



Digital Transformations in Nordic Higher Education

Edited by
Rómulo Pinheiro
Cathrine Edelhard Tømte
Linda Barman
Lise Degn
Lars Geschwind

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Digital Transformations in Nordic Higher Education

“The past ten years have seen a burst of exciting Nordic scholarship around the topic of digital technologies and education – offering a unique blend of pragmatism, criticality and an underpinning hope for fundamental change and improvement. This collection of essays is a great example of such work – remaining optimistic about the future, but also well aware of the digital difficulties that are likely to lie ahead.”

—Professor Neil Selwyn, *Monash University, Melbourne, Australia*

“Whether you are looking to understand the impact of EdTech platforms, explore new teaching and learning practices, or navigate the challenges of digital technology and education in the wake of COVID-19, this book on the digital transformation of higher education in the Nordics is an essential read. The book is well-written, engaging, and accessible, making it a valuable resource for scholars, educators, and policymakers alike.”


—Professor Barbara Wasson, *Centre for the Science of Learning & Technology,
University of Bergen, Norway*


Rómulo Pinheiro · Cathrine Edelhard Tømte ·
Linda Barman · Lise Degn · Lars Geschwind
Editors


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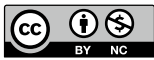
Rómulo Pinheiro 
Faculty of Social Sciences, Department
of Political Science and Management and Center
for Digital Transformation (CeDit)
University of Agder
Kristiansand, Norway

Linda Barman 
Department of Learning in Engineering Science
KTH Royal Institute of Technology
Stockholm, Stockholms Län, Sweden

Lars Geschwind 
Department of Learning in Engineering Science
KTH Royal Institute of Technology
Stockholm, Sweden

Cathrine Edelhard Tømte 
Faculty of Social Sciences, Department
of Information Systems and Center for
Digital Transformation (CeDit)
University of Agder
Kristiansand, Norway

Lise Degn 
Department of Political Science
The Danish Centre for Studies
in Research and Research Policy
Aarhus University
Aarhus, Denmark



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NOTES ON CONTRIBUTORS

Michael Oduro Asante is a doctoral fellow at the Department of Government, University of Bergen, Norway. His research interest lies in Trust in Organization, Organizational Resilience, Higher Education, Public Sector Leadership, Nordic regions, New Public Management and New Public Government, Organizational Reforms, Governance and Administration, Labour and Labour Movements, Interest Groups, and Globalization.

Linda Barman is a Teacher at the Department of Learning in Engineering Sciences, KTH Royal Institute of Technology, Stockholm. She holds a Ph.D. in medical education from Karolinska Institutet, focusing on her research on higher education change, and development of teaching and learning, for example, related to digitalization. She has about 25 years of experience working with staff and faculty development and organizational change in higher education as well as within the industry, and she has led different digitalization projects in higher education. She has extensive experience in teaching at undergraduate to professional level, and organizing courses and consulting teachers in curriculum development.

Bendik Bygstad is a Professor at the Department of Informatics, University of Oslo, and an Adjunct Professor at the Norwegian School of Economics. His main research interests are IT-based service innovation and the relationship between IS and organizational change.

Cathrine Edelhard Tømte is Professor at the Department of Information Systems; Deputy Director of the Center for Digital Transformation

(CeDiT) at the University of Agder (UiA). She is also a Guest Professor at SLATE (Centre for the Science of Learning & Technology), at Norway's University of Bergen. Tømte has a doctoral degree from the NTNU. She has previously been affiliated with the Norwegian Center for ICT in education and the OECD. Before joining Department of Information Systems at the University of Agder, she worked at the Nordic Institute for Studies in Innovation Research and Education, NIFU. Tømte's research interests include digital transformations of society and education.

Marco Capasso is a senior researcher at NIFU (Nordic Institute for Studies in Innovation, Research and Education). He is currently the principal investigator for the project 'The role of research, skilled labour and innovation in the Corona crisis', financed by the Research Council of Norway (2020–2022).

Morten Dæhlen a Professor in Informatics at the Faculty of Mathematics and Natural Sciences at the University of Oslo, Norway. From 2021, he is the manager of the new Science research centre at the University of Oslo. He was a dean at the faculty for Mathematics and Natural Sciences from 2016 to 2020.

Luiz Henrique Alonso de Andrade is a doctoral fellow at the University of Tampere, Finland, where he researches how public bureaucrats make decisions. He has a master's degree in Public Policy and Development from the Institute for Applied Economic Research (IPEA/Brazil) and a Nordic Joint Master's in Innovative Governance and Management (NORDIG). As a civil servant of the Brazilian National Social Security Agency (INSS), Luiz took part in the design and implementation of its digital transformation.

Lise Degn is Associate Professor at the Department of Political Science—Danish Centre for Studies in Research and Research Policy (CFA), Aarhus University in Denmark. Her field of expertise is the study of higher education governance, leadership, and management, particularly with a focus on qualitative investigations of transforming roles and structures. She is currently working on projects, e.g., relating to Responsible Research and Innovation and quality in higher education.

Lars Geschwind is Professor in Engineering Education Policy and Management, and coordinator of the research group Higher Education Organization Studies (HEOS) at KTH Royal Institute of Technology,

Stockholm, Sweden. His main research interests are higher education policy, institutional governance, academic leadership and management, and academic work. He is currently involved in a number of projects focusing on change processes in higher education institutions, including, e.g., governance and steering, quality assurance, academic careers, and partnership with external stakeholders. Most studies include a comparative component and a historical perspective.

Hege Hermansen is an associate professor at Oslo Metropolitan University, Norway, where she also is associated with the Centre for the Study of Professions. Her research interests include knowledge work in the professions, teaching, and learning in higher education, programme design and development in professional education, and the interrelationships between professional knowledge, autonomy, and responsibility.

Vito Laterza is Associate Professor in the Department of the Global Development and Planning, and the Centre for Digital Transformation (CeDiT), the University of Agder, Norway. He is Senior Research Associate at the Centre for Education Rights and Transformation, University of Johannesburg. Vito is an interdisciplinary anthropologist working on higher education, digitalization, and political economy. He holds a B.Sc. from LSE, an M.Phil., and a Ph.D. from the University of Cambridge. Vito has been studying the digitalization of higher education since 2006, when he was the lead researcher on a large-scale project on the use of the SAKAI platform as a virtual research environment at the University of Cambridge.

Alexandra Lazareva is an Associate Professor at the Department of Education at the University of Agder, Kristiansand, Norway. Her research is focused on computer-supported collaborative learning (CSCL) in the context of higher education. Her main research interests within the area of CSCL are collaboration scripts, online tutoring, student engagement, and self-regulated learning strategies.

Sten Ludvigsen is a Professor in Pedagogics at the Department for Pedagogics. He has been chair of the programme board for the evaluation of the Knowledge Promotion and the National Research School in Educational Sciences. From 2013 to 2015, he was the leader of the so-called Ludvigsen committee, which was to assess the subjects of basic education

against the requirements for competence in a future society and working life. He was also a dean at the faculty of Pedagogics from 2016 to 2020.

Andreas Lund is Professor at the Department of Teacher Education and School Research, University of Oslo, Norway. His research interests include the use of ICT in teaching and learning, collective cognition, human interactions in technology-rich environments, sociocultural and activity theoretical perspectives on learning and didactics, language, speech communities, and communication change.

