, one can see a certain resilience-promoting pattern in the policy responses during the pandemic for the German VET system:

The use of already existing established routines and structures

In this context, phenomena such as the high degree of coordination between the social partners manage to respond to complex coordination problems, resulting in coordinated structural measures. As an example of a complex coordination problem, inter-company mergers on training issues can be mentioned to maintain training during the pandemic. Several companies and inter-company training institutions joined forces. The completion of training was achieved through training alliances, which involved a change of learning location and the associated different work organisation, equipment, and contacts (Bundesinstitut für Berufsbildung, 2022, p. 44).

The functioning of industrial relations can be seen as 'a mode of self-governance that operates through the country's social partners and without much direct intervention by the state' (Thelen, 2004, p. 6). An example of self-organisation in this context is the placement of trainees in the event of insolvency or permanent closure, which is also carried out without government support. Here, trainees whose training relationship cannot be continued due to an involuntary closure are placed in another training

company. This is done through the joint efforts of the social partners, the Chamber of Industry and Commerce and the employers' associations (Allianz für Aus- und Weiterbildung, 2020, p. 6). Mechanisms such as sensitive legislation are still part of a large institutional package that, in the case of the Covid-19 pandemic, included safety nets and, for example, the adaptation of short-time work. If it was not possible to continue the training under changed conditions (e.g. online format), the trainee is initially entitled to continued payment of wages by the employer for six weeks. After that, the continued payment of wages is covered by the state short-time allowance. The short-time allowance is not paid during periods of compulsory vocational school (which is held on a daily or weekly basis, depending on the model) (BDA, 2023, pp. 14). In this context, the German VET system can be described as collective in the sense that it leads to the emergence of governance with the different institutions of VET. According to Thelen (2004, p. 19), the reason for this can be found in the fact that the training costs must be amortised for all participants, which is further monitored and strengthened by corporatist supervision, for example by broad-based employers' associations and trade unions with corresponding interest groups.

Shared concerns and solidarity

The need for and power of cooperation is also evident in the collective of the Alliance for Education and Training, whose ultimate common goal is to stabilise the training market in times of pandemic. There was widespread societal 'concern' about dual education during the pandemic, which led to immediate action and policy commitments. As early as the end of May 2020, the Federal German Minister of Economics called for this alliance, which was then joined by a total of 16 employers' associations, trade unions, the Conference of Ministers of Education and Cultural Affairs, the Conference of Ministers of Economics of the German states and the Federal Employment Agency, and through which significant measures were immediately taken to stabilise VET. A concrete example of measures taken by the Alliance for Education and Training is the cooperation on the digitalisation of careers guidance services. This has resulted in the Federal Employment Agency conducting digital counselling interviews and companies enabling digital job interviews. In addition, trainees were given the opportunity to use digital formats for exam preparation before the final exam, and free capacity in inter-company vocational training facilities was made available for exam preparation (Allianz für Aus- und Weiterbildung, 2021, pp. 3-6).

Accordingly, there seems to be a link between the characteristics of the German VET system and the resulting resilience to stressful situations such as a pandemic. This can be seen in the ability to adapt, at least in the short term, through ongoing training activities, the conducting of final examinations, the availability of training places and so on.

State protective shield

In this context, the relatively strong steering function of the state during the Covid-19 pandemic is recognisable (financing of the in-company training component through the promotion of cooperative training, financial support through federal programmes such as Securing Training Places (Fassbender, 2022, p. 182). Of particular importance during the pandemic was the state's intervention in the economy through the so-called short-time allowance (Hagelüken, 2021, p. 15; Dullien et al., 2021). This tool, which proved particularly effective during the financial market crisis of 2008-2009, was also used very quickly during the pandemic. In April 2020, almost 6 million employees in Germany (= 17.9% of all employees subject to social security contributions) were on short-time work. However, there is a legal requirement for apprentices to first receive 6 weeks of normal continued pay (§ 19 BBiG) and then a short-time allowance (but not for the vocational school part of the training). Attempts were made to avoid short-time work for trainees by providing subsidies (partial payment of trainees' and instructors' wages) to training companies (Bundesagentur für Arbeit, 2022). Short-time work did not only have positive effects, especially for apprentices. For example, trainers and their colleagues were sometimes absent from the company due to short-time work and could therefore not provide their training services, or certain areas of work had to be left out of the training programme. This was particularly evident in the catering sector. Here, trainees sometimes had to step in or were left more on their own but were also allowed to take on more responsibility (Wilke 2021).

All in all, short-time work saved around 2.2 million jobs in Germany at the height of the Covid-19 crisis and meant that economic potential could be immediately restored when the situation eased. During the Covid-19 crisis, the government's rescue efforts were much stronger than during the financial market crisis, as service providers were also hit particularly hard (catering, culture, retail).

Outlook

If one looks at the pandemic period from the perspective of the year 2023, it can be said that today, at first glance, hardly any effects can be immediately seen—apart from more openness regarding digitally supported communication and teaching. However, some current developments are related to the pandemic. In the immediate aftermath of the pandemic, for example, there was a very glaring shortage of skilled workers, which was also countered by dual training. Despite this, many apprenticeships still cannot be filled today. During the Covid-19 pandemic, there was a sharp drop in the number of new entrants to VET, but this had already stabilised by 2022. The dual form of vocational

training in particular saw growth (+1.3%), while the other areas of full-time school-based vocational training tended to decline slightly (BIBB Data Report, 2023, p. 78). VET data (BIBB Data Report, 2021) show that Germany saw a decline in newly concluded training contracts (dual system) of -11% between 2019 and 2020 and that the system has yet to reach pre-Covid-19 figures.

	2018	2019	2020	2021	2022
Absolute numbers	531.414	525.039	467.484	473.064	475.143

Table 4: New VET contracts in Germany (dual training system) (source: BIBB Data Report on the Vocational Education and Training Report (2021, p. 48; 2023, p. 47)

However, other factors must also be considered (such as lower demand due to demographic trends and less interest in training), and a slight quantitative upward trend can be noted. Yet, there is still a shortfall of about 9% in 2022 compared to the pre-Covid-19-year 2019. The pandemic has also highlighted the importance of trade fairs and internship opportunities for the allocation of the training place market. Nevertheless, a high degree of stability of the system as a whole can be assumed.

On a positive note, the Alliance for Education and Training continues to exist even after the pandemic (AAW, 2023). In their latest declaration for the period 2023–2026, they are stepping up efforts to promote dual training against the backdrop of social and economic transformation processes, the integration of refugees and youth vocational guidance. It sees itself as a central political platform and as an action alliance for the promotion of dual vocational training. Emphasis is placed on collaborative action and the contributions of all stakeholders.

The challenges will not diminish, even after the pandemic. However, the pandemic has shown where there is still room for improvement and what the really important levers are. Solidary common action and the care of the state are certainly part of this.

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Challenges and demands of work-related VET education and training experiences during the Corona Pandemic: A retrospective Latvian Skill Ecosystem Study

Irina Maslo, Svetlana Surikova, Rita Birzina

The Asia-Europe Education and Research Hub for Lifelong Learning conducted a research network study on the resilience of Skill Ecology Systems (SES) in pandemic times in Asian and European countries from March 2020 to October 2021, serving the SES concept as an analytical perspective for identifying its resilience-building elements. In 2022, key developments and resilience-building elements were identified, considering the organisational, political, regulatory, and cultural dimensions of workers' learning environments.

The current retrospective research on VET teaching and learning in Latvia during the epidemic was conducted by a cross-network team of the University of Latvia in 2023. This chapter focuses on Latvia's challenge-oriented innovation policy and identifies innovation demands in the SES in Latvia. The study addresses innovation needs in the SES in Latvia and focuses on demands for a challenge-oriented innovation policy.

The study tackles normative and causal contestations in work-related VET education and training that call for significant mobilisation and coordination among actors with various levels of commitment. Taking organisational, political, regulatory, and cultural aspects of workers' learning settings into account, key normative, discursive, and practical demands on taking challenge-oriented strategies will be highlighted.

Keywords: VET Skill Ecosystem, retrospective study, workplace resilience, corona pandemic challenge-oriented policy strategies

Introduction

Latvia participated in the research network study 2020–2023 on the resilience of Skill Ecology Systems (SES) in pandemic times in Asian and European countries. The SES concept provided an analytical perspective for identifying key developments in work-related vocational education and training in Latvia. This analytical framework of the SES

research (Buchanan et al. 2017) was particularly concerned with identifying the country-specific context, which was structured into elements as follows:

(1) Business settings and associated business models;
(2) Institutional policy frameworks;
(3) Modes of engaging labour;
(4) Structure of jobs; and
(5) Skill formation.

Our Latvian research cross-network team of the Asia-Europe Education and Research Hub for Lifelong Learning (ASEMLLL) conducted a retrospective Latvian study on these five context variables of the SES.

During the first and second phases of the survey "VET Resilience in the Pandemic," carried out from March 2020 to October 2020 and from October 2020 to October 2021, respectively, an online network-project questionnaire was filled out and useful documents and papers were mapped.

A number of key developments were identified in the spring of 2022 in view of the many dimensions of workers' learning environments - organisational, political, regulatory, and cultural - and how they change over time, enabling us to see social ecological development possibilities (Evans 2019).

In this chapter, we will explain the effects of the pandemic on VET teaching and learning. Approaching a challenge-oriented European innovation policy concept, we will identify innovation demands in the SES in Latvia. Innovation-based policymaking resulted in solutions that included a wide range of VET actors, fields, sectors, and technologies. These involve two complexities in the context of issues in work-related VET education and training. First, the content of the challenges will be addressed in relation to the normative and causal contestations of the VET Skills Ecosystem. Second, innovation-based policymaking necessitates substantial mobilisation and coordination, frequently including numerous actors with wildly varying levels of commitment. The normative, discursive, and practical demands of challenge-oriented strategies will be shown by these complications (Boon & Edler 2018; Uyarra et al. 2019).

Business settings and associated business models

Developments in Latvia's economy during the pandemic

The COVID-19 virus was first detected in Latvia on March 12, 2020. In order to limit the spread of the infection, it was decided on March 13, 2020, to declare an emergency situation (Cabinet of Ministers 2020).

The pandemic impacted Latvia's economy as seriously as that of most countries. In the first quarter of 2020, Latvia's GDP fell by 1.5% compared to the first quarter of 2019 (Official Statistics Portal 2020: Mai, 29).

Industries and types of businesses most affected

COVID-19 had an effect on practically every area of the Latvian economy. The accommodation and food service sector (down 38.1%) was one of the industries most negatively impacted, while that of the catering industry was negatively impacted (a decrease of 32.6%) as a result of gradually tightening restrictions and epidemiological requirements for services.

Most severely affected were arts, leisure, and recreation industries, where the decline from the equivalent period of the previous year reached 26.6% due to national limits on the spread of the infection. (Ministry of Welfare 2021: 9).

According to data on collective layoffs caused by COVID-19, 58 businesses had 5.703 employees scheduled to be let go. These businesses were in the following industries: transportation and storage; administrative and support services; accommodation and food services; wholesale and retail trade; re-cultivation activities; real estate activities; arts, entertainment, and recreation; professional, scientific, and technical services; forestry; financial and insurance services; and information and communication (Ministry of Welfare 2021: 10).

Regional differences in the context of COVID-19

At the regional level, unemployment rates vary across regions, with the highest rate in the Latgale region (15.8%) and the lowest in the Riga region (5.6%) in 2020.

Although the regional disproportions of the labour market have somewhat levelled out during the crisis, the unemployment rate in the Latgale region was still more than twice as high as the average in Latvia but more than three times higher than in the Riga region, which, together with the low geographical mobility of the workforce, increased the risks of structural unemployment and labour shortages (Ministry of Economy 2021: 103).

Institutional policy frameworks

Institutions important for vocational education and training react to the crisis

The Ministry of Education and Science (MoES), VET institutions, and other stakeholders were in constant contact and close collaboration to design and improve the distance learning process, as well as assess the situation swiftly and effectively. The MoES ordered three surveys on the use of remote learning during the emergency, with over 60.000 respondents, including instructors, students, parents, and school administrators (CEDEFOP 2020).

ESF additional funding was ensured to provide vocational education institutions with the opportunity to deal with the crisis by providing teachers and administrative staff of VET institutions with planned training events in a remote format.

In March 2020, the National Centre for Education[1] introduced and disseminated recommendations for remote learning in general and vocational educational institutions[2], addressing school management, teachers, and coordinators, to ensure pedagogical continuity during a temporary suspension of on-site learning. These recommendations could be adjusted to specific contexts and needs, making it possible for schools and teachers to develop their own strategies. It was recommended that the schools use formative assessment; there are guidelines for assessing the achievements of students in the distance learning process, both formative and summative (CEDEFOP 2020).

The Employers' Confederation of Latvia (LDDK)[3] helped the national government finalise the economic recovery strategy, leading the National Tripartite Cooperation Council (NTCC)[4].

Modes of engaging labour

The COVID-19's quick global expansion and the reduction in economic activity since March 2020 have both contributed to a sharp decline in the labour market.

Situation on the labour market

According to data from June 2020, Latvia's official unemployment rate was 8.6% and 7.2% in the third quarter of 2021, 0.5 percentage points higher than the average for the EU (6.7%) (Ministry of Welfare 2021: 14) (Table 1).

	2020	2021	2021		
			1st quarter	2nd quarter	3rd quarter
Total (15-74 years)	78.7	70.6	74.7	73.4	67.9
Males	44.4	40.2	40,5	43.6	40.6
Females	34.3	30.5	34.2	29.8	27.3
Young people (15-24 years)	8.8	8.3	8.5	9.5	9.1

Table 1: Number of unemployed persons (thousand). OSP database: NBB020 and NBB160c

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[1] https://www.visc.gov.lv/en/about-us

[2] https://www.startit.lv/upload/grid/uploads/document/file/5e733426471794000c01459a/VISC_Skola2030_Vadl nijas_atta_lina_ta_m_ma_ci_ba_m.pdf

[3] https://lddk.lv/en/about-lddk/more-about-lddk/

[4] https://lddk.lv/en/national-tripartite-cooperation-council/

Youth unemployment rate. In 2020, Latvia's youth unemployment rate (those between the ages of 15 and 24) was 14.9%, down from 12.4% in 2019 and 16.9% on average across the EU. When the unemployment rate for those aged 15 to 24 is compared between the fourth quarter of 2019 and the third quarter of 2020, it can be observed that it increased significantly from 10.1% to 18.2%, with male unemployment rising significantly from 8.4% to 21.9% and female unemployment only slightly from 12% to 13%. The unemployment rate for people aged 25 to 34 increased significantly from 6.3% to 9.3%, with a major increase in male unemployment from 7.2% to 9.9% and a slight increase in female unemployment from 5.1% (Ministry of Welfare 2021: 10).

In September 2020, the young unemployment rate did not exhibit any notable development in total. In general, 18.2% of youngsters were unemployed, 7.7% of those aged 15 to 24, and 9.4% of those aged 25 to 34 (Official Statistics Portal, 2022: February 24) (Figure 1).
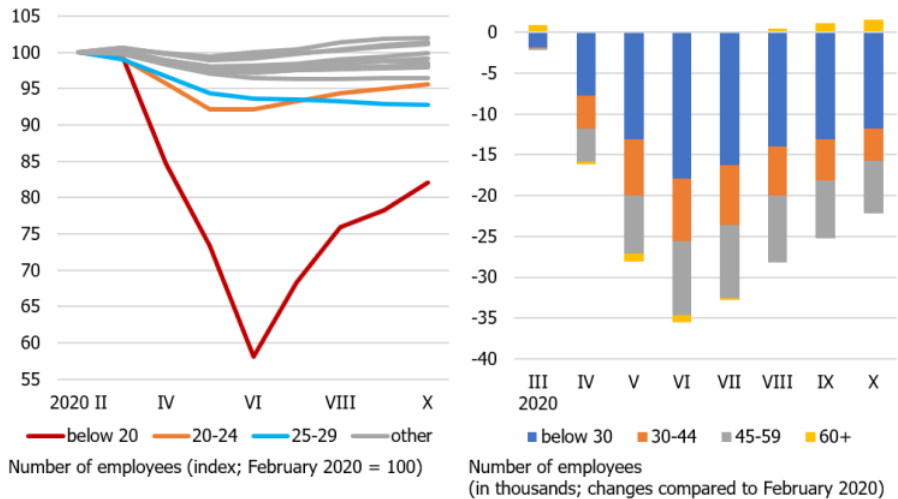

Figure 1: Employment changes by age group. Source: CSB and SRS (Krasnopjorovs 2021: 6)

Structure of jobs

Jobs currently affected by the crisis

Since March 2020, 90% of all job losses have occurred in the private sector, which includes industries most affected by the crisis, e.g., accommodation and food services,

beauty care, tourism, etc. However, within a few months, layoffs also affected the public sector. Given a sharp drop in tax revenues, the government was unable to fund all its functions at the previous level.

Different services were affected quite differently. For instance, in October, accommodations and food services had 15.0% fewer jobs than in February. At the same time, the number of jobs in information technology (IT), education, healthcare, and public administration remained almost unchanged (Krasnopjorovs 2021: 3).

The epidemiological condition continued to worsen by the year's end. Economic activity was negatively impacted by the COVID-19 control measures, being tightened. However, this time, there were much fewer layoffs than in the spring.

Positive developments were not likely to be predicted in this situation prior to the easing of the restrictions on international passenger flows designed to contain the virus (Figure 2).

(index; 2019 Q4 = 100; seasonally adjusted data)
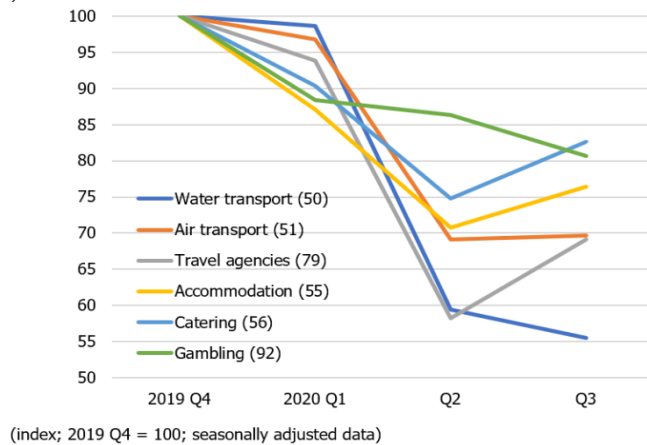
Figure 2: Number of jobs in the most-affected services subsectors. Source: CSB firms' survey (Krasnopjorovs 2021: 3)

The number of jobs decreased mostly in larger cities. While the number of jobs decreased in all Latvian municipalities, the decline observed in cities was more pronounced than that in other municipalities. This could be explained both by the economic structure of cities, which is more oriented towards private sector services, and by their higher population density. Among Latvian cities, Riga and Jūrmala suffered the largest layoffs (Figure 3).
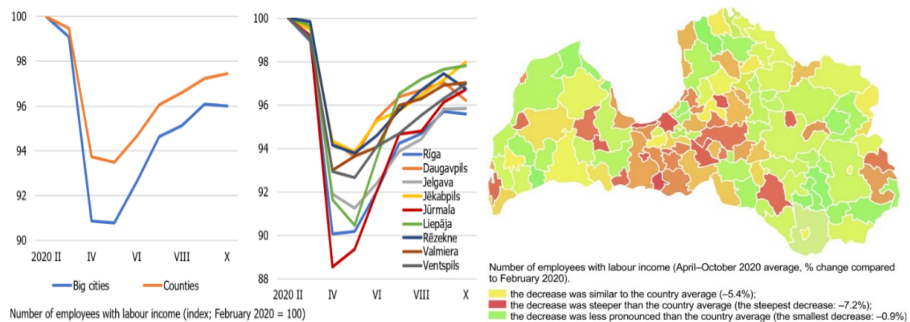
Figure 3: Employment changes by municipality. Source: CSB and SRS (Krasnopjorovs 2021: 7)

Changes in the mode of work during the pandemic

Modern technologies made it possible to organise the work of companies outside offices and across national borders, which was not widespread before the COVID-19 crisis. The pandemic forced many companies to rapidly change the organisation of work because working from home made it possible to continue the company's operations while giving employees the opportunity to work in safer conditions for their health and avoid the spread of the COVID-19 virus in the workplace.

In June 2020, one fifth (20.9%) of employees had the opportunity to work remotely, but 79.1% didn't have such an opportunity. The highest number of online workers was in the age group 15–34 (31.2%), and slightly less (27.0%) in the age group 45–54. Almost half (47.5%) of all online workers in June were employed in the trade and services sector. Slightly fewer (46.2%) employees worked in the other services sector. Senior specialists worked most often online (42.7%). 63.7% of employees working remotely worked full-time in June, 18.3% regularly worked 3-5 days a week, and 7.8% regularly worked 1-2 days a week. 5.2% of employees worked remotely a few days a month, but 5.0% regularly worked part-time or for a few hours (Official Statistics Portal 2020: August 4).