Dorothy Sutherland Olsen is Senior Researcher at the Nordic Institute for Studies in Innovation, Research and Education (NIFU), Norway.

Egil Øvrelid is a Postdoctoral Researcher in Informatics at the Department of Informatics, University of Oslo, Norway. His main interest is currently digital innovation in the health sector and the higher education sector, and the relationship between digitalization, information systems, and organizational change.

Rómulo Pinheiro is Professor of Public Policy and Administration and Deputy Head at the Department of Political Science and Management at the University of Agder (UiA), Norway. Rómulo is a member of the Public Governance and Leadership (GOLEP) Research Group, a co-track coordinator at UiA's Center for Digital Transformation (CeDit), and a Guest Professor at the University of Tampere in Finland. His research interests are located at the intersection of public policy and administration, organizational-, and higher education studies.

Antonia Scholkmann (Dr. Phil., Dipl. Psych.) is an associate professor within Learning and Innovative Change at the Centre for Educational Policy Research (CfU), Department of Culture and Learning at Aalborg University, Denmark. Her research interests are in the areas of learning and change in higher education, on the potential of Problem-Based Learning as a blueprint for innovative educational change, and on the meaning and outreach of enacted practices for a digitally transformed higher education.

Ammar Bahadur Singh is a Ph.D. research fellow at the Østfold University College. He investigates how digital collaborative teaching and learning practices can be improved in MOOCs aimed to develop teachers' professional digital competence through cultural–historical learning theory perspectives.

Halvdan Gaute Søvik Haugsbakken is an associate professor at Østfold University College, Norway, holds a Ph.D. in Sociology, and master's degree in social anthropology. Research on school and education has been a research interest since 2007, and after 2010 digitalization of schools, higher education and organizations have been of primary research interest.

Duncan A. Thomas is Senior Researcher, The Danish Centre for Studies in Research and Research Policy (CFA), Department of Political Science, Aarhus University, Denmark. His main research is on research policy and how science is funded, organized, evaluated, and its impacts. The main policy focus here is at the European level, but exploring research fields is typically global in scope. Duncan is particularly interested in investigating the rise, proliferation, and effects of EdTech and digitalization.

Maria Weurlander is an Associate Professor in Higher Education at the Department of Education, Stockholm University, Sweden. She was previously employed at the Department of Learning in Engineering Sciences, KTH Royal Institute of Technology, Stockholm. Her research interests are mainly focused on teaching and learning in higher education, especially in professional education, such as teaching, healthcare, and engineering education. She is also interested in the assessment of students' performance and the digital transformation relating to assessment.

Sabine Wollscheid is a senior researcher at NIFU (Nordic Institute for Studies in Innovation, Research and Education, Norway) and holds a Ph.D. in sociology from the University of Trier, Germany. Her research interests comprise inequalities in education, digital transformation in education, and systematic review methods.

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PART I

Digital Transformations in Higher
Education: Setting the Stage



CHAPTER 1

Digital Transformations in Nordic Higher Education: A Step Towards Unpacking a Multifaceted and Emergent Phenomenon

Rómulo Pinheiro^{ID}, *Cathrine Edelhard Tømte*^{ID},
Linda Barman^{ID}, *Lise Degn*^{ID}, and *Lars Geschwind*^{ID}

SETTING THE STAGE

Digitalisation-related challenges and opportunities in higher education (HE) are not new, but awareness of their transformative potential has increased, with global trends including massive open online courses (MOOCs) and other forms of technology-enhanced open education

R. Pinheiro (✉)

Faculty of Social Sciences, Department of Political Science and Management and Center for Digital Transformation (CeDit), University of Agder, Kristiansand, Norway
e-mail: romulo.m.pinheiro@uia.no

C. E. Tømte

Faculty of Social Sciences, Department of Information Systems and Center for Digital Transformation (CeDit), University of Agder, Kristiansand, Norway

(Fevolden & Tømte, 2015). The COVID-19 pandemic has emphasised the importance of flexible forms of teaching and learning (T&L), and, as a result, has intensified the adoption of technological platforms and solutions across the board (Nurhas et al., 2021). A 2020-study by the International Association of Universities revealed that substantial challenges remain, not least across world geographies. For example, 85% of HE institutions in Europe and 72% in the Americas were able to quickly move online following the pandemic, compared to 29% across the African continent (IAU, 2020; Marinoni et al., 2020). Such developments have increased the urgency of policymakers and managers within HE institutions (HEIs) to devise plans for digital transformation (DT) against the backdrop of rapid technological change impacting the whole of the public sector (Collington, 2021).

In this book, we address HE in the Nordic countries, which are a relevant object of analysis for a variety of reasons. First, the Nordics have among the better-developed state-funded (with ample resources) HE systems worldwide, with a broad commitment to tuition-free education and other equity-related considerations. Second, the Nordic countries are top-ranked in terms of digital adoption, with central governments playing a critical role in pushing the DT agenda throughout the whole of the public sector. Third, despite their similarities—geography, language, and

e-mail: cathrine.tomte@uia.no

L. Barman · L. Geschwind
The Department of Learning in Engineering Sciences,
KTH Royal Institute of Technology, Stockholm, Sweden
e-mail: lbarman@kth.se

L. Geschwind
e-mail: larsges@kth.se

L. Degn
Department of Political Science, The Danish Centre for Studies in Research and
Research Policy, Aarhus University, Aarhus, Denmark
e-mail: ld@ps.au.dk

Present Address:

R. Pinheiro
Faculty of Social Sciences, Center for Digital Transformation (CeDit),
University of Agder, Kristiansand, Norway

political and social welfare models, etc.—there are significant differences among the Nordic countries that are of relevance for investigating how the phenomenon of DT manifests itself differently across specific national and organisational contexts.

As a starting point, it is imperative to provide some clarity on the three concepts that are often used interchangeably in the extant literature. *Digitisation* refers to the process of converting analogue information (e.g., someone’s written notes) and encoding it into zeroes and ones so that it can be stored, processed, and transmitted through the use of ICT tools like computers (Bloomberg, 2018). It is important to highlight that the focus here is on digitising particular (analogue) outputs into digital information rather than referring to the process(es) by which this takes place. The latter process refers to the second key concept—namely, *digitalisation*—which includes how social relations and organisational arrangements affect the ways in which individuals and organisations interact and/or operate as a result of the adoption of digital tools and platforms (e.g., moving from ‘snail mail’ to email). In such a context, salient and ubiquitous phenomena like automation are inherent in digitalisation trends, ‘whether it be shifting work roles or transforming business processes generally’ (Bloomberg, 2018, p. 4). Finally, *digital transformation* (DT) refers to a much broader process of change that implies substantial (cross-cutting) organisational adaptation, in addition to the effective implementation of digital platforms and solutions. Vial (2019), based on a review of the existing literature and semantic analysis, has proposed a working definition of DT as a process ‘where *digital technologies* create *disruptions* triggering *strategic responses* from organizations that seek to alter their *value creation paths* while managing the *structural changes* and *organizational barriers* that affect the *positive* and *negative* outcomes of this process’ (p. 118; original emphasis).

The existing academic literature on DT in HE focuses primarily on T&L issues in the virtual classroom in the context of distance, online, and blended learning approaches. There is a burgeoning literature spanning several decades, both in the Nordic countries (Cerratto-Pargman et al., 2012) and in other parts of the world (Castro, 2019; Kirkwood & Price, 2014). Recent literature on massive open online courses (MOOCs), however, shows limited attention has been paid to developments across the Nordic countries compared to North America, the rest of Europe, and China (Veletsianos & Shepherdson, 2016; for an exception, see Tømte et al., 2020). Despite increasing attention on blended learning, relatively

little is known about how face-to-face T&L is affected by digitalisation. Studies have indicated that teachers use digital tools to complement rather than transform in-person T&L (Blaine, 2019; Kirkwood & Price, 2014). This was also observed during the initial phases of the COVID-19 pandemic—i.e., teaching with the support of digital technology, coined as ‘emergency remote teaching’ in HE (Hodges et al., 2020). This meant that the majority of faculty staff simply transferred their regular classroom-/campus-based teaching to the online sphere rather than substantially altering their pedagogical approaches and support content. In most cases, this included livestreamed lectures, the sharing of presentation files, and/or pre-recorded video and/or audio lectures to students (Farnell et al., 2021).

Studies on digital T&L in HE have tended to investigate classroom dynamics and interactions between teachers and learners (Shen & Ho, 2020), and more recently, between frontline IT staff and administrators (Haase & Buus, 2020; Khouja et al., 2018; Tømte et al., 2019). Analyses of the links between T&L and other relevant processes are often absent (for an exception, see Castañeda & Selwyn, 2018). For example, we know little about *how* (a) HEIs’ and academics’ strategic goals and future aspirations are taken into consideration when adopting digital policies and strategies; (b) HE policymakers and HEIs’ management shape the bottom-up processes of digital T&L, and vice versa; (c) software developers use pedagogical knowledge to develop T&L digital tools; and (d) for-profit, educational technology providers help shape the technological, organisational, and economic dimensions underpinning HEIs’ T&L.

A major ambition of this edited volume is, thus, to address these empirical and theoretical gaps in the literature. In so doing, our aim is, first, to move away from current debates on digitalisation towards embracing the broader framework of DT. The latter phenomenon can be understood, as highlighted earlier, as more than simply the digitisation of HE activities and materials; it also pertains to digital technologies’ potential to disrupt organisational structures, practices, and goals (Vial, 2019, p. 118). According to Sursock (2015), DT is a dominant feature of the twenty-first-century HE, globally. Yet, little is still known about how the process manifests itself across distinct policy, organisational, disciplinary, and T&L contexts. This quest has become even more urgent with the developments set in motion by the COVID-19 pandemic, increasing the urgency and saliency of adopting digital tools in T&L (cf. Crawford et al., 2020). A major contribution of this volume is expanding the relatively narrow (in most cases) scholarly and policy debates surrounding DT

within a broader systemic framework that conceives of the phenomenon as pertaining to multiple manifestations at various scales and involving an increasing number of internal and external stakeholders. In other words, following the initial suggestion by Laterza et al. (2020), our chief aim in this volume is to embrace DT in its plurality (interactions of multiple, co-evolving elements) rather than embracing a simplistic (narrow) analysis of individual components in isolation. In other words, we refer to Digital Transformations (DTs) from now on.

Given this backdrop, this edited volume brings together leading and upcoming social science scholars from different disciplinary traditions—history, pedagogy, public administration, information systems, sociology, anthropology, and political science, among others—to unpack the complex and dynamic processes of DTs in Nordic HE. Nevertheless, it is worth noting that developments across the region need to be assessed against the backdrop of other (macro-level) aspects associated with European and global institutional frameworks and the respective technical (resources and competition) and institutional (rules and regulations) environments. Hence, the view adopted in this volume is that of unpacking Nordic dynamics in light of global processes, developments, and macro-level trends, including key insights associated with the political economy and cultural dimensions underpinning HE systems and HEIs. This means that the empirical findings and conceptual insights generated throughout the volume are, we hope, of relevance to a much broader global audience and a multitude of stakeholder groups, not simply to those operating within the geographic scope of the Nordics. In so doing, we make use of a systemic or holistic approach by investigating developments across multiple levels of analysis—from macro to meso to micro—as well as the extent to which these are nested within (mediate or reinforce) one another (Pekkola et al., 2021). Moreover, the empirical case contributions that comprise the bulk of the volume contextualise ongoing dynamics by considering the effects (short- and mid-term) associated with the COVID-19 pandemic, among other areas, by providing critical reflections on possible future developments in the context of a post-pandemic (HE) outlook and the changing nature of the public sector at large.

UNPACKING DIGITAL TRANSFORMATIONS: A CONCEPTUAL FRAMEWORK

Digital transformation is a complex and multifaceted phenomenon that unfolds differently across specific contexts and temporal dimensions. As a

result of this, as is the case with other social science phenomena like *globalisation* (de Sousa-Santos, 2006), Laterza et al. (2020) have suggested that we move away from single conceptions towards more pluralistic (from DT to DTs) and systemic approaches that consider the complexity associated with the myriad of interrelated process(es) under investigation. As a starting point, the authors suggest three analytical elements worth noting in terms of attempts to unpack the manifold empirical manifestations of DTs in the HE realm.

The first element pertains to the importance associated with the *contextual* dimensions underpinning DTs. As alluded to earlier, within the framework of DTs in HE, there is a need to expand the analysis beyond the immediate context of the classroom to encompass *system-wide* (actors and institutions) and *organisational-specific* (internal change or adaptation) elements that play key roles in the ways in which ideas, actors, preferences, values, resources, and processes interact (in non-linear and complex ways), resulting in both intended or planned and unintended or emerging effects at the macro (system), meso (organisational), or micro (sub-unit, individuals, programme, etc.) levels. At the macro or system level, this implies paying close attention to aspects associated with the political economy underpinning HE systems and HEIs, including shifts in governance regimes. As is the case with many other arms of the public sector, HE systems across the world, including the Nordic countries, have, in the past three decades or so, been the target of New Public Management (NPM)–inspired reforms focusing on efficiency, quality, and accountability (Hazelkorn et al., 2018; Pinheiro et al., 2019). The effects of these reforms have played out rather differently across various countries, but there has been a general move towards the importance attributed to ex-post mechanisms of oversight and control centred on the combination of policy instruments, such as the following:

- Enhanced institutional autonomy, mostly on the procedural side ('the how');
- Centralisation of decision-making within HEIs, resulting from managerialism;
- Performance management, both within teaching and research;
- Concentration of resources (people and funding) for national and global competitiveness, e.g., via forced or voluntary mergers (cf. Pinheiro et al., 2016).

These initiatives are inherent in top-down (government and HEI management) attempts to transform HEIs into more rationalised or complete organisations that are capable of more efficiently responding to external demands and shifting circumstances (Ramirez, 2010; Whitley, 2008). Studies have revealed that some of the many unintended consequences emanating from these reform processes relate to a general decline in the collegial decision-making structures and lowered autonomy for teachers (Barman et al., 2014) within HEIs on the one hand (Amaral et al., 2013), and an erosion of trust between managers and academic staff on the other (Hansen et al., 2019). The role of external stakeholders has also become increasingly salient insofar as the governance of HEIs' internal affairs is concerned, including the setting of strategic priorities (Stensaker et al., 2016) alongside the importance attributed to societal impact (Sørensen et al., 2019). The rise (since the late 1990s) of contractual arrangements has changed the nature of the traditional pact, brokered via the state, between HEIs and society, from one based on trust towards an increasingly transactional arrangement based on performance metrics and 'deliverables' (Geschwind et al., 2019; Gornitzka et al., 2004). Finally, the co-existence of old (cherished) academic norms and values—like autonomy and collegiality—with a new managerialism outlook or logic stressing performance, accountability, entrepreneurialism, and competition has led to new tensions, not least regarding ideas of 'winners' and 'losers' (Santiago & Carvalho, 2008). Faced with multiple (often contradictory) external and internal pressures, many universities experience 'mission overload' (Enders & Boer, 2009), challenging the established norms, values, and shared identities (Geschwind et al., 2022).