Skill formation

Limited digital access for VET students and its effects on VET providers

One of the challenges was finding the right way to manage the virtual educational process. The next one was the students' limited access to technologies with an internet connection. Approximately 4.5% of pupils lacked smart devices, while on average in the

country there were 2.9% who didn't have the necessary facilities for the distance learning process (Linde 2020: April).

The digitalisation of education was one of the top strategic priorities before the COVID-19 crisis. In the policy planning for 2021–2027, it is being emphasised. Teachers' professional development should focus on acquiring the skills necessary for delivering remote learning, including mastery of digital tools. In these difficult times, collaboration at the national and international levels, as well as the exchange of cutting-edge methods and digital tools for teaching and learning, were essential (CEDEFOP 2020).

<u>VET changes (new programmes, institutions, and modes of learning and teaching, such as distance learning)</u>

Although the implementation of distance learning was one of the greatest challenges in the history of the Latvian education system, the shift to a distance learning process was successful with the help of innovative approaches and solutions. To solve the pressing issues with the lack of smart devices for distance learning, MoES, together with one of the biggest mobile operators in Latvia, set out a solution and was able to provide mobile devices with free internet connections. This partially solved the demand.

Colleges that had dual status - both as vocational education institutions and as higher education institutions - were developed as short-cycle professional higher education institutions by improving the structure of educational institutions and setting high criteria for the volume and quality of research.

Higher education institutions were expanding their lifelong learning and adult education programmes. The introduction of micro-credentials was considered a new initiative in the modular approach to higher education. In addition to digital literacy, the growth of students' innovative, social, and communication skills and other general or cross-cutting skills was promoted.

In order to offer opportunities to improve lifelong learning competences, expert working groups of VET institutions developed modular lifelong learning competence learning programmes. The content of the modules was designed according to the demands of the industry and the basic competencies of lifelong learning. Several competencies were combined or integrated into modules[5].

<u>Sustainable changes in teaching and learning affected colleges and universities by the pandemic</u>

The education process, according to the decision of the educational institution, could be partially or fully implemented remotely. For example, it could be done one day a week to ensure the possibility of distance. Similarly, in the vocational training process, all types of traineeships, including qualification traineeships and work-based learning in companies,

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[5] http://muzizglitiba.gov.lv/node/191

were planned on-site or remotely, assessing the risks for all parties. The experience showed that the VET system was able to mobilise quickly and adapt to the rules imposed by the pandemic. The education platform "Your Classroom", established by the MoES in two weeks, was recognised by the OECD as one of the best solutions in the world used by countries to continue the educational process in times of crisis. The MoES was also working on the further development of similar platforms, envisioning a much wider use of smart devices in the daily educational process.

To improve the VET system, the MoES, in cooperation with the Union of Local Governments of Latvia and other partners, developed solutions for increasing the involvement of technologies in the studies, making VET education and training more adaptive to epidemiological risks, and modernising the study process. A Baltic Alliance for the joint promotion of WBL practices in VET education and training was established[6].

Emerging new qualification needs

The COVID-19 crisis affected current employment opportunities and the agency's employment promotion plans. The crisis facilitated the transformation of the State Employment Agency (SEA)[7] into a national human resource management agency that changes people's views about employment and promotes new, modern types of jobs. With the easing of official requirements for accreditation of training programmes for the unemployed and the scaling up of work-based training programmes for future employment, the agency shifted its focus and increased emphasis on career guidance, the needs of employers, and on-the-job training for the unemployed.

The COVID-19 challenge-oriented innovation policy

The innovation policy oriented to the challenges of COVID-19 in Latvia created solutions and approaches that meet the demands of a wide range of actors, fields, industries, and technologies.

Demand for support for the companies and sectors most affected by the crisis

The government approved measures to provide immediate and specific support to the companies and sectors most affected by the crisis and to all companies and their employees. The legislation and various support measures imposed in Latvia on companies and employees remained until the end of 2020 (Saeima 2020a, b; Cabinet of Ministers 2020a, b, c).

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[6] https://www.izm.gov.lv/en/project-short-description-implemented-activites

[7] https://www.nva.gov.lv/en/state-employment-agency-sea

The adopted decisions on support measures for overcoming the COVID-19 crisis were classified into five categories: I: support in the field of taxes; II: support in the field of benefits; III: support in the field of loans and guarantees; IV: sectoral support; and V: European Union funding-related support.

Demand for support in the field of taxation

In the Law on the Suppression of the Consequences of the Spread of COVID-19 Infection, several tax support measures were defined in order to mitigate the consequences of the crisis for entrepreneurs and the population (Table 2).

Measures	2020		2021		2022	
	Execution	Impact on budget balance	Plan 23rd March	Operative execution till 21st March	Impact on budget balance	Impact on budget balance
Amount of support	1 329	-1 098	2 942	430.8	-1 893	-69
% of GDP of respective year	4.5	-3.7	9.6	1.4	-6.2	-0.2
I Support to the field of taxation	256	-141.8	110	34.2	-24.0	36.5
Deferrals of tax payment	161	-46.8	75	34.2	-24.0	1.5

Table 2: Support to the field of taxation (Ministry of Finance 2021: 43)

Demand for support in the field of benefits

A legal framework was adopted, defining additional support for the population for the disbursement of benefits and mitigating the consequences of the crisis caused by COVID-19 (Table 3).

Measures	2020		2021		2022	
	Exe-cution	Impact on budget balance	Plan 23rd March	Operative execution till 21st March	Impact on budget balance	Impact on budget balance
Amount of support	1 329	-1 098	2 942	430.8	-1 893	-69
% of GDP	4.5	-3.7	9.6	1.4	-6.2	-0.2

of respective year						
II Aid in the field of benefits	130	-130	550	224.1	-456	0
Downtime allowance	61	-61	98	67.4	-98	0
Wage subsidies	47	-47	76	11.6	-25	0
Sickness benefit for childcare	0.1	0	55	1.2	-11	0
Unemployment assistance allowance	5.2	-5.2	10.7	3.3	-10.7	0
Payment of sickness benefit from the state budget from day 1-10	2.8	-2.8	13.3	13.3	-13.3	0
Allowance for families with children, 500 euro child	0.0	0	182	125.0	0	-182 0
Benefit for pensioners and persons with disabilities, 200 euro per person?	0.0	0	112	0.0	-112	0

Table 3: Support in the field of benefits (Ministry of Finance 2021: 43)

Demand for support measures in the field of loans and guarantees

Support measures in the field of loans and guarantees were ensured, mainly via the Joint Stock Company Development Financial Institution Altum[8], and the type of support was mainly intended for improving the liquidity of enterprises in order to overcome the COVID-19 crisis (Table 4).

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[8] https://www.altum.lv/en/

Measures	2020		2021		2022	
	Execution	*Impact on budget balance*	*Plan 23rd March*	*Operative execution till 21st March*	*Impact on budget balance*	*Impact on budget balance*
Amount of support	1 329	-1 098	2 942	430.8	-1 893	-69
% of GDP of respective year	4.5	-3.7	9.6	1.4	-6.2	-0.2
III Aid in the field of loans and guarantees	284	-195	903	18.6	-89	0
Downtime allowance	61	-61	98	67.4	-98	0
Wage subsidies	47	-47	76	11.6	-25	0
Sickness benefit for childcare	0.1	0	55	1.2	-11	0
Unemployment assistance allowance	5.2	-5.2	10.7	3.3	-10.7	0
Payment of sickness benefit from the state budget from day 1-10	2.8	-2.8	13.3	13.3	-13.3	0
Allowance for families with children, 500 euro child	0.0	0	182	125.0	0	-182 0
Benefit for pensioners and persons with disabilities, 200 euro per person	0.0	0	112	0.0	-112	0

Table 4: Support in the field of loans and guarantees (Ministry of Finance 2021: 43)

Demand for sectoral support

Support to sectors for mitigating the financial difficulties of the sectors, as well as ensuring medicinal aids and equipment and a remote learning process, was defined. Sectors with the largest scope of support included the health sector, the transport sector, and support for current assets in the form of grants.

Support to sectors comprises almost one-half of the total volume of support, and, as compared to 2020, the planned volume of 2021 was doubled, having a direct impact on the budget deficit (Ministry of Finance 2021: 44) (Table 5).

Measures	2020		2021		2022	
	Execution	Impact on budget balance	Plan 23rd March	Operative execution till 21st March	Impact on budget balance	Impact on budget balance
Amount of support	1 329	-1 098	2 942	430.8	-1 893	-69
% of GDP of respective year	4.5	-3.7	9.6	1.4	-6.2	-0.2
IV Sectoral support	632	-632	1 379	153.2	-1 315	-99
Health-care	133	-133	638	31.4	-586	0
Transport industry (including aviation industry and road-building)	408	-408	205	0.0	-190	0
Grant for current assets	0	-0,02	311	98.5	-311	0
Support for agricultural, forestry, fisheries and food production sectors	38	-38	46	0.0	-46	0
Culture	21.1	-21.1	27	0.0	-27	0
Science and education (including sport and distance-learning	22	-22	36	18.1	-35	0
High readiness projects (without road-building)	0	0	62	0.0	-66	-99

Table 5: Sectoral support (Ministry of Finance 2021: 43)

Demand for European Union funding-related support

European Union funding provided assistance in the form of 'over-commitments' of the state budget for increasing the investments of EU funds projects in the medium term as well as additional 'over-commitments' for the support of crop-growing agricultural sectors, allowing 'over-commitments' for project implementation (Ministry of Finance 2021: 43).

The EU funding support for the most affected regions of Latvia and their populations was defined (Table 6).

Measures	2020		2021		2022	
	Execution	Impact on budget balance	Plan 23rd March	Operative execution till 21st March	Impact on budget balance	Impact on budget balance
Amount of support	1 329	-1 098	2 942	430.8	-1 893	-69
% of GDP of respective year	4.5	-3.7	9.6	1.4	-6.2	-0.2
V Support related to EU funds	27	0	-	0.7	-9	-7

Table 6: European Union funding related support (Ministry of Finance 2021: 43)

Demand for VET education and training support

In view of the global situation caused by COVID-19 and the potential risks in Latvia, several decisions were made to support vocational training.

Teaching and learning remotely.
Numerous precautions were implemented during this time to prevent the virus' spread, including the March 13, 2020, introduction of remote learning. VET institutions were reopened only at the end of the school year 2019–2020. For those HE institutions where remote examination was not practicable and required on-site presence, the study year was prolonged. Distance learning was provided in a decentralised manner at the HE level and in VET. In addition to pre-recorded lectures, learning resources for independent study, and feedback on completed exercises and tasks, institutions offered their students remote learning opportunities like live online classes, webinars, discussion forums, and consultations using *Skype, WebEx, Teams, Zoom*, and other online tools (CEDEFOP 2020).

Digital tools for learning online.

The MoES conducted regular surveys on distance education. There were many resources available for online learning. For instance, frequently utilised digital platforms (Ministry of Education and Science 2020). The largest internet service providers ensured that schools could use the internet at all times. IT specialists also provided help for teachers and trainers (CEDEFOP 2020). These resources and forms of support mitigated the problems of limited access to facilities among some VET students and also started to address the VET teachers' skills needs mentioned previously.

Practical training.
The main challenge for VET colleges was providing practical training, especially to students who were about to graduate and had already completed their academic studies. Many firms shut down, despite the fact that work-based learning (WBL) and internships (including qualification practise) at businesses might continue if there was no risk to health and all parties were in agreement. When on-site training was not possible, company tutors or VET instructors provided assignments for remote learning. Some VET institutions altered their training schedules to accommodate more theoretical content for online learning and altogether stopped in-company training. VET institutions might decide the length of internships after assessing the situation. Only a limited amount of useful progress was made when the state of emergency was revoked on June 9th (CEDEFOP 2020).

Supervision.
Responding to the consequences and challenges of the pandemic at the professional and personal level, the need for mental health support for educators was considered within the programme for educators. In the programme, teachers' difficulties were heard, and ways to create boundaries between professional and personal life while working at home, how to balance one's own and others' needs, and how to take care of oneself daily were jointly sought. The programme also promoted the understanding that educators in their team can support each other, and this support is an essential external resource for strengthening internal resources. (State Education Quality Service of the Republic of Latvia 2021: February 21).

Concluding insights

Latvia has taken the necessary *political measures* to effectively address the pandemic, sustain the economy, and support mitigating the employment impact of the crisis, including through flexible working arrangements, active labour market measures, and skills development.

To provide immediate and specific support to the companies and sectors most affected by the crisis, as well as support to all companies and their employees, the following *economic measures* were introduced: a grant for working capital flow; employee support; wage subsidies for part-time workers; and support for the self-employed and patent payers, among others. However, government expenditures were double the national income.

The current study highlighted the major *social measures* that Latvia's VET education and training system was facing. These were complementary in stimulating learning demand in terms of governance, funding, infrastructure, and supporting services, such as learning quality assurance, guidance, validation, and the resilience and well-being of learners.

The digital transformation component played an important role in Latvia, as it provided horizontal support for the implementation of other structural reforms and the achievement of the goals of several national strategies. Significant financial resources and technical assistance instruments were available for fostering individuals' understanding of how digital technologies can foster communication, creativity, and innovation, as well as their opportunities, limitations, impacts, and risks. These included their creative potential to develop the capacity to avoid the digital divide and access vital government and new products and services[9]. However, remote learning required teachers to improve their digital abilities and devote more time to the adaptation of teaching materials and communication with students, despite the fact that prior experience using digital platforms for communication with students greatly aided this process.

A new lifelong learning culture, recognising that basic and transversal skills were a key condition for youth and adults to be able to engage in further training and retraining later in life, encouraged youth and adults to get involved in the education system and to acquire new or improve existing skills. The investments in the context of skill development were especially important. These covered both basic skills and stimulated high-level digital skill development, as well as developing companies' digital capabilities.

Every crisis offers the chance for a new beginning. The COVID-19 quandary may have a long-term impact on employment opportunities, business, and practice of VET education and training. We may anticipate continued growth in the organisation of online work. It is feasible that the value of online education and the opportunities it offers will increase along with the work-from-home model and the learning process.

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[9]In accordance with the Latvian Digital Transformation Guidelines for 20212027. https://digital-skills-jobs.europa.eu/en/actions/national-initiatives/national-strategies/latvia-digital-transformation-guidelines-2021-2027#:~:text=The%20%E2%80%9CDigital%20Transformation%20Guidelines%20for,and%20digital%20content%20for%20society.

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The Covid-19 pandemic and evolving barometers for resilience in Singapore's vocational education and training (VET) system

Sahara Sadik

The historical framework of social negotiations involving the government, employers, and trade unions in Singapore has facilitated the resilience of its vocational education and training (VET) system in effectively addressing the challenges of job retention, skill development, and training continuity during the Covid-19 pandemic. Nevertheless, the Covid-19 pandemic has sanctioned new organisational norms characterised by fundamental shifts in work processes enabled by digitalisation, automation, and offshoring with significant implications for work and learning. There is early evidence that high skilled workers would be disproportionately impacted by these changes. Such changes fundamentally challenge the long-standing assumptions upon which Singapore's VET system has historically relied upon – the upgrading of the workforce for high-skilled work. Singapore's VET system must now establish new measures of resilience to effectively address emerging unprecedented labour market realities it has never encountered previously.

Keywords: digitalisation, VET resilience, high-skilled work

Introduction

This chapter is an appraisal of the institutional capacity for resilience of Singapore's vocational education and training (VET) system amidst the challenges of the Covid-19 pandemic. The approach taken in this article is one of thoughtful contemplation. It aims to connect theoretical understandings of institutional resilience with empirical evidence of actions taken by diverse actors within Singapore's VET institutions in response to the challenges posed by the COVID-19 pandemic.

An approach of thoughtful contemplation seems necessary as we wrestle with the immediate and longer-term implications of a pandemic such as Covid-19. Despite popular understandings of the Covid-19 pandemic as a 'black swan' event, there is surprisingly no scholarly consensus if it is indeed so (Dogra & Parrey 2022; Lalitagauri & Ajita 2022; Yarovaya et al. 2021). Higgins (2013: 76) describes 'black swan' events as

"unexpected large-scale shocks that severely challenge economic activity, social cohesion and political stability". While the world appeared to have come to a standstill in the first year of the pandemic, not all activities were impacted in the same way. Industries such as tourism, and food and beverage (F&B) were crippled, but the pharmaceutical and infocommunications industries received a significant boost as the pandemic increased demand for medical goods and digital ways of connecting and working. For instance, Wind et al. (2020) highlights how the pandemic serves as a pivotal moment in e-health adoption that surpasses two decades of prior experimentation. Likewise, Dogra and Parrey (2022) note how the pandemic accelerates 'work-from-home' arrangements. These studies offer a different perspective that the consequences of Covid-19 as a 'black swan' event extend beyond the immediate management of the pandemic, with far-reaching ramifications that continue to unfold.

Hence, when assessing the resilience of the Singapore VET sector in response to the Covid-19 pandemic, it is crucial to consider two perspectives: the handling of the current and the bridging to the future. The objectives of VET, which involve preparing learners for evolving labour market demands, underscores the importance of assessing the institutional resilience of VET in terms of its capacity to address both current and emerging needs. Tensions may arise in this context, where the very elements displaying resilience in the present may reveal vulnerabilities when examined within the context of emerging requirements. Navigating these tensions is a crucial aspect of institutional resilience.

The article first unpacks conceptual understandings of institutional resilience. It will then analyse the empirical evidence of activities by various institutional actors in Singapore supporting VET provisions. The empirical data is drawn mainly from media releases and newspaper articles, but it also includes published reports on surveys done on VET activities during the pandemic such as online provisions of training and learning activities. As the intent is to conduct the appraisal of the VET system in broad strokes as part of an exercise of thoughtful contemplation, the empirical investigation undertaken is indicative rather than exhaustive.

Conceptual and contextual understandings of institutional resilience

Anderson and de Tollenaere (2020: 24) describe institutional resilience as comprising the "capacity to deliver and enhance results over time, credibly, legitimately and adaptively; as well as the ability to manage shocks and change". Institutional resilience represents a dynamic condition rooted in the ever-evolving dynamics of state-society relations and expectations, necessitating innovative and creative socio-cultural adaptations (Aligicia &

Tarko 2014). It is grounded not only in the notion of continuity but just as crucially in the concept of change (Herrfahrdt-Pähle & Pahl-Wostl, 2012). Handmer and Dovers (2009) highlight that political and economic systems often exhibit entrenched resistance to questioning and reevaluating dominant development paths when confronted with unexpected and disruptive changes. At times, this manifests in what can be described as 'path dependency' of "a process that constrains future choice sets" (Kay 2005: 533). Yet, changing state-society relations may foster new directions of change. As described by Herrfahrdt-Pähle and Pahl-Wostl (2012), concepts of continuity and change interact to build or degrade institutional resilience. Due to the dynamism of contexts, institutional resilience requires a constant process of assessment and re-assessment to ensure that what works in the past continues to be necessary for the future (Aligica & Tarko, 2014).

VET systems, as persuasively argued by Antonazzo et al. (2023: 34), are systems responsible for "bridging the present and the future of industry" in ways that support the preparation of learners for evolving labour market demands. Seen in this context, VET resilience therefore is the capacity to respond to current and emerging needs in ways that are sustainable and mutually rewarding to learners and the ecosystems they are embedded in, recognising the interdependencies of business settings and models; institutional and policy frameworks; modes of engaging labour; structure of jobs, and skills formation systems (Buchanan et al 2017).
The wider set of institutional arrangements therefore shape VET systems considerably. Comparing Germany and the UK, Clarke et al. (2013) observe how the German VET system is underpinned by an underlying principle of developing 'occupational capacity' through negotiation and regulation by stakeholders manifesting in a system of VET qualifications that sustains an occupation over a longer durée. In contrast, the UK VET system is built on a 'production' approach whereby its system of qualifications is focused on performing recognised activities of the current that leads to an in-built difficulty to shape the trade in new ways. Evans and Stroud (2016) illustrate these key differences in the German and UK systems through the examination of the 'greening' of occupations in which skills needs are evolved to meet new environmental demands. They observe that the implementation of change is much more dynamic in Germany, where development is shaped by robust VET frameworks, alongside the ecosystem push for sustainable environmental innovation. In the UK, on the other hand, the development of green skills sits within an ecosystem targeted at current needs with the ecosystem being focused on environmental compliance. What is valued and facilitated through VET systems are thus mutually constitutive between the learners and the ecosystems they are embedded in.