One important dimension related to context pertains to what political scientists have termed 'path dependencies,' as well as the importance attributed to *critical junctures* and *temporality* (Bucheli & Wadhvani, 2013; Pierson & Skocpol, 2002). The transition (since the late 1990s) from an analogue into a digital sphere has created both new challenges and opportunities for HEIs. The rise of MOOCs—massive online open courses—represents the first step in a gradual process of adapting traditional teaching and learning activities (for a recent review, see Tømte et al., 2020). Thus far, the results have been mixed. The so-called 'promised revolution' (cf. Billsberry, 2013) has not materialised, but MOOCs have led to the adoption of technological/digital platforms across the board as part of the new *modus operandi*. It has also been

observed that MOOCs have somehow gained ground in terms of life-long learning offerings, including the development of new accreditation systems such as ‘micro credentials’ (Brown et al., 2021; Pickard et al., 2018).

The COVID-19 pandemic represents yet another disruptive step in the use of digital platforms and technologies within the realm of T&L and research. Yet, contrary to some predictions, the pandemic revealed the shortcomings resulting from current digital policies and institutional arrangements (Farnell et al., 2021), in addition to the classic importance attributed to the relational aspect of T&L (Bond et al., 2021; Iglesias-Pradas et al., 2021; Karalis & Raikou, 2020). Studies have suggested that significant progress must be made to take full advantage of digital literacies and pedagogies, despite the rise of more supportive policy and institutional environments in a handful of countries, including the Nordics (Farnell et al., 2021).

Organisational scholars have shed light on the importance attributed to *resource dependencies* while adapting to new circumstances, such as technological shifts and regulatory requirements (Marshall et al., 2007; Oliver, 1997). Overall, most HEIs around the world, including those based in the Nordic countries, are largely dependent on public budgets and other financial mechanisms to support the bulk of their teaching and research activities. Emerging crises, like COVID-19, create unprecedented challenges to governments in the re-allocation of public funding across the public sector at large (Ansell et al., 2020). In several European countries, the pandemic has resulted in the rise of a new financially stringent regime, posing new strategic and operational challenges to HEIs and academic communities alike (Estermann et al., 2020; Pinheiro et al., 2023). The absence of sustainable financial investments in technological platforms and digital competences may, in the mid- to long-term, result in the loss of HEIs’ abilities to cope with, and adapt to, future crises and other unexpected disruptive events. Put another way, financial stringency and the capacity for resiliency are negatively correlated (Pinheiro et al., 2022). Faced with regulative and technical environments that put a premium on short-term performance and responsiveness to societal demands, HEIs the world over face the challenge of managing their budgets and delivering on the ‘metrics’ while, at the same time, adapting their formal and informal structures and core activities to the new post-pandemic realities, including rapidly shifting and turbulent societal and policy environments (Trondal et al., 2022).

The second critical feature noted by Laterza et al. (2020) relates to the importance associated with several elements that play a *mediating* role at the system level. As identified by the authors, technologies—or more specifically, the nature, scope, and purposes of the technological platforms being adopted—are such mediators that must be considered while unpacking DTs in HE. The infusion of artificial intelligence (AI), big data, and learning analytics in HE has led to the phenomenon known as ‘platformisation’ (Perrota, 2021). A key element in this refers to the implementation of learning management systems (LMSs):

LMSs are now ubiquitous in higher education, where they have evolved from static repositories of learning materials to fully-fledged data collection environments. The data collected by LMSs include traditional grades and other assessment metrics, but also log-in data, resource usage data, online learning activities completion data, participation in forums, clicks, and other forms of ‘behavioural surplus’ (Zuboff, 2019) in digitally enhanced educational settings. (Perrota, 2021, p. 54)

Platformisation has enabled private, for-profit firms to gain unprecedented access to the considerable amounts of data being generated within the context of LMSs, raising several critical ethical and pragmatic considerations, not least regarding data protection (Angiolini et al., 2021; Botnevik et al., 2020). While LMSs offer new ways of visualising and measuring teaching and learner behaviours, the actual uses of relevant analytics derived from these platforms remain limited in the Nordic countries. Moreover, the adoption of national (Nordic)- and European-level strategies for learning analytics are absent. For example, most European countries have not yet established national policies for learners’ data or guidelines that govern the ethical usage of data in research and education, despite the emerging body of research presented by European scientists on these matters (Nouri et al., 2019).

Nevertheless, faculty staffs’ limited use of learning analytics as a means of improving T&L is perhaps not surprising. We may consider this way of monitoring or assessing teaching methods and learners’ behaviours as quite advanced in terms of digital competence. What constitutes ‘digital competence’ is also much debated in HE. An often-cited definition originates from Ferraris’s work, with digital competence understood as

[t]he set of knowledge, skills, attitudes, abilities, strategies, and awareness that are required when using ICT and digital media to perform tasks;

solve problems; communicate; manage information; collaborate; create and share content; and build knowledge effectively, efficiently, appropriately, critically, creatively, autonomously, flexibly, ethically, reflectively for work, leisure, participation, learning, socializing, consuming and empowerment. (Ferraris, 2012, p. 30)

While Ferraris's definition is rather broad and originates from a policy context, other studies have also strived towards the development of instruments that can measure levels of digital competence (Sillat et al., 2021). Recent studies have shown that most students and teachers in the Nordic countries and beyond hold only a basic level of digital competence (Zhao et al., 2021). Yet, prior to the COVID-19 pandemic, governmental initiatives in Denmark, Norway, and Sweden promoted the development of digital competencies among HE students and faculty staff, who were encouraged to employ appropriate learning strategies and used relevant digital technologies to improve the quality of education (Haase & Buus, 2020; SOU, 2015; Tømte et al., 2020; Zhao et al., 2021).

Academic norms and values are considered important mediating elements in HE (Balbachevsky & Kohtamäki, 2020; Benner & Sandström, 2000). As alluded to earlier, in several countries, traditional collegial structures have been under attack, resulting in a gradual decline in academics' participation in the internal governance of HEIs (Hansen et al., 2019; Santiago & Carvalho, 2008). The infusion of market-based elements centred on performance and excellence has contributed to a shift in many HE systems, including the Nordics, from an egalitarian towards a more meritocratic and competitive ethos (Geschwind & Pinheiro, 2017). This, in turn, has resulted in a growing divide between 'haves' and 'have nots,' contributing to cultural fragmentation within and across academic sub-units (Langfeldt et al., 2013). Third space professionals, mediating between administrative and academic tasks, norms, and strategic priorities, have become increasingly prevalent in certain European HE systems, like that of the UK (Whitchurch, 2012). Not only has the group referred to as 'technical-administrative' staff changed dramatically, with fewer assisting, secretarial roles to more expert positions (Ryttberg & Geschwind, 2019; Stage & Aagaard, 2019), but the traditional boundaries between academic and administrative staff have been blurred and hybridised (Pekkola et al., 2022). Finally, DTs in HE entail major implications for the complex and evolving relationships among ICT staff, educational developers, and academics.

Other types of stakeholders, internal and external to HEIs (cf. Pinheiro, 2015), also play an important mediating role, not least in terms of helping to translate external demands and expectations into internal activities and priorities. State agencies tasked with funding and accrediting HEIs play a crucial role in diffusing mechanisms and standards for key areas like quality assurance, bibliometrics, and societal impact. Student audiences are not only the co-creators of digital educational endeavours but they also play an increasingly important role in terms of quality assurance and certification, given the importance attributed to regular programmatic evaluations (Karlsson et al., 2014). External partners from the public and private sectors have also increased their footprint in the primary activities of HEIs in the last decade, partly as a function of the importance given to work-placement, employability, and lifelong learning (Small et al., 2018), as well as in the context of joint funding and risk sharing in the realm of research applications and the establishment of centres of applied science and innovation dedicated to grand challenges such as sustainability (cf. Yarime et al., 2012).

Finally, following seminal work on the institutional (cultural-laden) features of HEIs, careful attention should be paid to the dynamic and complex interplay between the adoption and diffusion of digital platforms and the solutions and local norms, values, identities, and traditions, both at level of the university (Clark, 1956, 1972) as well as the sub-units and/or sub-disciplinary academic groups in question (Becher & Trowler, 2001; Trowler et al., 2012).

The third aspect referred to by Laterza et al. (2020) includes the *types of effects* accrued to the adoption (and subsequent adaptation) of digital technologies and platforms in HE. One critical aspect of this sheds important light on the dynamics and complexities associated with the interplay between continuity and change. There is a long tradition in studies of HE systems and institutions suggesting that change tends to occur in a rather incremental manner (Seeber et al., 2015; Stensaker et al., 2012; Vukasovic et al., 2012). As is the case in other arms of the public sector, HE systems require a considerable degree of stability and continuity, and hence there are ‘natural’ (institutional) barriers to implementing disruptive innovations in HE (Pinheiro & Young, 2017; Young & Pinheiro, 2022). This, obviously, does not imply that change does not occur within systems and institutions, but its nature, scope, and pace differ substantially in accordance with contextual circumstances.

For example, new institutional arrangements may emerge from both internal and external digitalisation processes. By adopting learning-management platforms, HEIs may reach out to students independent of campus-based teaching offerings. Prior to the COVID-19 pandemic, such offerings were quite widespread in continuing education programmes offered by HEIs, both as MOOCs and as regular online courses in the Nordic countries (and beyond). During the pandemic, online offerings became the dominating course format offered to all students, yet as previously demonstrated, this type of offering, framed as ‘emergency remote teaching,’ was delivered by faculty without any prior experience in online teaching and to students who had signed up for campus-based programmes without any preference for studying online (Scherer et al., 2021; Solberg et al., 2021).

As European societies gradually learn how to live with COVID-19, both policymakers and HEIs alike are now debating how to proceed with online offerings as campus-based teaching becomes possible (and in many cases the default mode) once again. A newer concept is emerging—namely, ‘hybrid’ teaching (Nørgård, 2021; Schleicher, 2020). Although the concept is relatively new, framing a post-pandemic teaching mode, several understandings and approaches have begun to emerge (Nørgård, 2021). One such approach notes that university students may simultaneously attend classes both on campus and online (Barman, 2021). Yet, the quality of this type of offering has become much debated in countries like Norway (Krono, 2022a, 2022b). While the digital technologies/platforms that support this teaching mode seem to be in place, the pedagogical approaches remain unresolved for teachers, who are left asking how they can activate and reach out to students who are learning both on campus and online. In this way, digital technology either opens up new possibilities that are not yet consonant with existing pedagogies or the unintended results emanating from DTs lead to a new set of pedagogical dilemmas.

The escalating usage of digital technology also contributes to the establishment of new roles that affect academics’ responsibilities. For example, third-space professionals such as educational developers and Information and Communications Technology (ICT) staff may be more visible in the organisation, becoming increasingly significant for academics who require rapid support to design and deliver teaching in digital environments, as during the COVID-19 pandemic (O’Toole et al., 2022). Consequently,

this can lead to power shifts where technical skilled staff have a significant say in defining and assessing student learning (Facer & Selwyn, 2021), something that is elaborated on in some chapters of this book (cf. Scholkmann; Barman & Weurlander).

Finally, new digital technologies may also impact epistemic work within the academic disciplines themselves as the building blocks for HE systems and HEIs worldwide (Clark, 1983, 1984). Several of the book chapters demonstrate examples of how this plays out in practice (cf. Hermansen & Lund; Øvrelid et al., Tømte & Lazareva; Singh, etc.). In this regard, digital competences come to the fore as crucial in diverse ways. As suggested by Castelfranchi (2007), digital competence serves as the most important factor distinguishing the knowledge society from the information society. While the former aims to transform information into resources enabling society to take effective actions, the latter creates and disseminates raw data.

In short, by considering the complex interplay between the sets of factors and mechanisms outlined above, a more realistic assessment of the effects, both intended and unintended, of DTs at different levels, functions, and structures within HEIs can be realised. That said, the use of DT in HE is both a rather complex and evolving process, and this edited volume, with its methodological limitations, is a necessary first step in unpacking an important emerging phenomenon with the potential to substantially alter the profile and outlook of HE systems and institutions both in the Nordic countries and beyond.

VOLUME'S CONTRIBUTIONS

This edited volume addresses the suggested, systemic, and pluralistic framework encompassing different types of DT processes at multiple levels of analysis. Most contributions are empirically based on the Nordic context, with two of the contributing chapters looking at ongoing and emerging developments beyond Nordic HE. The volume is organised into four parts, including an introduction (prologue) and an epilogue by the editors.

The first part sets the stage by addressing aspects related to the political economy of HE, most notably by investigating how for-profit EdTech platform providers, as third parties, have increasingly gained influence within HEIs in the form of the provision of sophisticated digital infrastructures. In Chapter 2, de Andrade, Laterza, and Thomas provide a

research literature review, identifying various narratives around this development. Based on these findings, the authors further discuss what impact this development may have on HEIs, based on their status as either private or public institutions. In this part, the ambition is also to expand our understandings of how to unpack the DTs in HE. In Chapter 3, Øvrelid, Bygstad, Ludvigsen, and Dæhlen argue for looking at DTs as what they frame as ‘dual digitalisation.’ Using this approach, they elaborate on how education may converge with digital subjects, underscoring that this process is enabled by what they frame as boundary subjects and data. A key message from these authors is that digitalisation changes the relationship between students and teachers, and that digitalisation may also change the subjects themselves due to datafication. The authors thus elaborate on how this dual digitalisation can be managed.

The second part comprises four chapters that, in various ways, unpack new and emerging teaching and learning practices.

In Chapter 4, Tømte and Lazareva explore how new learning spaces may impact teaching and learning. By investigating a relatively new trend known as the future classroom lab, which originates from the policy field, the authors explore how this technology’s rich learning space may foster the development of teachers’ professional digital competence (PDC), which in itself may represent an epistemic change within teacher education. Key findings suggest that the room itself does not provide any learning for students as such—it has to be guided by the teachers. That said, teachers’ PDC may impact how they benefit from using the room with their students.

In Chapter 5, Hermansen and Lund perform a narrative inquiry to explore how institutional practices and activity settings at various levels within the faculty studied can be seen as coupled systems. It is suggested that these couplings may allow for sustainable and transformative change. The authors demonstrate that the interplay between structure and agency results in the transformation of situational contexts of action.