From this perspective, in assessing VET resilience in Singapore, it is important to situate the Singapore VET system within its wider historical origins. A common descriptor of the political economy of Singapore is as a 'developmental state', in which the state uses

its resources and influence to direct economic activities through public-private cooperation, balancing economic growth and social development (Doner et al., 2005; Johnson, 1982; Low, 2001; Sung, 2005). Indeed, the coupling of economic and social development has been a key aspect of the Singapore developmental state that upgraded itself from a developing economy to an advanced economy status within its short post-independence history of 50 years. It is this continuously upgrading of the economy that is pivotal to Singapore's meteoric rise. State policies engender the continuous transformation and upgrading of industries and occupations. Singapore's VET system is a key plank to support the economic transformation. Its polytechnics and vocational colleges deliver a highly-trained workforce to meet the upgrading goals of the Singapore state– first through industrialisation, then to skills-intensive manufacturing, followed by the services sector and now moving to 'global city' activities (Singapore Prime Minister's Office 2015). Sung (2005) describes the crucial role of the Singapore citizen as a 'developmental worker' in this economic transformation whose interests are aligned to the wider goals of the state. Within this model, the worker-citizen plays an important role to prepare themselves for new labour market demands that are created due to changes in the occupational structure that comes with upgrading the economy.

By and large, the focus of the Singapore state is not to limit the flexibility of employers to hire and fire as part of the changing economic and occupational structures. Instead, the focus is for the state to always create better jobs and invest in education and training that will help workers shift into new industries and occupations taking on jobs that are more high-skilled. There have been casualties. For instance, factory workers who were the bedrock of the Singapore economy in the early stages of industrialisation, were deskilled in the transition to the services economy taking on less-skilled job role as chambermaids (Koh 2007). However, new categories of workers would be created among the younger population through VET policies, facilitating intergenerational mobility such that the average Singapore family would not be seen as worse off. Due to an overall focus on job creation by the Singapore state, unemployment has never been a major issue for the vast part of Singapore's post-independent history. Social actors work to help displaced Singaporean workers transit into new job roles, even if those jobs might be less than desirable. Active labour market policies are thus a crucial part of the Singapore's VET system, complementing the educational activities of the polytechnic and vocational colleges.

From this perspective, there are similarities yet key differences among the VET systems in Singapore, Germany, and the UK. On the one hand, the VET systems in Singapore and the UK are both characterised by a 'production' approach driven by markets, as opposed to Germany's model of occupational capacity-building. Yet, the high level of state intervention in the Singapore economy makes the Singapore VET system different from the UK's economic system of market liberalism. At the same time, there are

similarities in the coordinated approach between the VET systems in Singapore and Germany. Yet, Singapore's coordinated model seeks to support ease of workforce transitions across industries and occupations, which is very different from the German model of social negotiation that seeks to preserve and enhance occupations.

There is ample evidence that the current VET model in Singapore is under strain. Having reached an advanced economy status, there is less room for high-skills job creation in the vast numbers that have sustained previous generations of occupational upgrading. Compared to graduates, the fortunes of graduates from Singapore's VET system namely polytechnics and vocational colleges have been plummeting leading to calls for expansion of university qualifications (Singapore Ministry of Education, 2023). To moderate credential competition, the Singapore government invested in SkillsFuture as an educational reform of offering alternative pathways to provide Singaporeans with the "opportunities to develop their fullest potential throughout life, regardless of their starting points" (Government of Singapore, 2023). The focus of the reform is to shift away from a frontloading model of educational opportunities towards providing the workforce with more opportunities across their working lives instead through access to short courses, career conversion programmes and workplace learning (Tan, 2017). In other words, it is about taking the initial VET system forward with continuous VET provisions. The vision is to support the empowerment of individuals regardless of their starting qualifications, with lifelong education provisions to allow workers to be the top of their fields as well as respond nimbly to industry and job disruptions. A senior politician described SkillsFuture as Singapore's "most important economic and social strategy in the long term" (The Straits Times 2019). Singapore's VET system is at this critical juncture of transition, when the Covid-19 pandemic hits. In the next section, we look at how societal actors respond to sustain VET opportunities in Singapore amidst the pandemic, and the implications for the longer-term resilience of the VET sector.

Covid-19 pandemic: VET resilience in tackling the current

The government came out in full force to minimise the employment fall-out from the Covid-19 pandemic, working with employer federation and trade unions. Given Singapore's history of multiple periods of economic changes that comes with significant workforce dislocations, the societal actors are well-connected to align their actions to support the need to keep workers in jobs. Where this was not possible, workers are given support to have access to continuous skills development. One-third of the Singapore workforce comprises foreign itinerant workers. Employers were urged, nudged and incentivised to shed foreign workers and keep Singaporean workers during the pandemic (Singapore Ministry of Manpower 2020).

A jobs support programme was launched to provide wage support of up to 50% for existing Singaporean workers (Singapore Ministry of Finance 2020). For industries that continued to do well, such as infocommunications technology, biomedical sciences, and financial services, they were encouraged to bring forward their hiring plans and create more good jobs for locals, with the government co-funding 50% of the wage costs of each new local hire. Enhanced course fee support of up to 90% were provided for hardest hit sectors such as tourism and accommodation services.

A National Jobs Council was set up in 2020, coordinating efforts between the government, businesses, and labour unions (Singapore Ministry of Trade and Industry, 2020). The Council curated over 100,000 jobs and skills opportunities under the SGUnited Jobs and Skills Package for locals. The initiatives include career conversion programmes, company-hosted traineeships, and attachments as well as training programmes to offer multiple pathways for jobseekers to enter into new careers or sectors.

Funding the programmes was challenging for Singapore but not insurmountable given its track record of financial prudence. Political actors came together to support the unprecedented drawing down of the national reserves at a total of S$40 billion (Channel NewsAsia 2023). This institutional capacity was critical in minimising the fall-out from the Covid-19 pandemic. The job support scheme was estimated to have saved 165,000 local jobs from March to December 2020 (Singapore Ministry of Finance 2020).

When it comes to the delivery of VET programmes, there was a push for digitalisation of education and learning activities prior to the Covid-19 pandemic. Yet, such digitalisation activities did not proliferate the VET sector extensively. Covid-19 pandemic was a game-changer in this regard. It ushered in a period of greater acceptance of digital in teaching and learning. Tan et al. (2021) conducted a learner survey (n=1354) in September 2020. The authors reported that there was a significant increase in learners' preference for 100% online learning (from 5.6% to 26.4%) or blended learning (from 56.9% to 66.6%) due to its convenience and flexibility. Respondents who participated in programmes with a mixed mode of delivery generally reported a slightly higher level of satisfaction and effectiveness.

Interestingly, although there was a clear preference for online learning, the authors note that almost half (47.1%) of the respondents who had participated in an online programme that was fully subsidized by the government, indicated that they would pay less for the programme. It suggests that while convenience and flexibility had an edge during the challenging period of the pandemic, it might not deliver the kind of perceived value and quality associated with face-to-face provisions offer. The authors additionally note that the lack of interactions was consistently a major concern among learners,

regardless of age or education (be it among classmates, or among learners and trainer). Not being able to get the required attention from the trainer was a major concern amongst learners aged 55 and above.

A separate survey was conducted between May to June 2020 (n=1553) targeting adult educators by Chen et al. (2021). The survey results showed that the proportion of respondents reporting frequent use of online platforms for teaching, assessment, and training related work increased more than 4 times from pre-COVID-19. About 7 in 10 respondents (71%) agreed that online teaching, assessment and training related work is the future of higher education, adult training and lifelong learning. Respondents generally felt that learning online would help their students and learners develop digital skills, as well as the knowledge and skills needed for employment. Majority of respondents felt that exclusive online learning would negatively impact learning outcomes and learners' well-being. About half of the respondents (48%) felt that online learning would have a negative impact on assessment.

Additionally, the period also saw the entry of non-traditional players into the VET system, namely ICT companies such as Google. Google offers online certifiable training programmes based on their curricula that includes hiring opportunities with themselves and their supply-chains (King 2022). These were initiatives that the government welcomed and supported through subsidised funding, as it offered new lines of opportunities for Singaporean workers to seek training and work.

Overall, the VET system demonstrated high levels of responsiveness to meet the evolving needs arising from the pandemic crisis. Jobs were retained through provisions of wage support. Skills development were sustained through internships and similar work attachments. Training continuity was maintained through online provisions of training. For new entrants to the workforce, the challenge of a 'lost generation' due to the isolating effects of the pandemic were generally not a problem due to the various mechanisms to sustain continued engagement in work, skills development and training. There were in fact areas in which the pandemic had advanced more robust discussions within the VET system. For instance, there was now a greater awareness but also problematisation of the value that digital brings to teaching and learning. It created more opportunities for dialogue on pedagogical approaches for optimising online and offline provisions.

Covid-19 pandemic: VET resilience in tackling the future

When viewed in the context of Singapore's prior efforts to address the stagnant opportunities for VET graduates, it becomes evident that the responses implemented during the COVID-19 pandemic failed to bring about significant improvements. To

some extent, this was understandable given that the tremendous pressure was focused on sustaining the continuing of the system, rather than pursuing new reforms. The system indeed sustained itself – not creating new forms of inequalities but neither did it address existing inequalities.

From another perspective, however, the preservation of status quo might be symptomatic of the Singapore VET system showing signs of 'path dependency' of its inability to chart out new paths. The cornerstone of the Singapore VET system is to deliver education and training programmes based on 'production' needs with the assumption that economic development strategies will continuously create better, well-paying jobs to sustain social aspirations. It does not have mechanisms to shape and co-create opportunities when issues of job quality are at stake. This is a significant institutional weakness in view of the emerging issue of stagnation of VET graduates. However, the Covid-19 pandemic may have amplified this challenge.

Certainly, the Covid-19 pandemic served as a significant work-from-home experiment, and its impact is likely to endure long after the pandemic itself (Dogra & Parrey 2022). Brynjolfsson et al. (2020) raises an alarm very early into the pandemic that the trend towards globally distributed work would likely increase with the Covid-19 pandemic, as organisational processes sanction remote working that may encourage firms to further invest in developing global digital work processes. Elsewhere, I have documented how remote processes of work is enabling a redistribution of work opportunities of what can be described as digital offshoring (Sadik 2021). Earlier phases of offshoring were the activities of well-resourced companies. However, digital offshoring is different. It is an activity that can be taken up by big and small businesses, established firms as well as new start-ups.

What is even more challenging for Singapore's VET system is that digital offshoring allows for a strategy of labour arbitrage by companies – not of low-skilled, routine jobs, but of high-skilled, cognitive jobs. This is of paramount importance for Singapore, as it stands as an advanced economy with elevated labor costs, situated amidst a regional economy comprised of low-cost countries boasting abundant pools of highly skilled workers. This labour market trend fundamentally challenges the assumptions upon which Singapore's VET system has traditionally been anchored upon – of the undisrupted creation of higher-skilled jobs. The emerging risks that may confront Singapore's high-skills workers were sufficiently felt to the extent that the Singapore Ministry of Manpower started asking companies to report on the likelihood that jobs could be done remotely. The results are reproduced at Figure 1, which shows a substantial risk for professional, managerial, executive and technical (PMET) occupations to be done remotely, compared to other types of occupations. Given that PMET jobs have historically been a source of social mobility in Singapore, it suggests that assumptions of the continuous capacity of

the Singapore developmental state to create ever more high-skilled jobs is called to question.
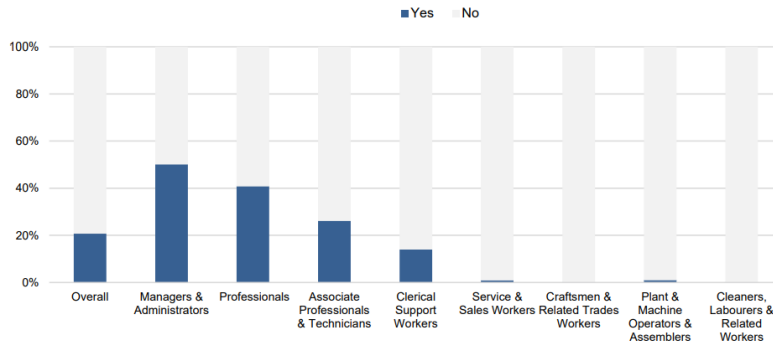

Figure 1: Distribution of Singapore job vacancies that can be done remotely by occupational categories (Source: Singapore Ministry of Manpower (2023))

The risks to PMET jobs were certainly not driven by the Covid-19 pandemic. It reflects an ongoing process of digital changes to work processes in which corporate strategies have been increasingly focused on unbundling knowledge work (Brown 2021). As generative AI tools such as ChatGPT have shown, societal actors can no longer assume that digital technologies will shed low-skilled jobs and enhance high-skilled jobs (Brown et al. 2023; Lassebie & Quintini 2022). High-skills platform work is proliferating (Berg et al. 2021). Authors like Altenreid (2020), Berg et al., (2018), Gandini (2019), Irani (2015) and Magaryan (2019) detail the decomposition of digital labour through gig platforms such as Amazon Mechanical Turk, with the return of piece wage system, the disciplining of labour power through online ranking systems, and workers' isolation from one another such as the designing out of workplace learning from platform workflows.

What the Covid-19 pandemic has done is to normalise acceptance of the decoupling of work from space substantively across organisations. There would be instances in which such decoupling is not sustainable over longer periods of times, leading to hybrid forms of work. However, the evidence is also strong that permanent remote work positions akin to digital Taylorism will persist (Brown et al. 2011; Berg et al. 2021; Brown & Sadik 2022).

What is clear is that there is a lack of evidence that Singapore's VET system is ready to substantively address the challenges of preparing workers for a world in which the

continued demand for high skills cannot be assumed. While Singapore's VET system has institutional mechanisms for facilitating strong cooperation among government, employers and trade unions, it operates within a model of delivering 'production' needs. The system is well-poised to serve markets, but it lacks the capacity to challenge markets unlike the German model of social negotiation. The SkillsFuture reform, being focused on the delivery of continuous VET through a model of top-ups, fails to adequately build new forms of resilience within the Singapore VET system. Taken in totality, this analysis suggests a fundamental weakening of the Singapore VET sector that is unable to bridge to future needs, being locked into a path-dependent model of 'delivery'. VET measures taken during the Covid-19 pandemic reflected the continued trajectory of the 'delivery' model. In the process, these measures also exposed vulnerabilities when evaluated in the context of the evolving trend of high-skills redistribution throughout labour value chains.

Conclusion

In this chapter, I have sought to undertake an approach of thoughtful contemplation. I seek to identify the ongoing pressures to the Singapore's VET system. I reflect on them against the VET institutional response to the Covid-19 pandemic. I further examine the Covid-19 effects on the Singapore VET system in the future.

The prognosis is grim. Singapore's VET system is locked into 'path-dependency'. It has a historically successful delivery model that have worked in the past, but is not fit for purpose for bridging to the future. Its socially negotiated approach remains centred on strengthening the efficiency of VET delivery to serve markets. This VET delivery approach rests on the capacity of the economy to continuously create high-skilled jobs. Yet it is the creation of these high-skilled jobs that would be challenging for Singapore to sustain. At present, the VET system lacks substantive mechanisms to negotiate issues of strengthening job quality. Indeed, Singapore's VET system may have emerged from the Covid-19 pandemic having degraded its institutional resilience, arising from a systemic inability to recognise fundamentally new challenges.

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Adaptation of Thai TVET Learning in the Time of the Pandemic for S-Curve and New S-Curve Industries

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Thailand has faced shortages in skilled and qualified technical workers for decades, but the COVID-19 pandemic has worsened the impact. This study aimed to analyze learning adaptation during the crisis by conducting surveys and in-depth interviews of students, teachers, school administrators, government agencies, and private sector/enterprises involved in TVET education. During the crisis, one of the key strategies adopted was the utilization of technology to facilitate remote learning. Blended learning and collaborations with stakeholders were implemented. Despite challenges, technology integration presents opportunities for improved access, lifelong learning, and employability. However, the majority of TVET institutions agreed that the government sector was able to provide only partial support in the adaptation process. The recommendation to strengthen cooperation among vocational schools, enterprises, and government agencies with the structure of the Tripartite system needed to be in focus for building a resilience model of the Thai TVET learning system. But in the real practice, this collaborative network is far from claiming the execution.

Keywords: TVET, lifelong learning, pandemic, Thailand industry

Introduction

Aligned with Thailand's 20-Year National Strategic Framework (2017-2036), the overarching goal is the comprehensive transformation of Thailand into the "Thailand 4.0" paradigm, achieved by nurturing specific industries. These industries, known as the 12 targeted S-Curve and New S-Curve industries, encompass automotive, smart electronics, affluent and medical wellness tourism, agriculture and biotechnology, food, industrial robotics, logistics and aviation, biofuels and bio-chemicals, digital technologies, medical services, defense, as well as education and human resource development (Eastern Economic Corridor: EEC, 2023). Establishing mechanisms to enhance human capital becomes imperative to realize these objectives, as it contributes significantly to elevating the nation's economic ability and competitive advantage. Achieving this enhancement hinges primarily on strategically cultivating vocational workforces (Chinapha et al., 2022), a pivotal element in driving sustainable growth.

Before the emergence of the COVID-19 pandemic, vocational education in Thailand grappled with challenges related to both quantity and quality, as underscored by UNESCO-UNEVOC in the works of Thanalerdsomboon (2021), Moonpa et al. (2021) and Permpoonwiwat (2021). The quantity challenge was the low number of vocational learners, primarily due to the lack of popularity and the socioeconomic status of students, leading them to opt for vocational education because of its more affordable tuition fees than mainstream education. Concerning quality issues, the learning content and curriculum must align with employability skills. The government endeavored to promote increased enrollment in vocational education and established technical and vocational education and training (TVET) programs to enhance technical skills and vocational education in response to these challenges (Vroonhof et al., 2017).

With the advent of the COVID-19 pandemic and the subsequent implementation of lockdown measures to curb its spread, substantial changes occurred in industries and work practices. Laberg et al. (2020) revealed that numerous businesses have invested in digital technologies to establish more flexible and convenient work systems, including utilizing digital cloud databases and remote work tools. Notably, the pandemic expedited the digital transformation process, accelerating its pace. Furthermore, as mentioned above, the country's industrial trajectory is increasingly directed toward high-tech sectors, particularly in areas such as artificial intelligence (AI) and advanced automation. Furthermore, the impact of COVID-19 has led to changes in the way teaching and learning are conducted, both in theoretical and practical aspects, through a collaborative effort between vocational education and the private sector. This has resulted in a shift towards online learning and hybrid learning systems (both online and onside) following lockdown measures (Sysoieva, 2022; Langlois et al., 2020).

These circumstances present significant challenges regarding vocational management and its system. It raises questions about whether the education management system can effectively develop expertise among vocational students during this crisis and whether it can achieve the goals of Professional Skills to support employment in the S-Curve and New S-Curve industries. To address these challenges, it is advisable to conduct a study on Learning Adaptation during crises, aiming to develop workforce skills as anticipated by labor and the job market. This study should encompass various issues and obstacles, leading to the formulation of policies and practical strategies suitable for future crises similar to the present pandemic.

Therefore, the objectives of this study were as follows: 1) To analyze the adaptation of professional skill levels among vocational students through the integration of Information and Communication Technology (ICT) within educational management during the COVID-19 pandemic, and 2) To assess the operation of the vocational education system during the crisis, identifying challenges and obstacles that emerged and

evaluating its overall operational effectiveness. It is important for this study to collect data that involves relevant stakeholders and consider a combination of qualitative and quantitative methods to gain a holistic understanding of the situation before, during, and after crisis. This information can guide policy decisions, educational reforms, and strategic planning to enhance vocational education in the face of challenges like the COVID-19 pandemic. In addition, the overall result could enable a more resilient and effective vocational education system that better serves the needs of students and the job market trend.

Literature Reviews

Adapting Vocation Education in Thailand Amid COVID-19

The Office of Vocational Education Commission (2021) has established guidelines for managing vocational education learning during the prevalence of the COVID-19 virus. Due to the viral outbreak, vocational educational institutions faced challenges conducting classroom-based or conventional teaching. Consequently, educators were directed to adapt their teaching methodologies from the traditional format to various alternative approaches, as follows:
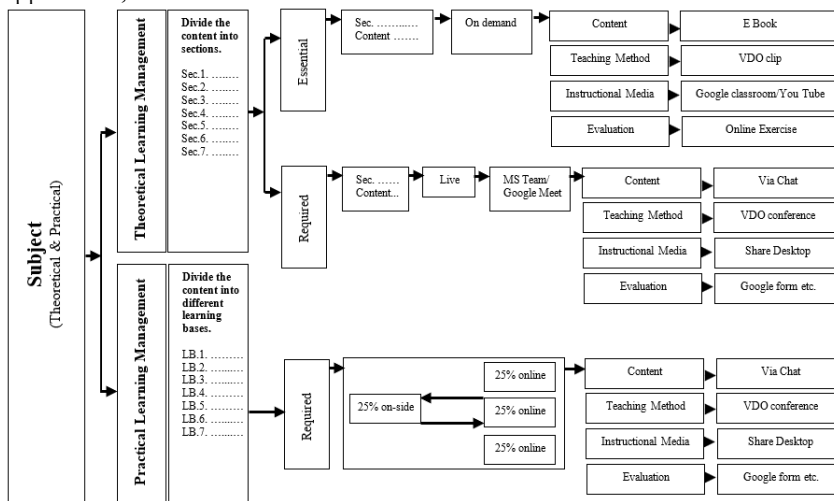

Figure 2: A flowchart outlining the management of teaching and learning based on subject descriptions during the COVID-19 period (source: The Office of Vocational Education Commission (2021)).