In Chapter 6, Singh and Haugsbakken study how the design of learning resources in an online course offering, here approached as an institutional MOOC in Norway, may foster sustained engagement and interaction with learning resources, which again may enhance the process of developing students’ scientific understanding. Even if findings suggest that the design seems to work well in the case being studied, the authors discuss the limitations of this type of learning. For example, in this MOOC-based online context, students have limited opportunities to

interact intellectually with fellow learners and instructors. Existing interactions tend to promote the seeking of solutions to specific problems rather than becoming reflective and discursive inquiry about issues, which could be a barrier to epistemic transformation. A key message from the authors is that key mechanisms like communication, interaction, and collaboration about developing and advancing a conceptual understanding of learning problems are necessary conditions for epistemic transformation to take place.

Chapter 7 addresses the timely issue of how digital technologies have impacted assessment practices in HE. Here, the authors Barman and Weurlander raise several issues that remain unsolved. By interviewing university teachers at two HEIs in Sweden, the authors investigate both roles and key decision-making processes as regards teachers' use of digital technologies. They discuss how the need for remote assessment that was accelerated during the COVID-19 pandemic resulted in epistemic changes in terms of what kind of knowledge and knowing are being assessed. A key finding is that the use of digital technology has seemingly led to the adaptation rather than innovation of assessment practices.

The third part of the volume highlights organisational manifestations of DTs and includes four chapters that address this perspective in various ways.

In Chapter 8, Scholkmann applies the theoretical lens of street-level bureaucracy and frontline work to discuss how different groups of actors in the university enact DTs as they execute their work. She illuminates how DTs may play out for faculty, students, educational developers, and administrative staff, as they represent essential practices that both enact and resist digital transformation. A key message here is that frontline workers should be focused on future research regarding DTs, including policy-making, the interplay between frontline practices and local variations, and a long-term perspective on their own work and DTs.

In Chapter 9, Degn discusses the extent to which local translations of digitalisation have been used strategically by universities in Denmark. The findings suggest that universities seem to be more reactive than proactive in their adaptation efforts. A key message here is that the strategic use of digitalisation as a policy idea thus far has not been high on the agenda for Danish universities.

In Chapter 10, Wollscheid and colleagues present the results from a scoping review of research on DTs in HE as a result of the COVID-19 pandemic. The findings point to a greater interest in knowledge for use

in, rather than knowledge *about*, academic writings during the first year of the pandemic, with a focus on the hard sciences. With that, potentially underdeveloped research areas include knowledge about DTs in HE and a focus on so-called soft disciplines. Another observation is that many of the digital technologies were already developed, and many were in use before the pandemic, which may indicate that the latter accelerated a wave of change that had already begun.

In Chapter 11, Laterza and colleagues present an empirical study within one HE in Norway to examine how DTs have been perceived by various actors before and during the COVID-19 pandemic. The findings showed that the historical tension between a top-down push towards DTs and the reluctance among several teaching staff to go ahead as fast as envisaged by central management has led to significant differences in conceiving of the desirable content and goals of DTs among different actors—especially between central management, administrators, and support services on the one hand and many of the teaching staff on the other.

In the **fourth part**, Chapter 12, the editors reflect on the volume’s empirical and conceptual contributions in the form of a short epilogue, proposing a way forward for future inquiries.

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The Rise of EdTech Platforms in Higher Education: Mapping Themes from Emerging Critical Literature

Luiz Henrique Alonso de Andrade^{ID}, *Duncan A. Thomas*^{ID},
and *Vito Laterza*^{ID}

INTRODUCTION

The COVID-19 pandemic posed a major challenge for universities as they had to rapidly switch to online teaching in order to provide continuity and consistency in their higher education (HE) offerings. Yet, restrictions on physical face-to-face teaching necessitated by the pandemic have

L. H. A. de Andrade (✉)

Faculty of Management and Business, Tampere University, Tampere, Finland
e-mail: luiz.alonsodeandrade@tuni.fi

D. A. Thomas

The Danish Centre for Studies in Research and Research Policy (CFA),
Department of Political Science, Aarhus University, Aarhus, Denmark

V. Laterza

Department of the Global Development and Planning, and the Centre for
Digital Transformation (CeDiT), University of Agder, Kristiansand, Norway

also afforded the educational technology (EdTech) sector a unique opportunity for growth. Private sector EdTech firms had already incrementally extended their reach into universities since the 1990s with HE's uptake of Learning Management Systems (LMS), and since the 2010s with the development of massive open online courses (MOOCs). With the pandemic's onset, however, many complex questions that may have held back universities from engaging more with EdTech platform provider firms were set aside, along with concerns about the potentially problematic nature of involving more private actors in the HE sector. Rapid digitalisation of HE teaching seemed the only viable way universities could continue to deliver courses to students at the same time as having to vacate campus classrooms (Decuyper et al., 2021; Ivancheva et al., 2020). The pandemic enabled EdTech advocates to rehash earlier claims that digitalisation can indeed remedy some supposedly outdated, inflexible and inefficient approaches of traditional HE. This is seen, for instance, in the speculative ambitions of commercial commentators, optimistically projecting that worldwide investment in EdTech will double between 2020 and 2025, from an already significant US\$227 to US\$404 billion (HolonIQ, 2021a).

Critical perspectives in education literature have noted many potential issues associated with rising EdTech involvement in HE. They also highlight that little here is new. The game, many of its players and their agendas resemble market consolidation tactics by private firms. The potential for digitalisation of HE to cause new divisions of labour, due to modularisation and outsourcing of academic work, also mirrors trends of casualisation of conditions and worker rights in the rise of 'gig economy' work in other sectors of the economy (Ivancheva & Garvey, 2022). Increased platform dependence by universities has also been linked to workforce precaritisation, privacy issues and concerns about who benefits from students and learning being turned into data assets that are capitalised by private firms (Komljenovic, 2020; Martínez Guillem & Briziarelli, 2020; Ovetz, 2020). Such questions are not unique to the pandemic emergency teaching period. They have also been raised during earlier waves of university engagement with EdTech, for example around MOOCs, LMSs, and outsourcing of course delivery to private sector Online Programme Management (OPM) companies (Ivancheva et al., 2020; Langseth et al., 2019; Shanley et al., 2020).

Much literature on EdTech has been uncritically triumphalist, particularly in the early days of MOOCs (Selwyn & Gašević, 2020). This chapter

instead aims to provide an overview of critical perspectives and their key themes, to make sense more broadly of *how growing university engagement with EdTech might transform HE provision*. This is done through an extensive review and narrative synthesis of critical studies of HE digitalisation. We especially focus on works incorporating political economy, and framing EdTech less as a set of pedagogical innovations disconnected from the broader economy and more as a powerful form of ‘platform capitalism’. This extensive qualitative review was conducted in disciplines such as education studies, anthropology, geography, sociology and cognate fields, where in-depth qualitative approaches are common. This is akin to what Gough et al. (2012) have labelled ‘configurative reviews’ which aim to ‘identif[y] patterns provided by heterogeneity’ (ibid.) and ‘have the purpose of [...] aiming to find sufficient cases to explore patterns and so are not necessarily attempting to be exhaustive in their searching’ (ibid.). Our search strategy included database searches in Google Scholar and Scopus, inclusion of relevant literature already known by the authors and snowballing of relevant literature from items found through these two previous avenues.