In vocational education institutions, subjects are classified into two primary categories: theoretical subjects and practical subjects. These categories encompass specific details presented in Table 1.

Aspect	Theoretical Learning Management	Practical Learning Management
Definition	Implementing remote teaching and learning through online platforms.	Hands-on training emphasizing essential competencies and practical subjects.
Learning Delivery	Online platforms simulating live classroom instruction.	Block Course approach with specific timeframes allocated.
Learning Content	"Essential Knowledge" (Pre-recorded materials) and "Required Knowledge" (Instructor-led)	Emphasizes problem-solving, scenario-setting, and case studies.
Learning Activities	- Online content access - Self-assessment methods - Communication via social media.	Small group organization based on available equipment and resources.
Assessment & Monitoring	- Electronic submissions - Progress monitoring - Examinations using electronic systems	Adherence to disease outbreak management or COVID-19 measures.
Teaching Methods	- Prerecorded materials (Essential Knowledge) - Instructor-led (Required Knowledge)	Live demonstrations and online simulations.
Interaction	Online communication between instructors and learners	Online social platforms for interaction.

Table 5: Key Dimensions of Information and Communication Technology (ICT) Proficiency.

This table provides an overview of how vocational schools managed learning during the COVID-19 pandemic. It raises the significant question of whether these teaching methods can foster ICT literacy that influences professional skills development. Moreover, it assesses the functioning of the vocational education system during the crisis to offer policy recommendations for the future.

Future Skills in Human Resource Development

Numerous research works, such as Salee (2023), Janyam (2022), Permpoonwiwat (2021), and the World Economic Forum (2020), have mentioned future skills in human resource development. These skills included computational and literacy skills, advanced cognitive abilities (such as analysis, critical thinking, and creativity), STEM skills (related to science, technology, engineering, and mathematics), social skills (including communication, teamwork, conflict resolution, empathy, and emotional intelligence), learning capabilities (such as readiness to learn, motivation to learn, curiosity, and self-directed learning), desired traits (like ethics, social and cultural awareness, and adaptability), complex problem-solving skills, and especially, ICT skills (Phuapan et al., 2016) or digital literacy (such as device and tool usage, reflecting on the impacts of ICT), was crucial in managing teaching and learning during COVID-19, particularly for vocational education institutions.

In assessing ICT skills, Phuapan et al. (2016, 2015) proposed evaluation topics in their research report titled "Digital Literacy Skill of Students in Thailand." These topics comprised six dimensions:

Dimension	Description
Access	Using ICT to access data and information through devices like smartphones and computers, and efficient search tools.
Management	Skills for decision-making, selecting technology-related data, communication tools, recording, data storage, installing applications, software usage, and data security.
Integration	Applying ICT to create new concepts and work, including technology synthesis for problem-solving and proficient utilization of various programs for efficient workflow.
Evaluation	Understanding ICT's purpose, scope, and suitability, involving applying fundamental ICT skills, assessing usage, ensuring safe utilization, and recognizing the value and benefits of ICT.
Creativity	Utilizing ICT tools to create works with components like text, images, animations, and sounds, as well as innovative solution design and problem-solving.
Communication	Using media and tools to share information and ideas, encompassing participation in social networks, online creative collaboration, and effective communication through various digital platforms.

Table 6: Key Dimensions of Information and Communication Technology (ICT) Proficiency.

Production Efficiency Evaluation

To evaluate and enhance production efficiency, a significant portion of research commonly utilized Becker's (1962) human capital theory as a framework for guidance. Becker asserted that investment in human capital could be facilitated through knowledge and skills acquired via formal or informal education systems, training, and work experience. These efforts result in individuals being better positioned to enter the labor market. Furthermore, the outcomes of individual labor productivity in the job market have broader implications for a country's overall economic growth (Galor & Tsiddon, 1997).

Multiple research studies, including those by Sheehan & Shi (2019) and Patrinos (2016), quantified the enhancement in production capability. These studies identified two pivotal independent variables: the duration of education and workforce skills. By scrutinizing the impact of these variables, they employed the Ordinary Least Squares Regression (OLS) method for the multiple regression analysis. The research findings consistently indicated a positive correlation between independent variables and production capacity. Moreover, a significant amount of research literature has validated the effectiveness of employing regression models with an ordered structure, which is well-suited for capturing variations across different levels of dependent variables. Consequently, a specific recommendation is to utilize the Ordered Logit Regression Method (OLM) for conducting these analyses, as underscored by the work of Bellizzi et al. (2018), and Chen et al. (2016).

Methods

This research used a mixed-methods approach to address the research objectives. 1) To analyze the adaptation of professional skill levels among vocational students through the integration of ICT within educational management during the COVID-19 pandemic. And 2) to assess the operation of the vocational education system during the crisis, identifying challenges and obstacles that emerged and evaluating its overall operational effectiveness.

To analyze the integration of ICT in educational management to assess the adaptation of vocational students' professional skill levels, a retrospective inquiry was made concerning students' adjustments or shifts in their ICT usage during the pandemic. Data were collected between July and August 2022 from 416 vocational students[1] within the industrial estate area, selected from the Eastern and Southern regions, which are central

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[1] A sample size of 385 individuals was determined for the infinite population, achieving a confidence level of 95%. Subsequently, a purposive sampling approach was employed, resulting in 416 respondents who participated in the questionnaire survey.

to exports and have a high concentration of strong S-Curve industries (IEAT, 2022). An online questionnaire[2] based on the existing Digital Literacy Skills assessment was utilized to collect basic information before and during the pandemic, and measure ICT competence and Professional Skills levels according to students' self-perceived abilities, by using a Likert Rating Scale of 5 levels (1.00 - 1.80 = poor/much worse, 1.81 - 2.60=faire/somewhat worse, 2.61 - 3.40 = good/moderate, 3.41 - 4.20 = very good/somewhat better, 4.21-5.00 = Excellent/much better) was applied. The collected data were analyzed statistically using frequency, percentage, mean, and standard deviation. Moreover, the analysis incorporated OLS and OLM models to conduct multiple regression analysis with personal factors and Digital Literacy Skills levels as independent variables. Both models confirmed the factors influencing Professional Skills, the dependent variable[3].

OLS model:

$$PSD_i^{\square} = \beta_0 + \beta_1(Academic\ Discipline\ and\ Study\ Duration)_i \\ + \beta_2(Equipment\ and\ Internet\ Browsing\ Time)_i\ + \beta_3(ICT\ Skills) + \varepsilon_i \qquad (1)$$

OLM model:

$$PSD_i^* = \beta_1(Academic\ Discipline\ and\ Study\ Duration)_i \\ + \beta_2(Equipment\ and\ Internet\ Browsing\ Time)_i\ + \beta_3(ICT\ Skills) + \varepsilon_i \qquad (2)$$

With regards to this,

$$PSD_i = \begin{cases} 1, if\ PSD_i^* < k_1 \\ M, if\ k_{i=(M-1)} \le PSD_i^* \le k_{i=M}\ , M = 2,3,4 \\ 5, if\ PSD_i^* > k_M \end{cases} \qquad (3)$$

In the study context, equations 1 and 2 introduce three distinct sets of independent variables that could influence Professional Skills. The initial group, called Academic Discipline and Study Duration, encompasses the participants' academic domains of study

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[2] It is essential to underscore that the questionnaire was employed for this purpose. This procedure engaged three qualified experts who assessed the questions for validity using the Item- Objective Congruence (IOC) index. Each question received scores exceeding 0.67. Furthermore, the questionnaire was subjected to a tryout to evaluate its reliability. The results revealed that the Likert-scale questionnaire exhibited Cronbach's alpha coefficients ranging between 0.81 and 0.89 for each item.

[3] In this study, the independent variable is "PSD: Level of Professional Skill Development, and the dependent variables include "Academic Discipline and Study Duration (AGF: Agricultural field, BAF: Business Administration field, INF: Industrial Technology, DBT: Digital Business Technology field, and YOS: Year of study)," "Equipment and Internet Browsing Time (COM: Computer, SMP: Smartphone, TAP: Tablet/iPad, OTD: Other Devices, and IUF: Internet Use Frequency)," and "ICT Skills Level (ACC: Accessibility, MNG: Management, ITG: Integration, EVL: Evaluation, CRT: Creativity, and CMN: Communication)."

and the duration of their educational pursuits. The subsequent group, labeled Equipment and Internet Browsing Time, pertains to the equipment utilized by participants and the time spent on Internet browsing activities. Finally, the third group centers on the proficiency level of ICT skills, characterized by a scale; from 1 (indicating the poor level of ICT skill proficiency) to 5 (representing the excellent level of ICT skill proficiency). This proficiency level is intricately associated with accessibility, management, integration, evaluation, creativity, and communication.

In equation 1, the dependent variables PSD_i signify the degree of enhancement in Professional Skills. Here, 1 denotes the lowest level of Professional skill proficiency ("much worse"), and 5 signifies the highest level ("much better") in this context.

Conversely, the variables PSD_i in equation 3 encompass the assessment of Professional skills improvement using a five-point scale, which ranges from the much worse to the much better proficiency levels: "Much worse" proficiency (k = 1), "Somewhat worse" proficiency (k = 2), "About the same" proficiency (k = 3), "Somewhat better" proficiency (k = 4), and "Much better" proficiency (k = 5). The ordinal variable PSD_i is contingent upon another variable PSD_i^* outlined in equation 2, which is continuous and unmeasured, featuring distinct threshold points (Bellizzi et al., 2018; Chen et al., 2016).

The study also delved into assessing the effectiveness of vocational education management during the crisis, taking into account the perspectives of the education, private, and government sectors. To achieve this, in-depth interviews were conducted with 30 participants, including teachers, school administrators, and representatives from both the public and private sectors, during the months of August and September 2022. The data collected from these interviews underwent qualitative content analysis, with a focus on critical topics such as operational changes and the effectiveness of teaching management under the circumstances of the COVID-19 pandemic.

Furthermore, as mentioned in the first objective, survey data related to students' ICT knowledge and professional skills development were utilized to provide feedback to educational institutions and government bodies. This feedback aimed to address the challenges and obstacles encountered in educational management during the crisis, ultimately leading to the formulation of policy recommendations for the future.

To further enhance the rigor of the in-depth interview protocol, a validation process using the Index of Congruence (IOC) was carried out. This process involved three qualified experts who evaluated the questions for validity and alignment with the research objectives. Each question received scores exceeding 0.67, signifying a high level of agreement among the experts regarding the validity of the questions concerning the research goals.

Results & Discussions

The presentation of research findings and discussion of results has been conducted in accordance with the objectives, as follows:

Results of analyzing vocational students' Professional skill level adaptation via ICT integration in educational management during the COVID-19 pandemic.

Based on Table 1 below, the data depicted the distribution of participants according to their gender, level of current education, field of study, and frequency of internet usage. Among the participants, 73.56% were male, while 26.44% were female. In terms of education, the majority had been enrolled in a High Vocational Diploma program, accounting for 56.25% (Year 1 = 23.32%, Year 2 = 15.87%, Year 3 = 17.07%), followed by Vocational Certificate participants at 43.75% (Year 1 = 25.00%, Year 2 = 18.75%). Industrial Technology emerged as the predominant field of study, with 67.55%, while Digital Business Technology/Computer constituted 24.52%. Concerning the frequency of internet usage, the majority (85.58%) accessed the internet daily, with a smaller proportion using it occasionally, monthly, weekly, or twice a week.

Lists	Frequency	Precent	Cumulative Percent
Gender			
Male	306	73.56	73.56
Female	110	26.44	100.00
Current Education			
Vocational Certificate Year 1	104	25.00	25.00
Vocational Certificate Year 2	78	18.75	43.75
High Vocational Diploma Year 1	97	23.32	67.07
High Vocational Diploma Year 2	66	15.87	82.93
High Vocational Diploma Year 3	71	17.07	100.00
Field of Study			
Agricultural	6	1.44	1.44
Business Administration	27	6.49	7.93
Industrial Technology	281	67.55	75.48
Digital Business Technology/Computer	102	24.52	100.00
Internet usage frequency			
Occasionally	27	6.49	6.49
Once a month	18	4.33	10.82
Once a week	6	1.44	12.26
Twice a week	9	2.16	14.42
Every day	356	85.58	100.00

Table 1: the distribution of participants based on gender, education level, field of study, and internet usage frequency (n=416)

Technological Equipment Used to Access the Internet	Frequency	Precent	Cumulative Percent
Lack of Computer (Desktop/Portable)	275	66.11	66.11
Possess Computer	141	33.89	100.00
Lack of Smartphone	6	1.44	1.44
Possess Smartphone	410	98.56	100.00
Lack of Tablet/iPad	362	87.02	87.02
Possess Tablet/iPad	54	12.98	100.00
Lack of Other Devices (Ex. Smart TV)	361	86.78	86.78
Possess Other Devices	55	13.22	100.00

Table 2: technological equipment used to access the internet (n = 416)

Table 2 presents the utilization of technological equipment for internet access. Among the participants, 66.11% lacked a computer (Desktop/Portable), while 33.89% possessed one. A similar pattern was observed with smartphones, where 1.44% lacked them and 98.56% owned one. Regarding tablets or iPads, 87.02% faced a shortage, with 12.98% having them. Additionally, 86.78% lacked other devices, such as Smart TVs, and 13.22% had access to these devices. These findings emphasized the prevalence of smartphone ownership and the significance of addressing limitations in computer, tablet, and other device accessibility for practical Internet usage.

Purposes of Technology Equipment Usage	Frequency	Distinction Within Group	Percentage Variation
Email Access Pre-COVID	294	29	9.86
Email Access Post-COVID	323		
Educational Use Pre-COVID	336	42	12.50
Educational Use Post-COVID	378		
Social Network Usage Pre-COVID	374	8	2.14
Social Network Usage Post-COVID	382		

Usage for Online Shopping/Internet Banking Pre-COVID	285	23	8.07
Usage for Online Shopping/Internet Banking Post-COVID	308		
Usage for News Updates Pre-COVID	376	10	2.66
Usage for News Updates Post-COVID	386		
Usage for Entertainment Purpose Pre-COVID	400	2	0.50
Usage for Entertainment Purpose Post-COVID	402		
Hours of Internet Use Weekly Pre-COVID	37.6	4.2	11.17
Hours of Internet Use Weekly Post-COVID	41.8		

Table 3: technology equipment usage purposes before and after the Pandemic (n = 416)

The analysis of technology equipment usage purposes before and after the COVID-19 pandemic, shown in Table 3, revealed notable changes in various categories. Email access increased by approximately 9.86%, shifting from 294 to 323 post-COVID. Educational use witnessed a substantial rise of about 12.50%, from 336 to 378. Social network usage experienced a slight growth of around 2.14%, changing from 374 to 382. Similarly, the utilization of technology for online shopping and Internet banking increased by about 8.07%, transitioning from 285 to 308. Usage for news updates saw a modest growth of roughly 2.66%, rising from 376 to 386. Entertainment purposes exhibited a minimal increase of about 0.50%, from 400 to 402. The average hours of internet use weekly saw an increase of approximately 11.17%, rising from 37.6 hours to 41.8 hours post-COVID. These percentage variations highlight the evolving patterns of technology adoption across different purposes in response to the pandemic.

ICT Skills Proficiency	Mean	S.D.	Result
Accessibility	3.45	0.71	Very good
Management	3.25	0.75	good
Integration	3.06	0.79	good
Evaluation	2.96	0.76	good

Creativity	3.12	0.81	good
Communication	3.27	0.74	good
Overall	3.18	0.66	good

Table 4: ICT Skills Proficiency according to students' self-perceived abilities (n = 416)

Table 4 pointed out that Participants' ICT skills proficiency levels were evaluated across multiple dimensions. Notably, their accessibility skills were at a "very good" level, as reflected by a mean score of 3.45. Management, integration, creativity, and communication skills were all categorized as "good," with mean scores of 3.25, 3.06, 3.12, and 3.27, respectively. Evaluation skills also garnered a "good" level with a mean score of 2.96. Overall, participants displayed a solid level of proficiency across these ICT skills, as evidenced by an average mean score of 3.18, marking a "good" level of proficiency across the board.

Level of Development of Professional Skills	Mean	S.D.	Result
Proficiency in Applying Required Professional Skills	3.38	0.74	About the same
Self-assurance in Applying Required Professional Skills	3.37	0.73	About the same
Inclination towards Relevant Professional Field Skills	3.46	0.74	Somewhat better
Dedication to Enhancing Relevant Field Skills	3.55	0.83	Somewhat better
Overall	3.44	0.76	Somewhat better

Table 5 Professional Skills Self-Perception (n = 416)

From Table 5, in terms of the students' self-perceived levels of professional skill development, the data indicated that their proficiency in applying requisite professional skills remained about the same, with a mean of 3.38. Similarly, their self-assurance in applying these skills also remained consistent, with a mean of 3.37. However, there was a slight improvement in their inclination towards applying skills pertinent to the professional field, with a mean of 3.46, and a somewhat more notable enhancement in their dedication to enhancing skills relevant to the professional field, with a mean of 3.55. Overall, the students perceived a somewhat better development of their professional skills, reflected in the mean of 3.44.

Variable	Model: OLS	Model: OLM
	Coefficient (Std. Error)	Coefficient (Std. Error)
Independent Variable		
Level of Professional Skills Development		
(PSD: 1 = Much Worse, 2 = Somewhat Worse, 3 = About the same, 4 = Somewhat Better, 5 = Much Better)		
Constant	1.3900*** (0.3060)	-
Dependent Variables		
Academic Discipline and Study Duration		
Agricultural field (AGF: 0=No, 1=Yes)	−0.1750** (0.1400)	−0.8250** (0.9170)
Business Administration field (BAF: 0=No, 1=Yes)	−0.0062 (0.1190)	−0.0650 (0.4590)
Industrial Technology (INF: 0=No, 1=Yes)	0.2000 (0.0809)	0.6830 (0.3070)
Year of study (YOS: Actual Number)	0.0016 (0.0233)	0.0360 (0.0747)
Equipment and Internet Browsing Time		
Computer (COM: 0=Lack, 1=Possess)	0.0563 (0.0759)	0.1130 (0.2880)
Smartphone (SMP: 0=Lack, 1=possess)	−0.3490 (0.2400)	−1.1600 (0.8560)
Tablet/iPad (TAP: 0=Lack, 1=possess)	0.2570*** (0.0932)	0.9770*** (0.3360)
Internet Use Frequency (IUF: 1 = Rarely, 5 = Often)	−0.0161 (0.0238)	−0.0206 (0.0868)
ICT Skills Level		
Accessibility (ACC: 1=poor, 5=excellent)	0.3360*** (0.0565)	1.2000*** (0.1920)
Management (MNG: 1=poor, 5=excellent)	0.1530*** (0.0538)	0.5160*** (0.1970)
Integration (ITG: 1=poor, 5=excellent)	0.0730 (0.0663)	0.3180 (0.2200)
Evaluation (EVL: 1=poor, 5=excellent)	−0.0103 (0.0522)	−0.0109 (0.1850)

Creativity *(CRT: 1=poor, 5=excellent)*	−0.0301 (0.0601)	−0.0928 (0.1980)
Communication *(CMN: 1=poor, 5=excellent)*	0.1760** (0.0761)	0.4770*** (0.1820)
Cut_1a	-	1.9900* (1.1000)
Cut_2b	-	3.5400*** (1.0800)
Cut_3c	-	7.5500*** (1.1400)
Cut_4d	-	10.9000*** (1.2100)

Table 6 Regression Results (n = 416)

Notes: **Significant at the 95% confidence level; ***Significant at the 99% confidence level. DBT (Digital Business Technology field) and OTD (Other Devices) were excluded from the analysis due to issues with multicollinearity. a, b, c, d: The Ordinal Logistic Model (OLM) of this study fitted four parallel lines (five groups, minus a baseline) with distinct intercepts, and the precise cutting points are precisely those. Other statistics: for the OLS: R-squared 0.442785, Adjusted R-squared 0.423331, F (14, 401) 20.93016, P-value(F) 1.02e-39. For the OLM: Number of cases 'correctly predicted' = 261 (62.7%), Likelihood ratio test: Chi-square (14) = 364.344 [0.0000]

The results of the regression analysis and the interpretation of the findings based on the types of independent variable groups (referring to Table 6) could be reported as follows:

Factors of Academic Discipline and Study Duration

It was found that only the variable of studying agricultural education significantly influenced the level of Professional Skills Development. OLS and OLM yielded consistent results. This relationship indicated a negative impact of studying in this field on the students' Professional Skills Development during the COVID-19 pandemic, aligning with findings from McKim et al.'s (2021) study on challenges in agricultural education amid the COVID-19 pandemic, primarily centered around Instructional Quality and Student Motivation. These interconnected challenges were pervasive across the entire agricultural education model in the USA. Notably, discrepancies in difficulties were noticeable between teachers and students, particularly impacting those from economically disadvantaged backgrounds, thus aggravating educational inequities.

Factors of Equipment and Internet Browsing Time

Research findings indicated that using tablets or iPads significantly enhanced vocational students' skill development during the COVID-19 crisis, supported by statistical significance. Amelink et al. (2012) reported that increased Tablet usage frequency correlated with higher engagement in engineering courses, emphasizing the importance of integrating instructional technology for practical education. Furthermore, Gashoot et al. (2023) highlighted the growing demand for mobile learning (through tablets or iPads) in higher education, driven by the proliferation of mobile devices. In industrial design, m-learning has become essential to align with changing consumer preferences. This learning mode offers flexibility for students to engage in various learning environments, ultimately preparing them for the demands of their future careers.

Factors of ICT Skills

The study uncovered that the three factors—Access, Management, and Communication—played a pivotal role in the success of online learning, significantly in both OLS and OLM: Access ensured students could retrieve crucial information from various sources using technology, facilitating efficient learning through smartphones and computers. Management skills were vital for effective decision-making, data selection, and adept use of communication tools, guaranteeing a well-organized and secure digital learning environment. Proficiency in Communication enabled students to seamlessly interact, collaborate, and share ideas across diverse digital platforms, fostering engagement and community within online learning. These elements collectively empowered students to excel in the digital education era. This observation aligns with the findings of Salee (2023), Janyam (2022), Permpoonwiwat (2021), and the World Economic Forum (2020), which highlight ICT literacy as a critical future skill for human resource development.

Study results indicate successful vocational education management during the crisis from educational, private, and government perspectives.

In this section, the results of the data analysis, derived from in-depth interviews focusing on the successful adaptation of teaching and learning methods to address challenges posed by the COVID-19 pandemic, were presented. The report was structured according to the perspectives of the education and private and public sectors. It provided insights into the challenges and obstacles encountered throughout this process.

Education Sectors: Students, Teachers, and School Administrators Perspectives

Not only students but also all other agencies concurred that adhering to the guidelines set by the Department of Vocational Education, Ministry of Education, proved effective

in teaching and learning. Both students and teachers agreed that organizing specific courses into sub-groups for rotation enabled students to access a broader range of resources, machinery, and instruments. This approach also fostered closer interactions for asking questions and allocated more time for hands-on experimentation. While the effectiveness of online and hybrid teaching methods was evident, it was acknowledged that learning efficiency experienced a marginal reduction of around 10% compared to the pre-pandemic period.

The school administrator highlighted the government's support initiatives, encompassing reduced tuition fees, low-interest loans for private vocational education institutions, and prioritized vaccine distribution for interns. Nonetheless, it became apparent that even with these supportive measures, the aid extended fell short of addressing all requirements comprehensively. As a result, educational institutions persistently leaned towards self-reliance and active alums engagement to ensure they could sustain operations through the crisis.

Furthermore, Teachers also addressed the ongoing issue of insufficient internet access for some students. This problem encompasses sharing online learning equipment with other household members, exacerbating the situation, and disrupting the seamless learning flow. These challenges resonated with the sentiments expressed by interviewed students, underscoring the urgency for support mechanisms like internet packages, complimentary internet services, provision of tablets, and financial aid.

Private Sector: Private Sector Representatives Perspectives

Based on in-depth interviews, it was revealed that despite the challenges posed by the COVID-19 pandemic, many workplaces remained committed to offering vocational students hands-on learning opportunities while adhering rigorously to public health protocols. Notably, certain establishments even went a step further by introducing paid internships and supplementary incentives like accommodation to minimize the health risks associated with commuting.

From these insightful conversations, a clear pattern emerged: enterprises held robust expectations of deriving multiple advantages through their collaborations with vocational schools. These expectations encompassed anticipations of heightened productivity and the acquisition of competitive edges through synergistic development initiatives. However, a prevalent sentiment among many establishments was that the shift to online instruction contributed to a dip in student performance compared to the pre-pandemic educational landscape.

Despite this observation, establishments emphasized their ability to tailor teaching methodologies to align precisely with their unique demands. The significance of internships also emerged as a central strategy, affording students the opportunity to refine their skills in direct accordance with the requirements of the participating establishments. This intricate process underscored the need for government intermediaries to facilitate

seamless coordination and cohesive curriculum design between private sector entities and educational institutions.

Public Sector: Department of Vocational Education Representatives Perspectives

The insights gathered from in-depth interviews highlighted the government's active involvement in several key areas. This included the development of an IT infrastructure, the establishment of smart classrooms in all 77 provinces, the implementation of Distance Learning Television (DLTV), the facilitation of online learning environments, and vaccines.

Additionally, the government introduced attractive tax incentives for businesses that trained student interns. This approach empowered businesses to effectively nurture students, aligning their skills with specific industry requirements and standards, consequently creating increased employment prospects for vocational learners.

Furthermore, the government was cognizant of the financial challenges faced by vocational students, which in turn affected the efficacy of online or hybrid learning systems. Consequently, it was deemed necessary to extend initiatives such as low-interest student loans and tuition reductions to improve accessibility. Equally important was the allocation of increased budgetary resources per student to vocational institutions, particularly for enhancing technological infrastructure like hardware and online instructional tools.
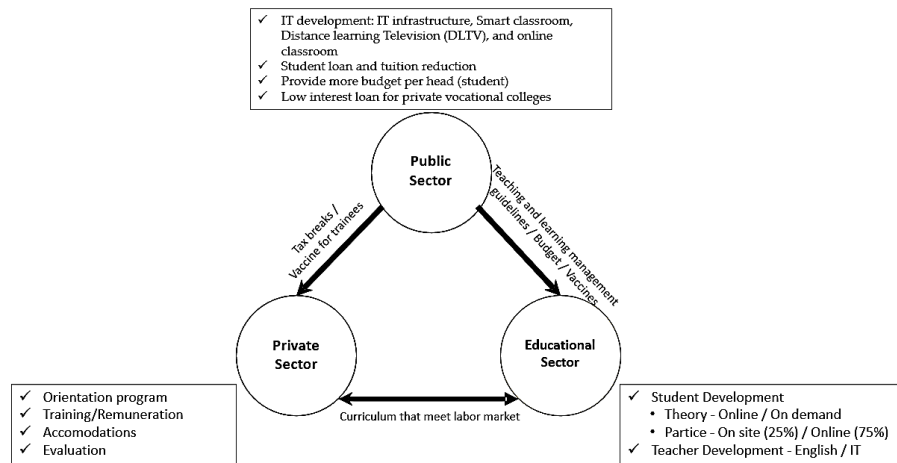

Figure 2: The vocational education management framework under the COVID-19 situation. Source: from the study

The challenges in managing teaching and learning during the COVID-19 pandemic have posed obstacles to the effectiveness of practical training and performance assessment. This alignment with Xia et al.'s (2022) study underscores the issues of poor student engagement in online learning attributed to technical skill gaps and low motivation. Various factors contribute to infrequent online participation, including participants' hesitation to utilize conferencing functions due to unfamiliarity with online systems, lack of confidence, connectivity problems, and concerns about privacy exposure.

Within this discourse, our research findings highlight the hurdles introduced by the shift to online learning during the crisis. These challenges encompass technology accessibility, teaching methodologies, and the alignment of skill development.

To optimize the efficiency of such teaching and learning models, the government's active involvement is crucial in coordinating and supporting vocational education between educational institutions and the private sector, utilizing a tripartite approach (Ibrahim et al., 2022; Association of Colleges 2021; Ojo et al., 2020). Moreover, the government should amplify efforts to enhance internet accessibility and provide robust e-learning tools while simultaneously addressing the enhancement of student skills through a comprehensive strategy centered around skill development.

Conclusions

This research utilized a mixed methodology involving both quantitative and qualitative analyses. In the quantitative aspect, the study aimed to demonstrate how teaching and learning during the pandemic period can contribute to the development of strong ICT skills and the advancement of Thai vocational students' professional abilities. The overall proficiency in ICT was found to be praiseworthy. Additionally, the research uncovered a favorable connection between students' access to devices, proficient device management, effective communication, and the improvement of their professional skills.

During the qualitative assessment, both the educational and private sectors acknowledged the effectiveness of integrating ICY to enhance Professional Skills during teaching in the pandemic context. Nevertheless, a slight decrease in skill levels was observed compared to the period preceding the COVID-19 outbreak. This decline could be attributed to challenges in accessing devices and the internet, particularly among economically disadvantaged vocational students. To address this challenge, the study suggested establishing a central coordinating body to facilitate cooperation between the education and private sectors, with more engagement by the involved government agencies. This collaborative endeavor would encompass actions such as ensuring students' access to online learning resources, internet connectivity, financial assistance, and supplementary support measures.

Recommendations

Considering the research findings, the following policy and research recommendations aim to strengthen vocational education in Thailand. These recommendations are crafted to address the challenges exposed by the COVID-19 pandemic, enhance the resilience of vocational education, and optimize the opportunities presented by technology and collaboration.

Policy Recommendations

<u>School and Institution Level:</u>

(1) Curriculum Review: Schools and vocational institutions should conduct a thorough review of agricultural education programs in light of the negative impact observed during the COVID-19 pandemic. This review should prioritize addressing challenges related to instructional quality and student motivation, particularly for students from economically disadvantaged backgrounds. It should take into account the insights gained from the study.

(2) Integration of Technology: Institutions should consider integrating technology, such as tablets or iPads, into their educational practices. The research findings suggest that these devices significantly enhance vocational students' skill development. Vocational programs should explore ways to incorporate instructional technology effectively, aligning it with their unique demands.

(3) Internet Accessibility: To overcome internet accessibility challenges, institutions should take proactive measures to support students. These measures may include providing internet packages, offering complimentary internet services, distributing tablets, and offering financial aid. These actions align with the study's findings regarding the importance of addressing internet-related obstacles to learning.

(4) Effective Teaching Strategies: Schools and vocational institutions should invest in research and training to develop and implement effective teaching strategies suitable for online and hybrid learning environments. Research can help identify best practices in adapting teaching methods to ensure that learning efficiency is not compromised in virtual settings. This supports the findings that online and hybrid teaching methods are effective but need optimization.

<u>Government Level:</u>

(1) Investment in IT Infrastructure: The government should continue investing in IT infrastructure, smart classrooms, and online learning environments for vocational education. The findings suggest that these investments improve access to quality resources for vocational students. Government policies should support and expand these initiatives.

(2) Private Sector Collaboration: Policymakers should actively facilitate collaboration between the private sector and educational institutions. Encouraging private sector enterprises to offer hands-on learning opportunities, paid internships, and incentives can enhance vocational education. Government policies should promote and incentivize such collaborations, as indicated by the research.

(3) Financial Support for Students: Government-level policies should prioritize financial support for vocational students. Measures such as low-interest student loans, tuition reductions, and increased budgetary resources per student can significantly improve access and affordability of vocational education. These policies align with the findings highlighting financial challenges faced by vocational students.

(4) Enhanced Internet Accessibility: The government should work on enhancing internet accessibility, especially for students experiencing internet access challenges. Policies should be designed to address this issue, ensuring equitable access to online education. Research reinforces the importance of improving internet access in vocational education.

(5) Long-Term Resilience Strategies: Policymakers should focus on long-term resilience strategies for vocational education. Research can provide insights into developing and implementing these strategies to better respond to future crises and disruptions. A tripartite approach, involving educational institutions, the private sector, and government agencies, should be central to these strategies, as demonstrated by the research findings.

Further Research Recommendations

(1) Impact of Curriculum Modifications: Further research can investigate the impact of curriculum modifications in agricultural education programs, addressing challenges observed during crises. This research can assess whether instructional quality and student motivation have improved due to curriculum changes.

(2) Technology Integration in Vocational Education: Research can delve deeper into the integration of tablets, iPads, and other instructional technology in various vocational programs. It can explore the pedagogical approaches that maximize the benefits of these technologies for skill development.

(3) Internet Access and Learning Outcomes: Further studies can examine the relationship between improved internet access and vocational students' learning outcomes. Research can explore how internet accessibility influences participation, engagement, and skill development in online vocational courses.

(4) Teaching Strategies for Online Learning: Research can focus on identifying effective teaching strategies specifically tailored to online and hybrid learning environments in vocational education. It can investigate methods for maintaining or improving learning efficiency in virtual settings.

(5) Evaluation of Private Sector Partnerships: Further research can evaluate the outcomes of private sector collaborations in vocational education. It can assess the impact of internships and partnerships on student performance, employment prospects, and industry relevance, particularly within the tripartite approach framework.

(6) Effectiveness of Financial Support: Research can assess the effectiveness of financial support measures, such as low-interest student loans and tuition reductions, in increasing access to vocational education and improving students' financial well-being. Consideration should be given to the role of all three stakeholders in implementing and sustaining these measures.

(7) Resilience Strategies in Vocational Education: Studies can explore best practices and strategies for building resilience in vocational education systems, ensuring their adaptability and effectiveness during crises. A tripartite approach, involving educational institutions, the private sector, and government agencies, should be central to these strategies, as indicated by the research findings.

These revised policy and research recommendations emphasize the importance of a tripartite approach involving educational institutions, the private sector, and government agencies in addressing the challenges and opportunities identified in the study. This approach ensures a collaborative effort to enhance vocational education and respond effectively to crises. By addressing these research areas and implementing the recommended policies, vocational education can become more resilient, adaptable, and effective in addressing challenges posed by crises like the COVID-19 pandemic.

Acknowledgements

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Addressing COVID-19 challenges through institutionalisation and innovation within an evolving skills ecosystem: contexts of England and small islands in the British Isles

Natasha Kersh, Andrea Laczik and Karen Evans

The chapter aims to consider some implications of the COVID-19 pandemic for VET and workplace learning policies and practices in the contexts of England and small islands of the British Isles. One of the implications of the COVID-19 pandemic is that it has created both challenges and opportunities of unprecedented intensity for lifelong learning within an evolving (skills) ecosystem. Shifts in organisational practices intensified by pandemic have become sustained and recognised both within individual organisations and more broadly, across industries. Workplaces and VET sectors had quickly to adapt their strategies and practices to new ways of working, learning and teaching, while coping with constant change. Some strategies and practices have been largely perceived as temporary and short-term solutions during the pandemic, as contingency arrangements to manage any further impact of COVID-19. However, some of them have been subsequently retained and institutionalised, particularly, those related to digitalisation, flexible learning and working modes, innovation, automation and sustainability. The chapter will aim to explore how this process of institutionalisation of innovation, challenges and opportunities is playing out in the contexts of ecosystems of England and some small islands of the British Isles.

Keywords: skills ecosystem; COVID-19; workplace learning; England and small islands of the British Isles

Introduction

The Covid 19 pandemic has brought about a range of unprecedented challenges, affecting the development of VET and workplace learning. The distinctive nature of the pandemic and accompanying lockdown measures have triggered various shifts in VET and work-related policies and practices. Consequently, both workplaces and VET institutions had to swiftly adjust their strategies and practices to accommodate new ways

of working, learning, and teaching, while simultaneously coping with continuous change. These adjustments frequently entailed fostering institutional and individual resilience, creativity, and innovation. Their efficacy and sustainability have depended crucially on contexts and the functioning of local and national skills eco-systems, reflecting the interdependencies of business settings and associated business models; institutional/policy frameworks; modes of engaging labour; structure of jobs, and levels of skills and systems for their formation (Buchanan et al 2017).

In England, the impact of several lockdowns (2020-2021) has been evident, leading to severe consequences for vocational institutions (including Further Education (FE) colleges and private providers), workplaces, and businesses across various sectors. A significant number of employees were either furloughed or made redundant, particularly in the hardest-hit sectors, such as hospitality, tourism, retail, entertainment, and construction. Moreover, there was considerable disparity by demographics, with women, individuals with lower pay, and young people being the worst affected (Resolution Foundation 2020). Research undertaken by the Institute for Fiscal Studies (2020a; 2020b), observed that younger workers were nearly two-and-a-half times more likely to work in a sector that shut down due to the pandemic. These circumstances caused by the pandemic have severely affected young people's progression, life chances and career development (Edge Foundation 2020). A recent study (Ray-Chaudhuri and Xu 2023) also highlights that 'the loss in working experience and the reduced ability to progress in their careers during the pandemic, coupled with shocks to mental health, could leave long-lasting scars on recent graduates' (Ray-Chaudhuri and Xu 2023: 2). Similarly, Christie and Swingewood (2022: 5) observe that 'COVID-19 exacerbated existing concerns about young people's position in the labour market,' particularly as 'young people were more adversely affected than other generations by changes to employment and work caused by the pandemic.' . Additionally, the pandemic has intensified the trend towards increased polarisation in the youth labour market between high- and low-skill jobs, leading to fewer 'stepping stone' mid-skill jobs and more young people in insecure and part-time work (Williams et al 2021: 2). Research by Spours et al. (2022: 785) has identified five 'indirect harms' resulting from the effects of successive 'lockdowns' on local economies, workplaces, training opportunities as well as on learners' well-being and life chances.

- COVID Harms 1. Vocational disruption
- COVID Harms 2. Problematical transitions including access to higher education
- COVID Harms 3. Inequalities, disadvantaged young people and NEETs
- COVID Harms 4. The mental health and well-being of young people
- COVID Harms 5. A 'stressed' FE Sector

This indicates that the COVID-19 pandemic has brought about numerous unprecedented challenges. However, there is growing evidence that during the crisis, it has also provided an opportunity to reflect on and develop innovative policies and practices for learning and working. A study undertaken by the British Council points out that the challenges posed by COVID-19 present an enormous opportunity for the Technical and Vocational Education and Training (TVET) sector to innovate and increase its potential. The research has observed that these new approaches can include experiential virtual training, remote placements with employers, and other initiatives to enhance the inclusiveness of provision and work experience (British Council 2021). During the pandemic, these strategies and practices were initially perceived as temporary and short-term solutions, known as contingency arrangements to manage any further impact of COVID-19. However, some of these strategies have been subsequently retained and institutionalized, particularly, through the following key trends:

- Remote, hybrid, and/or flexible learning and working modes;
- Digitalisation, which involved experimenting and employing different modes of digital technology, including online blended learning;
- Focus on innovation, automation and sustainability;
- Focus on addressing skills shortages and labour market mobility - skills that support swift economic recovery, both in the pandemic and post-pandemic reconstruction;
- Resilience and skills to manage emergency within institutions and workplaces.

The chapter will discuss these key trends and some implications for policy and practice discourse in England, while also considering examples of institutionalisation from small island contexts closely connected in the social and governance ecologies of the British Isles. When considering the developments in the context of England and the British Isles, the chapter does not aim to undertake a systematic comparative analysis but rather aims to exemplify the emerging trends during COVID-19 that led to the institutionalisation of strategies associated with the initial emergency responses. Some similarities and differences will be discussed within the common discourse of the evolving ecosystem.

The next two sections will introduce the respective contexts of England and selected small islands of the British Isles, specifically discussing some key trends associated with Covid-related responses such as remote and flexible learning and working modes, digitalisation and the changing nature of learning and working spaces. The subsequent section will consider the impact of digitalisation, as one of the major trends, and its implications for institutionalisation and for future developments. The chapter will then focus on some implications for future developments, illustrating the ways in which the institutionalisation of changes, that were initially implemented as an emergency response

to lockdowns, has become an enduring development characterising both England and the small islands' approaches to learning and working within their respective ecosystems. The chapter will further reflect on the implications of these developments, which often require a high degree of resilience, as well as new skills and expertise that individuals need to develop to address various challenges in the constantly changing world of work. The concluding part will pull together issues considered within this chapter, discussing the ways the COVID-19 pandemic has created both challenges and opportunities for VET and workplace learning within an evolving skills ecosystem.

England: remote, hybrid, and flexible learning and working.

In England, the outbreak of COVID-19 in 2020 has triggered a rapid and significant shift towards remote learning and working. In March 2020, the Westminster Government implemented a series of lockdowns and requested people to work from home where possible. Subsequently, on March 23, 2020, the Government issued guidance requiring people to stay at home and away from others, thus introducing the notion of covid related social distancing (House of Parliament 2021: 12). Both VET institutions and workplaces had to adapt to the new reality, which involved a move to remote learning and working, where possible. Working remotely has become one of the most notable shifts in organisational practices, accelerated and intensified by the pandemic, which resulted in enormous uptake in hybrid and fully remote work. As noted by Hansen et al.'s research, over time, it has become clear that this shift will endure long after the initial forcing event (Hansen et al 2023: 1). Subsequently, a variety of workplace-related COVID-19 guidance was issued, which was continually modified and adjusted, to address the challenges of the COVID-19 pandemic in England (UK Government 2021). Advice to businesses in other parts of the UK was set by the Northern Ireland Executive, the Scottish Government, and the Welsh Government.