Our focus is not on reaching some abstract notions of objectivity and replicability. Rather we aim for an in-depth interpretation of the sources to build dialogue between the different voices and contributions. The review is organised around themes that emerged from reading the selected literature (induction) in interaction with topics and debates that the authors were already aware of beforehand (deduction). This thematic approach differs from much EdTech literature that tends to organise reviews around the kind of technology used and can artificially isolate, for example, MOOCs, LMSs, OPMs or other EdTech from their broader societal and economic contexts. Instead, we attempt to provide a more comprehensive, critical review and synthesis of key themes across different dimensions of HE digitalisation.

In what follows, we first put our review into the context of rising digitalisation and marketisation of HE—something that is unevenly occurring across universities worldwide. We then outline a model of the critical themes we found in the literature and present these across several sections. This is followed by a closing discussion of what these themes collectively may mean for HE digitalisation prospects and challenges.

RISING EdTECH IN CONTEXT: HE DIGITALISATION AND MARKETISATION

The context within which we seek critical perspectives on the rise of EdTech firms and their involvement with universities is one of rapid HE digitalisation and marketisation globally. As noted in Chapter 1 of this book, these processes are very uneven. There is more use of EdTech everywhere, but uneven access to a stable internet infrastructure produces rather different outcomes within and across countries. This transformation logic is often portrayed as follows:

Framed as an agent of disruption, digital technology in education, or EdTech, is imagined as an unstoppable force of nature descending upon higher education. We are defenseless against it. We must adapt to what EdTech wants from us and embrace what it is doing to us. We have no choice. (Mirrlees & Alvi, 2019, p. 2)

This perhaps bleak vision of ‘unstoppable’ expansion of EdTech is common (see Costello et al., 2020; Marachi & Quill, 2020; Martínez Guillem & Briziarelli, 2020; Ovetz, 2020; The Analogue University, 2019; Williamson et al., 2020). However, Mirrlees and Alvi (2019) show that it is difficult to define what EdTech is exactly, and to determine how to connect it to the current stage of global capitalism. Almost every tool applied in education could be understood as EdTech. Like other contemporary tools, EdTech spans and integrates different technologies. It depends upon complex value-chains, and is inherently linked to broader political and economic processes (Mirrlees & Alvi, 2019). For our purposes, we will rely on the understandings emerging from the critical literature under review. We focus then on the software ecosystem used, typically composed of intertwined educational platforms (e.g. Blackboard, Canvas, Google Classroom, Moodle) and their platform providers (e.g. Blackboard Inc, Instructure, Alphabet, Moodle Community). Our critical discussion of EdTech is not merely focused on the tools and their insertion into the everyday life of HEIs, but also on the broader connections between the academic, pedagogical, institutional and economic spheres within which EdTech operates. We are concerned not only with the *how* but also the *why* of rising EdTech presence in HE, and the possible futures of *where* digital transformation of HE might be going.

Much critical literature links the rise of EdTech private sector business with global capitalist trends that enable private companies to provide services to universities (Martínez Guillem & Briziarelli, 2020; Mirrlees & Alvi, 2019; Williamson, 2019). We see EdTech then as part of what Williamson (2019) calls the ‘HE space’, which is being rebuilt under an overarching marketisation agenda driven by policymakers and education platform providers. Such EdTech involves the ‘nuts and bolts’ work of ‘the practical, material, technical and discursive effort of market-making and maintenance’ of platforms (Williamson, 2019, p. 9). This market-making endeavour includes supply-side processes, where EdTech firms attempt to re-frame norms and expectations around what education provision should be. It also involves demand-side processes that incentivise individualised, competitive personal cravings so that students feel a constant need for career development, professional development and lifelong learning, to keep their skills updated (Biesta, 2018).

Platform providers offer universities packaged ‘solutions’ embodying this dual instrumental nature, including MOOCs, OPMs and, mainly, LMSs. They meet demand but also induce it. They service the marketisation of the HE space, whilst also reinforcing it (Williamson, 2019, 2021). These solutions effectively redesign learning experiences into a more market-amenable logic. Just as traditional educational tools once controlled the bodies of students to produce state citizens (Foucault, 1995), EdTech turns today’s students into lifelong learners (Biesta, 2018). It instils in them a restless, consumerist drive for relentless skill updating, and a feeling they must continually improve their competitiveness in labour markets or else become obsolete (Walshok, 2021).

These trends have been amplified by the pandemic. The pressure on universities was enormous, as there was a real risk of dramatic drops in student numbers if teaching did not continue digitally (Witze, 2020). This was a perfect storm and opened the way for radical institutional change in HE. Significant policy changes were implemented with often little consideration for long-term effects and with academics in a weak position to oppose or improve new ‘emergency’ policies.

REVIEW OF KEY THEMES

We now review nine key themes that emerged from our review of the critical literature on EdTech in HE. These exemplify key institutional and technical dimensions, and potentials and prospects around EdTech-related digital transformation of HE. Some themes include dynamics already given names in literature: *platformisation*, *learnification*, *datafication*, *modularisation*, *unbundling* and *assetisation*. For others, we use new labels: *crowdification*, *peer-to-peering*, and *skillisation & short-circuiting*.

Figure 2.1 shows how these themes interrelate. *Platformisation* and *learnification* act as meta-themes, under which the other sub-themes are grouped. On the left, we gather technological processes, conjoining digitalisation and marketisation, involving dynamic *platformisation* occurring in HE, also being inspired by broader platformisation processes in other sectors (McAfee & Brynjolfsson, 2017). The core of platformisation, we posit, is a process of *datafication*. This enables *assetisation*, powers *modularisation* and allows *crowdification* and *peer-to-peering* to emerge (explained in the more detailed thematic reviews later in this chapter). On the right is a non-technological, institutional process, *learnification* (see also Biesta, 2018), which we argue is essential to platformisation but also strengthened by the latter. *Learnification* provides a kind of ideological backbone for more abstract processes within this meta-theme, such as *unbundling* and *skillisation & short-circuiting*.

We should note several limitations of our approach. First, as Decuypere et al. (2021) note, any critical study of digital platforms in HE still faces epistemological difficulties and requires new theoretical frameworks to understand the multifaceted dynamics that are at work, as well as their potential effects. In other words, we are attempting to review a complex, evolving terrain. This review therefore does not aim to take a particular normative stance or to arrive at any summative assessment of the reviewed themes. Second, as noted in Chapter 1 of this book, we cannot assume these dynamics are universally prevalent. They are likely uneven and their implications across world regions, including the Nordic context, need further study, so that local contingencies and specificities are properly taken into account.