In December 2021, members of the Flexible Working Taskforce published guidance on effective hybrid working. The key points of the guidance included recognising the importance of appropriate training for managers, specifically on how to manage and support hybrid teams effectively, including performance management, remote communication, collaboration and relationship building. In addition, the guidance notes that ongoing listening activity with employees, managers, and employee representatives should be undertaken to understand the early lessons of hybrid and whether hybrid is delivering anticipated benefits to individuals and the organisation (House of Parliament 2022a: 12). Some influential policy papers, aimed to offer more flexibility and to encourage skills development and lifelong learning. The Skills and Post-16 Education Bill (House of Parliament 2022b) introduced in the House of Lords on 18 May 2021:

- aimed to improve how the skills and post-16 education system functions in England.
- supported the Lifetime Skills Guarantee, announced by the Prime Minister in September 2020. (Prime Minister Office 2020)
- aimed to implement reforms set out in the Department for Education (DFE) White Paper, Skills for Jobs: Lifelong Learning for Opportunity and Growth (Department for Education 2021), giving employers a greater say in skills development and introducing a Lifelong Loan Entitlement.

It's worth noting that the key policy paper mentioned above, 'Skills for Jobs: Lifelong Learning for Opportunity and Growth' (Department for Education 2021), aimed not only to empower employers with a greater role in skills development but also included measures to address recommendations from the Independent Panel Report for the Review of Post-16 Education and Funding (the Augar report), which was published in May 2019. These measures particularly focused on expanding opportunities for flexible, lifelong learning (Department for Education 2019).

Both the policy discourse and challenges caused by the pandemic have resulted in the growing role of remote and flexible working and learning modes. Hansen et al.'s research, which examines the full text of over 250 million job postings across five English-speaking countries, provides compelling evidence of the significant surge in remote working during the pandemic. Figure 1 (source: Hansen et al 2023: 55) illustrates a substantial increase in the demand for hybrid and fully remote work across the five countries. The figure indicates that the unweighted share of new job ads offering hybrid or fully remote work is highest in the UK.
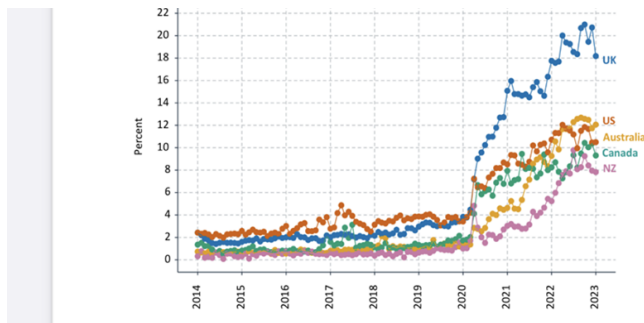

Figure 1 (source: Hansen et al 2023: 55)

Working remotely is a term that encompasses various configurations of work conducted outside conventional physical workplace settings. It may pertain to a range of contexts and spaces, such as libraries and trains. The concept of workplace space has been recently reconceptualized in response to evolving societal perceptions and demands regarding learning and work (Malloch et al 2021; Kersh 2015; Kersh and Evans 2017). Even before the pandemics, workplace spaces have been increasingly characterized by their multidimensional nature, blurring the boundaries between different work-related contexts and settings (Kersh and Evans, 2017). The emergence of new learning and working spaces has emphasised the growing flexibility of learning opportunities and the evolving demands of contemporary workplace. The pandemic has exacerbated the blurred boundaries between work, learning, and other environments, highlighting the flexibility of both workplace location and working hours. On the location spectrum, some tasks may necessitate specific places, while others can be accomplished anywhere. Similarly, on the time scale, certain tasks may require adherence to specific schedules whereas others can be executed at any time (CIPD 2021). Furthermore, as emphasized by Derrick et al (2021), the pandemic has brought into sharp view that working productively goes beyond just the tasks that are required to be done. Research indicates that remote work often demands more than the execution of specific tasks; it calls for creativity, resilience, and multitasking. In addition, resilience has become a critical dimension, particularly concerning managing the stress and anxiety associated with national lockdowns and the complexities of transitioning to full or hybrid remote work. This transition frequently demands the development of new skills, such as ICT proficiency (e.g., information and communication technology) as well as building resilience through personal commitment, problem-solving, and multitasking.

Small islands in the British Isles: unique ecosystems and Covid responses

Small islands that form part of the British Isles represent distinct contexts and unique ecosystems that relate to the UK in different ways. The research by Dabbous et al (2022) investigated selected small islands around the UK with relationships to UK governance, whether governed by UK parliament and devolved parliaments, such as the islands of Scotland, or with other established governance relationships to the UK such as Crown Dependency. Islands known as 'crown dependencies' (Isle of Man[1], Bailiwicks of Jersey, Guernsey[2]) are self-governing on all domestic matters and they are not represented in the UK parliament. In the Channel Islands, large enough islands operate their own

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[1] The Isle of Man is located in the Irish Sea between Great Britain and Ireland.

[2] located in the English Channel and together known as Channel Islands

parliaments (Dabbous et al 2022: 7-8). The governance relationships have implications for education systems, and also for the ways in which COVID-19 restrictions have been managed in each location. For example, the crown dependency islands' education policy developments link to a certain extent to education policies within the UK but such linkages are not legally required and policy developments are introduced in the islands according to their specific needs and contexts. All participating islands selected for the research had more than one secondary school but were big enough to have their own further education college and an established post-16 provision. These colleges also provided on-island higher education courses.

The islands have experienced the outbreak of the pandemic similarly to the UK mainland and went into lockdown in the last two weeks of March 2020. However, lockdown timescales and recovery plans for re-opening colleges and essential services varied. Focusing on schools and colleges lockdowns, Jersey, for example, only had one lockdown, Guernsey had two lockdowns and the Isle of Man three lockdowns. The durations of school and college closures were generally shorter in the self-governing islands than those that applied in the directly governed counties and islands of England and Scotland.

The frequency and the length of lockdown, and the preparedness of FE colleges for going into lockdown clearly had an impact on their responses. Further specificities of the small islands, such as geographical size and the relatively small population, offered unique possibilities to overcome the challenges FE colleges faced due to Covid. FE interviewees often referred to the small community spirit and 'everybody knows each other' when asked about how their employer engagement changed and, specifically, what possibilities they had to support their disadvantaged young people.

Given the differences of lockdown frequency and length, the small islands' abilities to have a clearer sense of how their policy makers planned to respond to Covid, offered other solutions for FE colleges. These FE colleges often rearranged the curriculum, which meant that they focused on the delivery of theory during lockdown and picked up the practical elements of the curriculum once the colleges were open. This was possible when FE colleges had a sense of the extent of lockdown. Employer engagement is fundamental to VET. While this partially stopped and changed during COVID-19, there were ways this could be sustained and resumed in some cases very quickly given the close communities on small islands.

The role of digitisation and use of ICT

In England and in small islands of the British Isles alike, at the time of the pandemic, digitalisation has emerged as an important trend underpinning remote and hybrid modes of learning and working, and ICT has been commonly perceived as a 'key enabler of

remote and hybrid working' (House of Parliament 2022). Digital tools like websites, social media platforms, smartphones, content-sharing systems, other platforms and gadgets have played a crucial role in enabling businesses to maintain their day-to-day workplace activities, and participate in innovation, research and development. A Cedefop study observes that the coronavirus pandemic and its wide-ranging implications have accelerated digital skills demand in many occupations, especially non-ICT ones (Cedefop 2021). Businesses in England have swiftly embraced remote work arrangements to maintain their operations. Employers have been increasingly using video conferencing tools, collaboration platforms, and project management software to facilitate communication and workflow.

Equally, in VET, virtual classrooms became the new norm, allowing students to continue their studies and interact with teachers remotely. This shift brought about both challenges and opportunities, as educators had to cope with ensuring equal access to technology and internet connectivity for all students and exploring innovative ways to deliver engaging and effective virtual lessons. Comparisons can be made between system-wide findings in England and the other jurisdictions of the UK (Scotland, Wales, Northern Ireland), with the specific situation in 'island colleges' in small islands highlighting the ways in which the vocational challenges could be creatively addressed in some 'close-knit' communities that, at the same time, have multiple interconnections and interdependencies in neighbouring eco-systems (Dabbous et al 2022).

In the context of small islands of the British Isles, FE colleges clearly experienced 'Vocational disruption' (Covid Harm 1) due to the lockdown and developed their own response to teaching and learning of vocational courses. Online teaching and learning is not new. What was new at the beginning of the pandemic was the speed, intensity and extent to which course delivery shifted online. Island colleges have already used different learning platforms, such as Microsoft Teams, Moodle, Blackboard, Zoom and Canvas and had online teaching built into their practice well before Covid. This was also due to their geographical sizes and locations. Nevertheless, having the tools to access education has been key and many FE colleges on the islands were able to lend their learners laptops in order for them to remain engaged with education and training. They were often able to do so from day one. Similarly, developing further digital tools and in particular digital skills of teaching staff and learners have been key to successful online and blended teaching and learning. Further, most FE colleges on the islands developed their IT support further. These tendencies are not unique and fit in well with what happened across the UK.

Online and blended teaching models have been promoted through various national initiatives in the countries of the UK. In England, the Department for Education (responsible for education including higher and further education policy, apprenticeships,

and wider skills in England) launched the 'Skills Toolkit' – a new online learning platform providing free access to digital, numeracy and employability courses to help people build skills, progress in work and, during lockdown, to maintain skills development during furlough (Department for Education 2020). As highlighted by Cedefop (2021), the effective utilisation of digital skills has emerged as a driver of resilience, assisting both workers and entire organisations in adjusting to the new realities forged by the pandemic. This has further facilitated the uninterrupted delivery of public and private services. Notably, numerous employees who did not previously incorporate digital skills into their immediate work responsibilities were able to seamlessly transition to remote virtual work in response to the pandemic.

However, the development of digital skills, especially during the time of COVID-19, posed challenges for many employees. They were required to quickly master new digitally related skills within a relatively short period. Additionally, the accelerated pace of digitisation has contributed to a digital divide, resulting in inequalities in access to skills and training. This has particularly led to the following issues:

- Workers who earn more tend to work in jobs with more scope for home working: Employees who earn higher hourly wages are more likely to be able to work from home.
- The impact of digitisation will differ across sectors, jobs and geographical areas.
- Women, BME workers, young workers and migrants are overrepresented in jobs that are very liable to digitisation.
- The evidence suggests a digital skills gap, particularly amongst workers in precarious types of employment. The lack of on-the job training opportunities puts these workers at high risk of unemployment in the future. (TUC 2022)
- Those lacking digital literacy are considerably disadvantaged.

While this period of change was associated with significant challenges, it also revealed the potential for a more flexible and adaptable approach to education and employment in the future. As restrictions eased, a hybrid model of learning and working has been gradually adopted and institutionalised, combining the best of both physical and virtual dimensions of learning and working spaces.

Implications for future developments

This section will examine key implications arising from the changes and challenges faced by VET and workplace learning during the pandemic. Shifts in organizational practices, such as flexible and hybrid working and learning, have become enduring and widely recognized and adopted, within individual institutions and across the business world. The

gradual institutionalisation of these emergent measures has become a pivotal development, shaping fresh approaches to learning and working post-pandemic both in England and in small islands of the British Isles. Simultaneously, these developments underscore the need for new skill sets and new occupations to address both existing and emerging challenges intensified by COVID-19. The complex interplay between these challenges and opportunities brought about by the pandemic will be explored.

Institutionalisation

Some strategies, particularly those related to digitalisation, flexible and remote working and learning, have been formalized and have contributed to the emergence of innovative approaches in the context of vocational education and training (VET) and workplace learning. A study undertaken by British Council, points out, 'that change that was initially implemented as an emergency response to lockdowns and campus closures has generated efficient and sustainable practices that suggest a complete return to pre-pandemic TVET policy and practice is unlikely'. The current social and economic challenges, caused by the COVID-19 crisis and the subsequent need for many workplaces across the world to move to remote working and learning, represent a powerful example of the changing nature of the learning space at work. (British Council, 2021)

In both England and the small islands contexts, similar tendencies have led to the gradual institutionalization of COVID-19-related responses, which were initially employed as short-term and temporary measures. In small island contexts of the British Isles, it has been noted (Dabbous et al., 2022) that lessons learned during college closures have resulted in long-lasting impacts on the way teaching and learning take place. In VET and work-related learning, these developments have been characterized by a consensus that the traditional pre-COVID-19 ways of teaching, learning and working do not need to fully return as the default. The key features of these new approaches have included increased flexibility for staff and students to engage in some form of remote working and learning, as well as rethinking physical spaces at colleges and workplaces to accommodate blended learning and working approaches.

Institutionalisation of post-pandemic VET changes in England is rooted in the dominant models for VET development and the way in which these are developing in the UK. The direction of travel is towards the systemic upgrading and enhancement of TVET as an alternative but equivalent (in status) pathway parallel to the 'academic route'. This process has encountered some significant set-backs as a consequence of Covid, which has impacted negatively on the take up of TVET relative to academic education. The policy of strengthening TVET quality and participation is now connected with a 'levelling-up discourse' and related set of policies (necessitated by Brexit and then pandemic effects).

The policies are building on long-standing parity of esteem arguments that have held that inequalities can be reduced by generating 'higher normative expectations' for vocational learning, through the provision of flexible progression routes and equivalence frameworks. Historically, VET in England has performed relatively poorly in outcomes and quality of vocational provision. While many of the limiting factors identified by Green et al (2021) endure (e.g. over-reliance on 'initiatives' and long – term underfunding) progress over recent decades have been made in institutionalising common standards frameworks extending from basic to higher professional levels and flexible progression routes have been recognised and become established. These have been stress-tested during the pandemic with some of the consequent changes to institutional/pedagogic practices outlined above contributing incrementally to development and sustainability. Post pandemic, the reliance on 'initiatives' remains, with active support for dissemination of best practice still a primary means of institutionalisation in England. Sustainability questions remain urgent for insecure, often lower-level work-based routes with few guarantees for young people and adults on programmes that end when companies cease operating. Action is urgently needed on 'safety nets' and recovery plans, for young people and adults who are placed in vulnerable situations by events beyond their control, without the means to cope unaided. The Trades Union Congress has recommended, for example, a revamp of the disappointing Kickstart scheme, investment in job creation, and a strong safety net for those who do lose jobs – learning from some short-term coordinating and support arrangements that were successfully deployed during the pandemic in specific localities or sectors3. Calls for more multi-agency coordination of this kind in communities and sub-regions have intensified, in the face of the challenges of pandemic recovery, feeding into policy planning processes from local to national levels and influencing what Spours et al. term the development of nascent 'covid recovery ecosystems'.

Regarding the development of the 'lifetime learning guarantee', its reliance on take-up of loans for learning is also raising fundamental questions about its scope, viability and efficacy, and its possible effects in further entrenching inequalities that were laid bare in the pandemic.

Innovation, automation and green skills

Another significant implication is linked to rethinking the skills required by contemporary society, particularly those tied to innovation, automation, and sustainability. The COVID-19 pandemic has presented a range of challenges and changes for Vocational Education and Training (VET) and workplace learning. At the same time, across the UK, the pandemic crisis has provided an opportunity to reconsider the significance and types

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3 Please see for further details https://www.lancaster.ac.uk/work-foundation/publications/impact-of-covid-19-on-the-uk-labour-market-the-case-for-a-place-based-recovery

of skills and expertise that individuals need to develop to address various challenges in the constantly changing world of work. The COVID-19 pandemic has accelerated and sharpened the focus on skills shortages and labor market mobility that already existed prior to the pandemic.

As observed by Suciu et al (2023), the COVID-19 pandemic has not only produced devastating effects globally, particularly in terms of health, economic activity, and social life, but has also highlighted the gaps and vulnerabilities of Industry 4.0 (Suciu et al 2023: 2). Their research indicates that automation creates significant shifts between sectors and job profiles, driven by technologies, which can impact both low-skilled workers and high-skilled professionals. The authors conclude that empirical evidence, along with medium- and long-term forecasts, suggests that the process of substantial digitalization of business models is expected to accelerate, thereby increasing pressure on the labor market (Suciu et al. 2023). This acceleration requires the development of new job roles and skills. For instance, specialists in Artificial Intelligence (AI) and machine learning, Information Technology (IT) services, and process automation are expected to be in demand, necessitating specific training and skill development (Schlegel and Kraus 2023). The newly created jobs are linked to several skill requirements, including: (1) skills needed to use specific new hardware and software; (2) data science skills and (3) the need to apply or adapt skills to future-related goals, for example combating climate change. A new green learning agenda has emerged as a prominent post-COVID development. It has been argued (e.g. Kwauk and Casey 2022) that there is a strong necessity to formulate frameworks for the skills required to tackle one of the most far-reaching challenges: climate change. This involves considering the three types of green skills that form the foundation of a new green learning agenda for climate action:

- Green life skills
- Skills for green job
- Skills for green transformation

Williams et al (2021: 2-3) note that concerns about climate change have been linked to the shift towards green jobs, offering an opportunity "to create 'future-proof' jobs for young people, including those from disadvantaged groups." Their research found that this is particularly relevant for jobs in social care, low-carbon housing, sustainable transport, and healthcare, resulting in significant job opportunities across the skills spectrum – including mid-skill jobs. It's worth noting that opportunities for young people to transition from existing roles to 'green' roles may span across a variety of sectors. For instance, in the construction sector, trades might involve home retrofitting and low-carbon heat, while receptionists and retail sales workers could shift into customer service representative roles within green sectors to meet the growing demand (Williams et al 2021: 3).

COVID-19 has been recognized as both a disrupter and a catalyst for addressing the green skills agenda (Strachan et al 2022). Specifically, this could be seen as an opportunity to expedite social change and the reskilling and upskilling of the workforce needed to facilitate any transition toward a cleaner, fairer economy and society. Addressing the climate change agenda within the workplace demands innovation, resilience, and creativity within an evolving post-COVID ecosystem that brings together all key stakeholders. This requires increased collaboration between VET providers and organizations, aiming to foresee and provide the necessary support that employers need to enhance skills development for their workforce.

Conclusions

One of the implications of the COVID-19 pandemic is that it has created both challenges and opportunities of unprecedented intensity for lifelong learning within an evolving skills ecosystem. As Child (2020) puts it, the coronavirus crisis has created an opportunity to reflect on how a more effective system of social collaboration and learning could contribute to more effectively addressing other enduring challenges. This includes considering collaborative solutions to many of the contemporary problems that will persist beyond the COVID-19 period (Child, 2020: 2-3). Shifts in organizational practices, intensified by the pandemic, are being sustained and acknowledged both within individual organizations and more broadly across industries. Across the UK, similar strategies to address the challenges of the pandemic stemmed from the common legal frameworks that link the countries' actions. Differences reflected greater influences from the local government when colleges could re-open for face-to-face teaching. This indicated the extent to which overall strategies were flexed to fit localised contexts. Dabbous et al.'s research (2022) has found that institutions in small British island contexts developed specific approaches to working responsively and flexibly within their local communities to resolve issues and tackle emerging challenges. During the pandemic, many communities experienced shorter periods of school and college closure, and a greater influence from the local government (Dabbous et al, 2021), while, as observed by Mouthaan et al (2021) England appeared to exhibit a more "top down" or centralised approach than the other parts of the UK.

The phenomenon of institutionalization has become increasingly widespread, particularly in relation to maintaining and implementing hybrid and online modes of learning and working. The advantages of hybrid modes of learning and working have been appreciated by various stakeholders, including employers, teaching staff, and learners. These trends are often associated with innovations aimed at sustaining and improving the best innovative practices developed in response to COVID-19. Local capacity, creativity and

communication matter in speed, targeting and quality of efforts on the ground. We have drawn on lessons from both England and some small island contexts that illustrate not only the diversity and interconnectedness of ecosystems but also the commonalities and shared experiences across contexts.

Despite these advancements, there are many challenges and gaps that need to be addressed post-COVID. One important challenge relates to finding a balance between digital engagement and direct face-to-face engagement to ensure that the needs of both learners and other key stakeholders have been considered, and that any implementation of online modes of learning is meaningful. According to a McKinsey report, organizations increasingly promoting their existing portfolios of digital-learning options need to go beyond merely applying existing technology solutions to offer virtual classrooms. Instead, they should represent a more fundamental rethinking of the learning experience to enable collaborative, interactive social-learning experiences for groups of learners (Kshirsagar et al., 2020, p. 5).

Collaboration has been highlighted as one of the key dimensions of the skills ecosystem. There is a clear need for schools and colleges to collaborate with employers, career advisors, local authorities, and other education and training providers. This collaboration is essential to nurture the evolving ecosystem and support students/learners in preparing for the workplace and making informed choices about their next steps in education or training.

Ecosystems perspectives show how challenges in maintaining learning and skills development under conditions of external shock such as pandemics are reinforced at the institutional level as learning and skills providers experience multiple, sometimes conflicting pressures as the communities in which they are situated (and the families that comprise them) are differentially affected by disruptions. At the macro-level the qualification system effects are pervasive. Interdependencies of these levels and scales of activity evolve over time. Focusing on the ecosystem interdependencies that affect the broad structures of vocational education and training structures highlights the necessity for longer-term strategic planning to mitigate system-wide disruption. This more strategic approach requires more than the building of capacity at local and regional levels to remediate shorter term vocational learning losses and longer-term harms (institutionalising a pandemic-recovery approach). It also requires active planning for (re)entry-to-employment, generation of new job opportunities and systemic support for social collaboration and lifelong learning, as key elements of a pandemic/'external shock' resilience eco-system.

COVID-19 pandemic effects on vocational education and training hit workplace learning hardest. Recovery required flexibility and catching up, but resilience will require greater attention to the interdependencies of labour markets, business systems and

industry processes. Covid emergencies have already intensified calls for the stronger institutionalisation of industrial strategies for generating and securing future jobs, particularly in greening the economy, and have also contributed to the acceleration of plans for lifetime learning guarantees linked to reskilling, underpinned by new legislation.

Institutionalising the upgrading of VET requires more than ongoing changes to the qualification system that are already in hand in England. It also requires adequate resourcing for public sector colleges and incentives as well as obligations for employers. Mounting evidence from key Sector actors has already strengthened calls for broadening of learning and skills entitlements in England, building on policies already implemented in Scotland and Wales. Systematic reviews of evidence have confirmed the strategic importance of collaborative multi-agency interventions that aim to co-ordinate job placements; careers education and guidance; and support for vulnerable learners (Spours et al. 2022). The strengthening of the meso-level of the broad structures of VET requires resources for the further institutionalisation of local and subregional networks of schools and colleges, HE institutions, employers, training agencies and providers of work-based learning, working with trade unions and other 'third sector' organisations. Strengthening of these meso-level, intermediary relationships potentially creates a more secure basis for national governments in UK to devolve progressively more responsibilities to the lower levels. Devolution can harness local knowledge, relationships and support networks for future resilience, beyond mere recovery, The challenges of how far and how best such devolutions can be realised are already featuring in the formation of plans and missions of political parties, towards the 2024 UK general election. The exploration of these challenges and the proposed solutions requires the further development of ecosystems perspectives and research methodologies that can capture the complexities and interdependencies at a deeper level.

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Covid-19 and war implications for skill formation in Ukraine

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This chapter aims to explore how the Covid-19 gained experience helped VET providers to acquire and develop their resilience to the disruptions and volatility of environment (e.g. obstacles brought by the war). Firstly, there are disclosed the nature and extent of disruptions of the VET provision caused by the pandemics and war. Secondly, there are analysed the public policies and strategies which facilitated resilience of the VET provision to the disruptions of pandemics and war. The essential part of the study explores strategic tools and management practices applied by VET providers as a response to significant social shifts caused by the war, for ensuring institutional flexibility and a set of new safety requirements.

Keywords: vocational education and training, skill formation, Covid-19, war in Ukraine

Introduction

The skill formation ecosystem of Ukraine since the collapse of the Soviet Union has experienced different transitions and critical junctures, including complicated transition of the VET provision to the conditions of the market economy, curriculum, reforms, trends of Europeanization of the VET institutions and processes after the Dignity revolution in 2014 and many others (Melnyk 2022; Tūtlys et al 2021).

The critical junctures related to the disruptions caused by Covid-19 and military aggression of the Russian Federation launched in February 2022 are exceptional in many senses – not only by their radical and abrupt character, highly disruptive and destructive impact on society and VET provision, but also by actualization previously accumulated unsolved problems, bringing important changes in the vectors of the future development of VET and its role in society. The closeness of these disruptions in the timeline also created opportunities for the VET system and VET providers of Ukraine to use the know-how of adaptation of VET provision to the Covid-19 closure conditions for the fast adjustments of the VET providers and their educational activities to the conditions of the war.

This chapter aims to explore how the Covid-19 gained experience helped VET providers to acquire and develop their resilience to the disruptions and volatility of environment (e.g., obstacles brought by the war). Firstly, there are disclosed the nature and extent of disruptions of the VET provision caused by the pandemics and war. Secondly, there are analysed the public policies and strategies which facilitated resilience of the VET provision to the disruptions of pandemics and war. The essential part of the study explores strategic tools and management practices applied by VET providers as a response to significant social shifts caused by the war, for ensuring institutional flexibility and a set of new safety requirements.

The core set of research methods includes a historical analysis of regulatory documents, VET statistic mining, as well as targeted interviews with VET managers and teachers, forecasting methods and a scenario-building approach.

Institutional development of the skill formation system of Ukraine before disruptions

Covid-19 closure, and the military aggression of the Russian Federation constituted significant critical junctures of the institutional development of skill formation in Ukraine. Skill formation in this country is characterized by the specific development of VET providers, including specific linkages between education and employment, extra social responsibility of VET and fragmentation of social partners involvement (Melnyk 2022).

Starting from the collapse of the Soviet Union skill formation institutions in Ukraine experienced the transformations of post-communist transition and building of new skill formation institutions on the vestiges of the Soviet legacy or from the scratch (Melnyk 2022; Melnyk et al 2021). This implied rather protracted and complicated processes of dealing with the Soviet legacy of institutions and processes under the new (market-oriented environment) conditions. The main change in skill formation was shift from the planned system of skill formation oriented to the demand of skills in the state-led and planned economy to the school-based and skill supply-oriented system struggling with the challenges of meeting the skills needs in the emerging market (Melnyk 2022; Melnyk et al 2021). Increasing autonomy and power of skill formation institutions, together with the freedom in choosing skill formation pathways lead to the massification of the higher education and significant decline of VET provision. These processes were accompanied by the change in mass behavioural model of youngsters in favouring higher education pathway of skill formation, what in longer term has led to diploma inflation due to growing gap between provided academic degrees and demand of skills in the labour market.

The beginning of the 21st century was marked with differentiation of the skill formation pathways, development of new types of providers and standardization of the VET curricula by formal adoption of competence-based approach. It should be also noted that the system of occupations in the legal meaning was not able to suit real labour market needs and consequently it led to the separation of training practices from companies' requirements.

Another significant critical juncture was "Europeanization" of skill formation system and processes after signing of the Association Agreement between Ukraine and the European Union in 2014 resulting from the Dignity Revolution (Melnyk 2022; Melnyk et al 2021). This process brought important changes in the field of skill formation, including systemic approach of reforms in the field of VET and qualifications, orientation to the development of national system of qualifications, strengthening of the autonomy of VET providers in the curriculum design, efforts and steps towards decentralization of the design of qualifications and VET curricula, as well as focus on the regional and sectoral development of VET provision and support to capacity building of VET providers in the regions, international mobility of the VET professionals.

Overall, before the disruptions caused by the Covid-19 and the military aggression of the Russian Federation, skill formation system, and especially VET were on the track of highly ambitious, challenging and systemic transformations aimed to the development of open, learner-centred and market-oriented institutions and processes.

Covid-19 as critical juncture in the development of skill formation in Ukraine

Covid-19 pandemic related disruptions caused numerous implications to the skill formation, including deterioration in the quality and accessibility of education, development of "touchless" training approach, modification of equipment and communication models.

One of the most significant implications of pandemics to labour market is fostering of digitalization of the work processes, especially in the sectors of services, retail trade, logistics. what increased the risk of technological unemployment for the low-and-medium skilled people working in these sectors, predominantly women, as well as increased the demand of continuing training and reskilling of these population groups (Yuzkiv Sakhno Kobernik 2021). What regards the supply of human capital and skills, the pandemics further exacerbated demographic crisis and emigration of the population: the data of International Organization of Migration the total volume of emigrants from

Ukraine in 2021 constituted 1 million 167 thousand persons or by 11 percent more than in the pre-Covid year 2019 (Kolomiyets Samoyliuk 2021).

Closure of schools exacerbated educational inequalities because of significant differences in accessing the online learning measures, as well as due to regional differences in switching from distance learning to mixed learning during the adaptive quarantine period, when the country was divided into epidemiological safety zones: "green", "yellow", "orange" and "red" (Nazarenko Polishchuk 2021). Like in many other impacted countries, students, teachers and lecturers also experienced various problems related to mental health: increased anxiety, depression, stress, fear. Meanwhile, employers' requirements were changing in a more dynamic manner and simultaneously with VET adaptations.

Fast transition to the online and mixed formats of education was one of the key organizational changes brought by Covid-19 to all educational institutions, including VET (Nazarenko Polishchuk 2021; Kolomiyets Samoyliuk 2021). It also brought the educational institutions dependent on the instructions and guidelines from the Ministry of Education and Science of Ukraine, lack of resources and HCD capacities. Having in mind specificities of the institutional settings of skill formation, such as lack of trust of education and training providers in the central government authorities and their dependence on these authorities as a consequence of strongly centralized education system, the cooperation between the schools and governmental authorities in dealing with challenges of closure was quite fragmented, and specific needs of support from the VET schools were often ignored, neglected or satisfied with significant delays (Schreyer et al 2022). VET institutions often suffered from the unpreparedness for a sharp transition to distance learning because of a lack of material and technical base, shortages of expertise and know-how of teachers and trainers, as well as a lack of appropriate training and methodological recommendations on the organization of educational and practical training processes (Schreyer et al 2022). At the beginning of the pandemic the performance of educational processes depended a lot on parents' and educators' abilities. However, in the academic year of 2020/2021 the government and education system implemented different national and local level distant education support measures, such as the information campaign "School, we are ready" (together with UNICEF-Ukraine), an online program for vocational training and exchange of experience between teachers on distance education issues (EdCamp Ukraine), majority of schools have acquired distance learning technologies (such as Google Classroom, Zoom, Microsoft Teams, etc.) provided on free-basis with the government support (Nazarenko Polishchuk 2021). The Ministry of Education and Science of Ukraine issued "Recommendations on the implementation of blended learning in institutions of professional pre-higher and higher education", which, among other things, considered ways to prevent plagiarism in education (Association of the Ukrainian cities 2020). The deepening of educational

inequality due to the closure of educational institutions has been especially noticeable in the differences of accessibility and quality of online resources in the rural and urban schools. For example, in the winter of the study year 2021/2022, in the communities of 5 regions of Ukraine, difficulties were recorded with providing students and teachers with computer equipment and access to the Internet, and therefore, there were problems with equal access to education in conditions of distance learning for students from low-income families and children with special needs, for children in regions with different IT infrastructure (Nazarenko Polishchuk 2021).

In December 2020 the Ministry of Education and Science together with the Ministry of Digital Transformation launched an updated version of the "All-Ukrainian School Online", which was hosted on a specialized online resource (https://osvitoria.org/en/the-all-ukrainian-online-school/). This national wide tool became used by an increasing share of teachers and students engaged in online learning. Overall, during the pandemics there were implemented different initiatives in the field of digital education together with the different international organizations and partners. Seeking to promote development of digital skills, the Ministry of Digital Transformation (DT) of Ukraine was established in 2019, and DT Officers (Deputy Minister responsible on digitalization was appointed) were appointed in 2020 at the Ministry of Education and Science (MoES) to drive the digital transformation in education. In 2021, the Directorate of Digital Transformation in Education was established within the MoES. Around this time, over 90 projects were launched, including EU initiatives such as the SELFIE – a free, customizable tool to help schools to enhance capacity to use digital technologies in learning. Moreover, the ILO, in collaboration with the MoES, developed e-learning solutions for VET institutes focusing on the hospitality, mechanical, electrical, and garment sectors. Some of these solutions include a national e-learning platform to make digital learning materials more accessible, e-courses for instructors on e-learning, teacher training, or interactive training modules for students (ILO 2022).

The support of international donors has been very important for the adjustment of VET provision to the new requirements. For example, under the international support project EU4Skills coordinated by GIZ there were implemented different instruments, like informational management system for VET schools, websites of VET schools were upgraded, teacher training in IT area were conducted, e-learning materials were developed as pilots in seven regions.

War as critical juncture in the pathway of EU integration reforms of VET and skill formation in Ukraine

Military aggression of the Russian Federation against Ukraine launched in February 2022 impacted significant changes in the institutional development of skill formation in the country at the different levels. In terms of timing the disruptions of war followed the disruptions brought by the Covid-19 pandemics, when the population and skill formation institutions were already progressing in adjusting to the conditions and requirements imposed by the lockdowns from the one side, but the accessibility and quality of public VET provision significantly compromised. What have been the implications of war for the VET provision and qualifications system in Ukraine and what were the policy responses?

Implications of the war for VET provision

With the beginning of war, the public VET system of Ukraine faced extreme additional pressure (to that imposed by Covid-19) due to factors such as migration, dynamic economic changes caused by war (e.g., relocated business from Eastern regions to Western part of Ukraine), and lack of funding, exacerbated by the sharp increase of funding need for national defence. Displacement of people is one of the key specific challenges faced by the VET system of Ukraine during the war compared to the Covid-19 closure. Over 8,5 million persons fled from war in Ukraine between February and mid-June 2022 – 12% of its population, and more than 7 million people are estimated to have been internally displaced within Ukraine (UNOCHA 2023; UNHCR 2023). Despite such global and complex challenges, Ukraine's VET system managed to stabilize the situation and adapt the activities of specialized management bodies and VET schools to new conditions in about three months period since the beginning of the active phase of the war. This section will review implications of war to VET related to infrastructure, VET provision regimes, learners conditions, VET teaching staff.

Implications for VET infrastructure

War inflicted damage and long-term effects for human capital, infrastructure and social-institutional settings of VET provision. During the war, as for January 2023 13 VET schools were completely destroyed, and 15 institutions could not be relocated from the temporarily occupied territories (State Scientific Institution Institute of Educational Analytics 2022; 2023). That is, the direct loss of the number of VET schools in the country is 28, or 4.0% of the total number the beginning of 2022 (694 schools). In the conditions of martial law, the infrastructure of VET institutions continues to suffer significant losses. According to the operational information of the departments of education and science of the regional and Kyiv city military administrations, as of August

1, 2023, 13 such institutions were destroyed, 146 institutions have been damaged with varying degree (State Scientific Institution Institute of Educational Analytics 2023). As of the end of January 2023, 80.0% or 536 VET schools were teaching in mixed and full-time format, 31.0% or 208 VET schools have been teaching in face-to-face format (State Scientific Institution Institute of Educational Analytics 2023). According to the operational information of the departments of education and science of the regional military administrations, as of January 25, 2023, the educational process has been carried out by 93% of VET institutions, of which: 49% – in a mixed format; 31% – in the direct contact format; 20% - remotely (State Scientific Institution Institute of Educational Analytics 2023). In 2022/2023 172 VET institutions carried out the educational process according to the dual form of training, 10438 students studied under it, 1003 enterprises, institutions, and organizations were involved in this process (State Scientific Institution Institute of Educational Analytics 2023).

Implications for the geographical accessibility of VET

In the war mostly impacted Donetsk, Luhansk, Zaporizhzhia and Kherson regions, 70 out of 108 VET schools are in the temporarily occupied territory (State Scientific Institution Institute of Educational Analytics 2023). Out of these 70 VET institutions, 55 institutions were relocated to the Ukraine controlled territory. Given the existing threat to life and health, many VET learners from these regions were forced to move to other regions of Ukraine and/or beyond its borders. In addition, some students live in the areas impacted by combat actions or are under temporary occupation and encirclement. Premature graduation of graduates in the academic year of 2022/2023 took place in 22 VET schools of the Kherson region and 16 institutions of the Zaporizhia region (except the city of Zaporizhia) (State Scientific Institution Institute of Educational Analytics 2023). Some VET schools redistributed their students from the combat affected areas to the VET schools in the safe regions. The MoES in this regard supported transition and recognition of the learning outcomes as an induced response for internal mobility of students.

Another faced challenge has been preparedness of the infrastructure of school in the war impacted regions for the functioning under the war conditions. According to the information available in the Ministry of Education and Science, only 31 VET schools were equipped with 38 civil defence facilities (State Scientific Institution Institute of Educational Analytics 2022). According to operational information as of June 15, 2022, 463 VET schools have dormitories, in which live 82163 people. 20% of them (16443 persons) are internally displaced persons (State Scientific Institution Institute of Educational Analytics 2022).

Implications for VET students conditions

As of January 1, 2023, the total contingent of VET learners numbered 230.5 thousand people, of which 12.7 thousand people were internally displaced persons, 17.5 thousand people are abroad, continuing their studies in VET schools in Ukraine remotely, 5.5 thousand people - in the temporarily occupied territory were enrolled (State Scientific Institution Institute of Educational Analytics 2023). Nevertheless, there is noticed recovering volume of enrolments in VET: in 2023, the approved volume of admission of VET applicants according to the quotas from regions is 92 799 persons, by 4672 persons or 5% higher compared to enrolment in 2022 (State Scientific Institution Institute of Educational Analytics 2022; 2023). The new management of the MoES was defined as one of the key priorities for the nearest future and for the strategic perspective of the Ukrainian VET development.

Implications for the VET teaching staff

The contingent of VET teaching staff has been also strongly impacted by the Covid-19 and the war-related factors. As of July 1, 2022, 23905 teachers worked in the field of vocational education and training in the country, of which 1258 (5.3%) were internally displaced, 904 (3.8%) were outside Ukraine, 472 (2.0%) persons were on leave without pay during martial law or on layoff, 654 persons (2.7%) were serving in the Armed Forces and the Military Academy. 372 persons (1.6%) resigned from the positions of VET teaching staff during the martial law (State Scientific Institution Institute of Educational Analytics 2022). As of January 1, 2023, 30201 teaching staff were still employed by the VET schools (State Scientific Institution Institute of Educational Analytics 2023).

Policy responses to the implications of war: systemic level adjustments of VET provision

Above-described implications of war required urgent responses of policy and legal regulation. On June 19, 2022, the Verkhovna Rada (Parliament) of Ukraine adopted a draft law providing for amendments to the current Law of Ukraine "On Vocational (Vocational and Technical) Education" No. 1312 (Verkhovna Rada of Ukraine 2022). The adopted changes make it possible to adjust the VET considering the realities of the war, the requirements of the modern labour market and the focus on the post-war development. One of the key changes of legislation is movement to the expansion of accessibility of VET and liberalization of the enrolment to VET, increasing role of adult education in VET and growing influence of the employers. Suggested new interventions are targeted to the reduction of the unemployment rate, ensure the rapid retraining of those who have lost their jobs, and most importantly, vocational training centres have acquired the right to enrol for practical training the learners of all age groups. In accordance with the adopted legislative norms, it is provided for the possibility of

obtaining vocational training without full general secondary education on the second level of the Ukrainian qualification framework. Citizens obtain the right to get a second vocational qualification via state funding in 3 years after obtaining the previous qualification if there are employment insurance and free places in the VET schools. There is also introduced the possibility to get permission to acquire VET qualification in another professional area with state or regional (municipal) funds, even in the absence of confirmed unemployment insurance in two cases: if due to the state of health a person has lost the opportunity to perform work in a previously acquired profession, as well as for the purpose of urgently meeting the needs of the labour market. Enrolment in VET institutions is detached from the place of registration of candidates, what enables internally displaced persons to access vocational education and vocational qualifications in the places where they have been temporarily settled.

Due to the war an educational cycle was considered as the national priority to ensure skilled labour force provision on the national level. The issue of waiving students and teachers of VET schools from conscription for military service during mobilization was approved by the government. Corresponding changes were made by the Law of Ukraine dated 04.14.2022 No. 2196-IX "On Amendments to Article 23 of the Law of Ukraine "On Mobilization Training and Mobilization" regarding the postponement of conscription for military service during the mobilization of certain categories of citizens", which entered into force on June 12, 2022 (Verkhovna Rada of Ukraine 2022) This amendment created equality of students and their rights at the different levels of education. The issue of certification of VET schools has been settled, namely, the state validity of certificates has been extended for the period of martial law.

There has also been approved the Regulation on the interruption of studies by vocational (vocational and technical) students and granting them academic leave in conditions of martial law, state of emergency or state of emergency (special period) (Ministry of Education and Science of Ukraine 2023). 365 people have already used the right to academic leave during the war period. Also, there have been introduced legal provisions concerning recognition of nonformal VET via the National Qualification Agency and newly established qualification centres.

Amendments were also made to the Standard Rules for Admission to Vocational (Vocational and Technical) Education Institutions of Ukraine, which regulate the admission of certain categories of persons to VET schools and define the list of documents to be submitted through the online application (Ministry of Education and Science of Ukraine 2023). From the 1st of July 2023, documents for admission to VET schools can be submitted online. Online enrolment tool was introduced for VET applicants in Ukraine via the State Database on Education (EDEBO) and the state operator AIKOM, creating equal opportunity for children from different regions.

Policy responses to the implications of war: organisation of VET provision

There were also provided different guidelines and recommendations to the VET establishments on how to organize the VET provision in the conditions of war. The martial law introduced after the Russian invasion forced many educational establishments to shift to emergency remote teaching which had been adopted during the Covid-19 pandemics. During the war one of the key challenges in providing online education is often occurring blackouts caused by the damages to the energetic infrastructure of the country. According to the recommendation issued by the Ministry of Education and Science, VET providers should provide theoretical lessons online, and practical training – in the school workshops, enterprises, and, where possible, in the online mode (Ministry of Education and Science of Ukraine 2022). When these opportunities are absent, practical training is postponed until the end of the martial law. This creates obvious difficulties and risks for both learners and for their future employers. One of the solutions of emerged problem is flexibilization of the existing qualifications and curricula by introducing micro-qualifications and micro-credentials. Ministry of Education and Science of Ukraine also prepared guidelines for VET teacher and school managers on the organisation of the online education, including special online course for development of needed competencies "On the distance and mixed learning formats" (Ministry of Education and Science of Ukraine 2022). VET teachers are advised and encouraged to use online educational materials, which they developed during the pandemics and to elaborate new materials by using YouTube platform and WordSkills Ukraine master classes. The Regional VET Methodological Centres of under the MoES significantly built on their Covid- 19 experience in supporting schools and teachers in re-arrangement of the training process, especially in assisting of creation of the e-content and electronic lessons, as well as facilitating teacher training in the different projects implemented with the support of international organizations. For instance, the project "E-TVET in Ukraine: Training continuity and modernization during COVID-19 and beyond", which was implemented by the ILO in 2020 and 2021 (ILO 2022). Representatives of regional educational methodological centres have been trained as support staff in the deployment of Microsoft Office 365 instruments of online education in 2020, Moodle usage, video conference software implementation in VET and now they continue providing such support to the VET schools. VET schools, universities and general education establishments was granted free access to the "G Suite for Education" service by Google corporation. In case of absence of possibilities of electronic training and learning other means of communication are used to get in contact with learners, including sending of the learning tasks and materials my emails, various messengers and phone conversations. One of the major problems is organization of the practical training in the war conditions due to significantly reduced availability of the training workplaces in the regions affected by the military actions. Virtualisation and 'remotisation' of the VET processes, including enrolment of students is one of the key strategies in coping with restrictions brought by

the war, for example by using chat-bots and virtual tours of the VET establishments (Verkhovna Rada of Ukraine 2023).

Resilience of VET providers: key factors

How VET institutions of Ukraine become resilient to the disruptions of war? OECD policy brief (2022) claims, that traditions of strong VET provision and interest of youth to VET in this country are important factors for both adaptation of the war refugees in the host countries, as well as for the post-war reconstruction of the country. Despite massification of higher education provision, the choice of VET pathway is quite controversial amongst the Ukrainian youth. The changes in the demand of skills caused by the war could further strengthen this trend. There is a high match in the demand of skills and qualifications provided by the VET in Ukraine both in the host countries, as well as in Ukraine, what also create opportunities for the host countries to invest in the training of war refugees thus contributing both to the economies of host countries and to the future recovery of Ukraine (OECD 2022).

Reforms in strengthening the VET provision and its orientation to the market needs before the Covid-19 pandemics and war, including implementation of the dual apprenticeship programmes, also contributed to development of resilience of the VET provision. In the context of martial law, the beginning of the decentralization of the management of the VET system of Ukraine launched in 2018 played a very positive and decisive role in terms of its preservation in the conditions of disruptions. The biggest share of effective VET support measures are carried out within the framework of the high autonomy of regional management bodies and VET schools. There can be indicated various examples supporting this statement. VET schools have effectively taken care about safety conditions for education of students by using the assistance of international partners. In 95% of VET schools, shelters have been arranged in accordance with the Requirements for the use and accounting of the fund of civil defence protective regulation, approved by the order of the Cabinet of the Ministers. Despite the military difficulties, 260 career centres have been launched in the state VET schools, whose activities are aimed at helping graduates of job-placement, in line with their right to get the first workplace, as well as popularizing VET and career guidance among children (International Labour Organization 2022; Schreiyer at al 2022). There can also be outlined effective organization of communication activities in the VET schools which included holding open door days and other career guidance events in VET, running information sessions on the rules of communication in social networks for VET institutions (involving more than 1000 participants), launching in the social networks different sessions and platforms, such as "Vocational guidance", "Lifelong Learning hacks" and "Advantages of vocational education", organization of the All-Ukrainian Week of Vocational Education on the 22-26th of October 2022 with the events on the

national and regional levels and involving different actors: "Students' Day", "Employers' Day", "Teachers' Day" and "Profession Day" (State Scientific Institution Institute of Educational Analytics 2023).

The national wide VET promotion campaign was launched with support of international donors (EU4Skills project coordinated by GIZ) targeting at work gender stereotypes, popularization craftsmanship, supporting self-employment. The agency of VET schools has also been important in creating conditions for the rehabilitation and adaptation of military veterans in society. According to the operational information of the departments of education and science of the regional military administrations, as of January 1, 2023, 101 veterans and 5,327 children of war veterans received appropriate education in 414 VET schools, namely: 101 persons with the status of a war veteran: combat participants - 57, persons with disabilities caused by the war - 4, participants of the war – 40, children of combatants – 5,015, children of deceased combatants – 270, children of persons with disabilities caused by the war – 42 (State Scientific Institution Institute of Educational Analytics 2023). There are certain patterns discovered by the conducted national social survey in training ex-combatants and veterans (Kirillova Znoviak Kazanska 2023). For instance, males in the war-affected families have around 3 months to be reskilled or upskilled according to new labour market requirements. Females usually need 6 months for gaining a qualification with same complexity due to household duties carried in traditional Ukrainian family.

Autonomy of the VET schools and regional stakeholders also significantly contributed to the effective implementation of the national policy measures aimed to adjust the VET system to the conditions of the martial law. Here there can be mentioned implementation of the distance learning platform "Vocational Education Online". With the support of international partners, more than 80 online training courses have been developed, which are already posted on the specified platform. In the period from December 23, 2022 to July 14, 2023, 4000 users of this Platform were registered. The internal academic mobility program, introduced in 2022 also became an important tool for maintaining the contingent VET learners (Ministry of Education and Science of Ukraine 2022). In 2022, 316 people used the right to internal academic mobility, in 2023 - 222 people (State Scientific Institution Institute of Educational Analytics 2022).

Process and national priority for decentralizing of VET school system is also playing a significant role for enhancing closer partnerships of VET schools with regional communities and local employers. In average, 13-20 VET schools are transferring annually from the state funding to the regional budgets. It also helps to diversify resource pressure during the wartime.

National and international projects supporting the reforms of VET in Ukraine has also become highly important factor of resiliency by helping to mobilise both national and international expertise and resources in creating and developing needed measures. All national and international VET development projects since the beginning of the war have shifted their interventions from the reforms of the national policy to the direct support for learners and teachers and people-targeted measures. During the war the main priority is to satisfy the needs of suffering population and army, whereas political reforms are postponed or significantly redirected. The support from the international, especially EU funded programs is oriented to the strategic goals of development of VET, which include not only preparation of the VET provision to the needs of war time and post-war reconstruction, but also development of the VET system and provision in line with the requirements of the EU accession (reforms of EU candidate country). For example, the implemented EU4Skills program funded by the EU and the member states Germany, Finland, Poland, and Estonia aims to support the implementation of vocational education reform in Ukraine. This program is implemented by GIZ and other institutions of partner countries within the framework of co-financing. Despite of these impediments caused by the war, this programme together with the policy makers and stakeholders from Ukraine prepared "Conceptual foundations for the development of human capital in the field of vocational education and training". This strategic document approved by the decision of the Board of the Ministry of Education and Science of Ukraine in December 2022 determinates key directions of the VET reform until 2027 around three priorities: modernization of the content of education, strengthening of institutions and mechanisms of their activity, and reconstruction of the educational infrastructure. The modernization of the content of education involves the improvement of the national system of qualifications, the introduction of independent assessment of educational results and the digitization of the field, such as the development of different online VET sources and platforms established by the state and private investors and the development of digital skills of students. Improving the institutional capacity of vocational education institutions involves strengthening of the institution's autonomy, that is, the creation of a more open model of vocational education management with the active involvement of employers, the community, and other stakeholders. It is also planned to improve the financial legislation of professional education and the development of competence and skills of managers and teachers of vocational schools. "Smart reconstruction" is the restoration of vocational education institutions for the training of professional workers who meet the needs of the labor market. Within this direction, it is planned to create a more optimal and durable network of professional education institutions with new educational spaces. Within the framework of the EU Program "EU4Skills: Best skills for modern Ukraine" a number of trainings were held for teaching staff of the VET schools, namely: "Self-management", "Creative thinking", "Prevention of professional burnout, stress management", "Emotional burnout: building resilience and sustainability", "Information security during martial law", "Conflict management", "Effective

negotiations". In total, more than 300 people were involved in these trainings. Also, 150 English language teachers at VET schools completed training in teaching methods.

Quality of practical training in VET was decreased due to the Covid-19 impact and war and it is big issue in regard general decline of business activities in almost all economic sectors. Employers are surviving and employability has increased, but due to the war it is difficult to arrange practical training part of the VET curricula.

Implications of the war for the development of the system of qualifications

In analysing the implications of the war for the VET provision it is not possible to ignore the resulting changes and adjustments of the skill ecosystem of this country. Perspective of skill ecosystem is highly relevant here, because it enables to take into consideration the implications of the war for the institutions, processes and socioeconomic context of skill formation, to consider implied systemic changes in the labour market, national system of qualifications and VET (Buchanan Anderson Power 2017). In this context the national system of qualifications is one of the central elements of skill ecosystem playing role of bridge between the supply and demand side (education and labour market). The national system of qualifications of Ukraine has had to adjust to the changing demand of qualifications in the labour market and changing supply of qualifications in the impacted systems of VET and HE. This system still contains post-soviet 'qualification characteristics' and grades (Melnyk 2022). The state classifier of occupations will have to be reformed and updated according to the post-war structure of the Ukrainian labor market. The war also brought other, far bigger challenges to the Ukrainian qualification system.

According to the ILO (2022) about 4.8 million jobs (around 30 per cent of employment) has been lost due to the war (ILO, 2022). It is estimated that with the continuation of the war up to 7 million jobs can be lost, or 43.5 per cent of the total employment. War also led to the loss of the workforce, as 2.72 million of war refugees are people of working age, 43.5 percent of them were working before the war and 87 per cent were working in full-time jobs, two thirds have tertiary education (ILO, 2022).

Fast growth of unemployment just after the launch of the military aggression was caused by the destructions and displacements of businesses and employees. The war also made significant change in the demand of qualifications. For example, the reduced demand of qualifications was caused by important decreases of production and employment in the sectors, which enterprises were concentrated in the occupied zones (metallurgy and machinery production, coal mining located in the currently occupied regions in the Eastern part of the country), or where activities were reduced by the direct impact of war

like reduction of agricultural production due to contamination of land with mines and bombs (Melnyk 2022). On the contrary, energy sector demands more skilled workforce top deal with the challenges of reconstruction after massive attacks on energy infrastructure. Qualifications of skilled industrial and construction workers are in high demand, as well as of professionals with higher education and higher professional qualifications (teachers, pharmacists, general practitioner-family doctors, educators, inspectors, engineers, economists, practical psychologists), equipment maintenance and operation workers (drivers, gas station operators, turners, tractor operators, machine operators, excavator operators, forklift drivers, machine operators with software control, milling operators, crane operators) (Melnyk 2022; Kuzyo 2023; GrowHow.in.ua 2023). During the war, the demand for workers in the financial and insurance spheres, in construction, and in the hotel and restaurant business decreased significantly. In addition, there is practically no demand in air transport, tourism, leisure and entertainment.

The greatest need for personnel was formed in those industries and spheres of economic activity which are critical in wartime, for example, in the fields of industrial production (especially military related sectors), transport and logistics, healthcare and pharmaceuticals, which are important for both military and civilian needs (Melnyk 2022; Kuzyo 2023). Demand of skilled workforce is also noticed in the labour market sectors least affected by the war, for example, the spheres of trade and catering. In some cases, businesses managed quickly to transform and adapt activities to the war conditions by digitizing of technological processes, more flexible forms of personnel work organization (in particular, the transfer of employees to a remote form of work), for example in the fields of IT, finance and audit also feel the need of skilled staff (Kuzyo 2023; GrowHow.in.ua 2023). Implemented under the Covid-19 managerial systems and tools (planning workload, meetings etc.) were also successfully realized under the circumstances of war.

What regards policies and strategies of the national system of qualifications, disruptions of pandemics and war have not caused derailing effects in this area. The volumes and rates of development of relevant occupational and educational standards and programs remain the same in comparison with the pre-pandemic and pre-war periods. During 2022–2023, 38 state VET standards were approved, including 29 in 2022, and 9 – in 2023 (Ministry of Education and Science of Ukraine 2022; 2023). One of the key changes in the field of qualifications, brought by our analysed disruptions, especially by the war, has been increased provision of partial, or micro-qualifications. There have been also rapidly established qualifications centres for recognition of different VET qualifications gained outside formal education. 34 sectoral qualification centres were established in the different sectors and without any financial support from the state budget.

Covid-19 pandemic and the war did not derail the legal implementation and development of the National System of Qualifications in Ukraine. For example, on the 1st of April

2022 there has been accepted the Law of Ukraine "On Amendments to Certain Legislative Acts of Ukraine Regarding the Functioning of the National Qualifications System" No. 2179-IX (Verkhovna Rada of Ukraine 2022). This Law does not aim at comprehensive regulation of the National System of Qualifications, but at regulating certain aspects of its functioning. It introduces micro-qualifications into the normative field, seeks to link occupational standards with the wage system, amends the functions of the National Qualifications Agency, introduces simplified procedures in the awarding of learning outcomes and qualifications through fast confirmation of the applicant's existing qualification level and the provision of employment opportunities, stipulates the activities of industry councils for the development of occupational standards. There could be noticed some impact of the disruption of pandemics for the attempts to liberalise and flexibilise the processes and procedures of design and awarding of qualifications in this legal act. These provisions would become even more necessary after the start of the war in February 2022. Of course, implementation and realisation of these legal provisions in the institutional practice of the national system of qualifications has been strongly compromised by the lack of capacities and resources of institutions (especially new institutions, such as National Qualifications Agency and industry councils) facing the challenges and deprivations brought by the war.

Besides, becoming of Ukraine a candidate country of the EU has fostered the processes of comparison and referencing of the Ukraine's National Qualifications Framework to the EQF, leading to the publication of the 'Comparison report of the European Qualifications Framework and the Ukrainian National Qualifications Framework' in February 2023 (European Commission 2023).

The introduced micro-qualifications are implemented in the system of education and training through free short-term courses for the adult population, in particular forcibly displaced persons, permitting them to obtain partial VET qualifications. The development of tailor-made training courses oriented on partial qualifications has become possible via amendments of the normative regulation from 2013 on the VET school level. VET providers are eligible to make entrance control of applicants and create partial-qualification programs on basis of accredited full programs. The Covid-19 and the war have stimulated searching new market-oriented mechanisms for earning revenue. More than 1,000 people have already completed such training, 30% of which are employed according to obtained partial qualification. In the organization of such courses, VET schools, in particular, are assisted by international partners in the purchase of consumables, payment of wages to VET teachers and workplace trainers, etc. Seven textbooks for VET schools with a total circulation of 167,000 copies were printed, namely: "Electrical materials science", "Fundamentals of safe work", "Technology of sheet metal works", "Grain harvesters", "Mining and tunnelling machines and

complexes" ", "Basics of information technologies", "Basics of economic knowledge" (State Scientific Institution Institute of Educational Analytics 2023).

Conclusions

Education and skill formation in Ukraine in the recent years have been significantly impacted both by the Covid-19 pandemics and by the military aggression of the Russian Federation. This double impact has had significant and specific repercussions for the institutional and processual development of skill formation, VET and qualifications in Ukraine. Despite the harmful impact of Covid-19 on the Ukrainian VET, it has also created the potential for VET providers to face the subsequent war challenges.

There can be presumed that the war further contributed to the sharpening traditional transitional problems in VET, the deterioration of the quality of VET provision brought by the Covid-19 by bringing in new negative factors and further expanding the ones brought by Covid-19. Significant differences of this disruption from Covid-19 closure have been loss or damage of the part of infrastructure of VET, as well as loss or dispersion of the part of learners and teaching staff for the different reasons. One of the key implications of the war was further disruption of the normal face to face educational process by rearranging it to the remote format or blended format, depending on the situation in the region. The dynamic shifts in the whole structure of the national economy have led to the reconsidering of the whole structure of the Ukrainian labour market and tasks of the skilled workforce formation.

Among the tools for dealing with the implications of the pandemic for VET, which were used during the war period the organizational transition to distance learning has been of critical importance. Here the organizational and methodical experience gained during Covid-19 closure by the VET providers and stakeholders as well as their developed solutions were highly useful. Transition to the online training during the war further led to simplification of the content and methods of learning, as well as digitalization of educational content. Additionally, the martial law conditions significantly contributed to the expansion of the continuing training provision in the initial VET establishments and strengthened regional orientation of the VET provision referring to the concrete skills needs in the regions and sectors of economy. The state responded to these challenges by reduced bureaucratization and state control of the VET provision and further implementing the policy of decentralization launched before the disruptions of Covid-19 and the war.

Tuning the economy to the wartime needs and adaptation of the sectors of economy to the constrains of war change the demand of skills in many sectors of economy, what

fosters flexibilization of the design of qualifications (implementation of partial or micro-qualifications) and training provision processes (development of short-term courses in continuing vocational education and training). In this context the priorities of the policies shift towards fostering autonomy of VET providers and their capacities in the curriculum design and provision of training, enhancing constructive competition on the market of VET provision between the providers and between the formats of the IVET and CVET, investments in the infrastructure of VET provision and teaching staff, especially in work-based learning, according to the regional and sectoral needs of reconstruction, ensuring equal access to the employment in professional areas (all formats, unified value of qualifications without discrimination according to education form) and further strengthening lifelong learning, digitalization and sustainability dimensions of VET provision.

Skill formation and VET will also be strategic factors in the post-war reconstruction of Ukraine. Here the support of the EU and international community to the current reforms of VET and system of qualifications play the strategic role in creating capabilities for the sustainable recovery of the Ukrainian society and its significant contribution to the future development of the Central and Eastern European region.

On the basis of this research there can be suggested few recommendations on the further steps in strengthening the resilience of VET provision during the war and fostering its readiness for the post-war reconstruction. With the continuation of war there is a need of further simplification of obtaining vocational qualifications, educational programs, procedures, standards, tools and other mechanisms of training, retraining and advanced training of citizens who already have educational and professional qualifications (adult population). The benchmark should be a 2-5-times reduction in training duration, which can be achieved through recognition of previous work experience (results of non-formal education and informal training), training for partial (most in-demand) qualifications.

It is necessary to temporarily cancel the regulatory norms regarding the licensing and accreditation of the relevant educational programs, any inspections by the controlling authorities, as well as temporary suspension of activities for a certain VET quality control and inspection institutions. To ensure better fit of the offer of VET to the needs of economy and state under martial law, the practice of forming a regional order for the initial and continuing vocational training of all forms and types should be further disseminated, by actively involving enterprises, VET schools, vocational training centres of the State Employment Service and other stakeholders. What regards qualifications and VET curricula, the expansion of provision of the micro-credentials and micro-qualifications is a clear priority.

What regards the preparation of the VET provision for the post-war reconstruction, the Europeanization can be regarded as a key factor ensuring needed institutional, human, and methodological capacities of the VET system for this challenge. It will require not

only to ensure compliance of the VET provision and qualifications to the requirements of the EU accession, but also to make the Ukrainian VET system really open for the creative and mutually beneficial partnerships with the EU counterparts in creating effective and sustainable institutional settings for the formation of human capital needed for the post-war reconstruction, including opening the possibilities for the VET providers from the EU to operate in Ukraine by opening of their branches, subsidiaries, creating international consortia and clusters.

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This anthology records research activities of the ASEM Research Network 2: Workplace learning. Right at the beginning of the pandemic, plans were made within the research network to examine this historically unique external shock in its impact on the systems of vocational skills production in the individual countries of the research network. All members were encouraged to closely follow the developments in the vocational education system already during the pandemic and to collect materials. For the scientific observations of the effects on the VET system of the respective countries, the so-called skill ecosystem perspective was used, which above all also establishes the connection of VET structures to the surrounding economic, legal, political, and social context.

Specifically, the research questions focused on three aspects: how resilient the systems for development and assessment of vocational capabilities in the current and future workforce proved to be in the shock situation, which stabilising elements proved to be particularly helpful and which forced changes are still having an impact today.

Finally, this research initiative has resulted in the contributions of this anthology, which refer to the skill ecosystems of Brunei, France, Germany, Latvia, Singapore, Thailand, England (and small islands in the British Isles), and Ukraine.