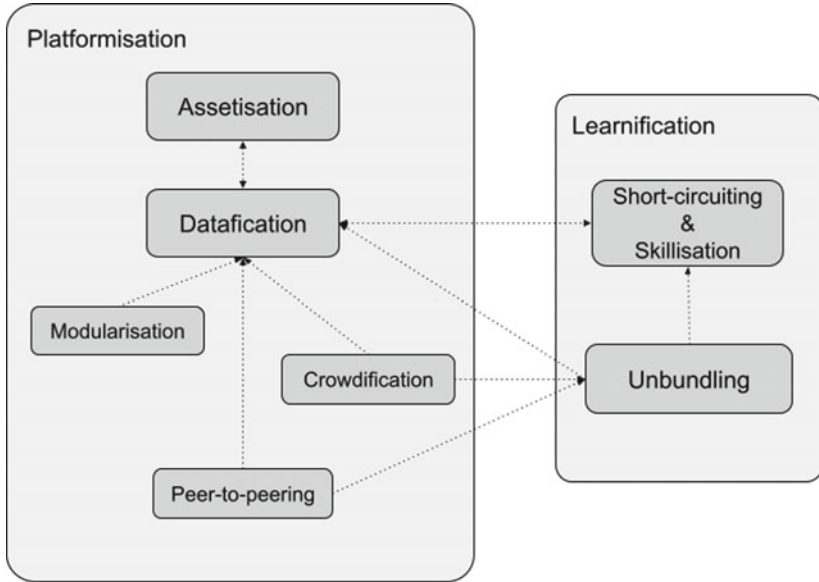


Fig. 2.1 A heuristic model to connect themes emerging from the EdTech critical literature

Meta-Theme 1: Platformisation or from Product to Platform

The first meta-theme in our review sees EdTech from a market perspective. Here, digital platforms are virtual spaces for transit of digital information goods, replacing typical product consumption mechanisms. Three inherent traits are that these goods can be reproduced with negligible costs, each copy is always an exact replica, and their distribution is practically instantaneous, regardless of distance (McAfee & Brynjolfsson, 2017). The rise of EdTech platforms can be similarly conceptualised. HE knowledge in digital format is, at least in principle, perfectly replicable and perfectly transmissible. Thus, when digitised, these traits enable platform-based marketisation logics in HE. This logic mirrors the growth of online music platforms such as Spotify or Apple Music that have made trade in physical music commodities (e.g. LP records or CDs) obsolete, replacing it with the consumption of individual digital tracks within a platform environment. McAfee and Brynjolfsson (2017) describe this as transformation

from product to platform. In a similar manner, once recorded, a university lecture, can be endlessly and relatively cheaply shared on a platform. This seemingly makes it senseless, from a strictly market standpoint, for any student to pay to consume this same material being repeated later in a physical setting—or to purchase inferior content provided by competing university teachers elsewhere.

Another sub-theme here is the effects of such platformisation on the behaviour of platform users. Decuyper et al. (2021) explain these by describing three roles played by platforms. First, platforms work like urban architectures, providing spaces (interfaces) for user interactions. These are both human-to-software or navigation (through graphical user interfaces or GUIs) and software-to-software or interoperability (across platform features, drawing upon application programming interfaces or APIs). Platforms are not flat surfaces, as the name might suggest. They are more like ‘pocket’ universes, enabling complex economies. They are a space where internal modules connect to external ones or even to other platforms. They can be nested and built upon one another (*ibid.*). Second, platforms are intermediaries. They host dwellers, modules, and their interactions, and set rules for what happens inside them (*ibid.*). They have their own ‘physics’, defining how interactions can be pursued. They establish governance forms, and structure and (e)valuate internal artefacts and processes (*ibid.*). Third, they collect fine-grained data on the activities going on inside it (a process we can call datafication). They become able to capitalise on this, such as by improving platform functionalities, or by trading data in data markets (a process that has been labelled assetisation). The platform thus autonomously assures its own sustainability and is itself a kind of new organisational form (*ibid.*).

Platforms are thus far from ‘neutral digital tools’ (*ibid.*, p. 2). They embody intermediary economic roles, like those of book publishers, insurance brokers, or record distributors. They exert comprehensive control over internal processes and relationships. They impose certain ‘contracts’ because the platform’s software rules reign supreme. Codes that rule in-platform behaviour are the core, and by design are not negotiable, explaining how platforms influence users’ decision-making processes and cognition (Decuyper et al., 2021). For an analogy, the small symbolic reward systems in platforms like Facebook or LinkedIn, such as ‘like’ buttons, interconnect with user crowds and their similar assessment mechanisms. These nudges shape dweller behaviours, inside and outside of the respective platforms’ ‘pocket universe’. Such institutional settings work

like city architecture, dress codes and other rules in the offline, physical world (Grimaldi & Ball, 2021).

Processes like these can drive differing, competing forms and logics of HE. They are heavily shaped by their EdTech provider firm's criteria, internally embedded in their architecture, defining which values seem legitimate (Decuypere et al., 2021). Besides the ability to capitalise on data platform providers extract from in-platform interactions (datafication, assetisation), they can shape these interactions via their platform. This could impact conceptions of appropriate learning processes and student–student interactions, for instance (Grimaldi & Ball, 2021; Williamson, 2021). Platform providers may not supply or own platform content; universities may supply it. Nevertheless, providers configure their platform processes for how platform 'life' occurs. They thus draw upon significant new power asymmetries (Komljenovic, 2021) by enacting governance as both infrastructure-providers and rule-shapers. A key dynamic for digital transformation of HE platform providers is that conceptions and expectations of what classrooms and campuses, may be displaced by how they are framed by platform providers. Connectivity is usually the term used to express how platforms connect people. If such connectivity is always mediated by in-platform rules, it is steered by how platforms conceive it. This can embody and be constrained by the provider's software 'business rules' (Martínez Guillem & Briziarelli, 2020).

Sub-Theme 1.1: Datafication or from Interactions to Data

Datafication is a conversion of human interactions into machine-readable formats or 'data'. Customer relationship management (CRM) systems are good examples of this process. They extract data from people's interactions in platform ecosystems to feed algorithms. These then create consumer profiles and offer matched products to consumers based on these profiles. The same logic underpins credit-scoring systems and the outlier example of China's—arguably dystopian—social credit platform to rank citizen behaviours (Liang et al., 2018). Datafication is seen as essential for dataveillance, both underpinning and enabling surveillance capitalism (Marachi & Quill, 2020). Here, value is created by data-scraping agents that colonise internal or external platform systems to monitor, profile and even predict customer behaviours. This is all with the

aim of using such data to inform and optimise a firm's market strategies and competitive power.

For human interactions on EdTech platforms in HE, market-oriented datafication aims to compress interactions into market-relevant data packages. This converts a 'mess' of human relationships into standardised, actionable data. This can involve standardisation via the use of algorithms. These may apply race, gender or other biases from patterns consciously or unconsciously introduced in the way algorithms work. For instance, Gilliard (2018) shows this for the Uber taxi platform. Uber's algorithm mediates between customer passengers and drivers to shield any apparent racist traits in selections and preferences. Such algorithms can allow users to 'feel innocent' whilst behind-the-scenes the platform continues to operate in questionable or discriminatory ways (Garcia, 2016).

In HE, datafication by EdTech platforms has led to a process of 'enumeration of the university' (Grimaldi & Ball, 2021; Williamson, 2019, p. 1; Williamson et al., 2020). Here platforms have '[d]ata mining capabilities' that gather 'data about student performance, analyze it, and use it to provide individualized feedback' (Mazoué, 2012). This feedback can be translated into scores for things such as 'student performance, sentiment, engagement, and satisfaction', and to provide 'proxy measures of the performance of staff, courses, schools and institutions as a whole' (Williamson et al., 2020, p. 354). This echoes a wider (e)valuative logic of the broader metric society (Lamont, 2012; Mau, 2019; Williamson, 2019; Zeide, 2017). Datafication can also be where EdTech 'solutions' (HolonIQ, 2021b) connect to other non-EdTech, but still data-rich platforms. Such cross-platform data flows can be hard to regulate (Marachi & Quill, 2020).

As more tools become available in EdTech platforms, and across connected platforms-of-platforms, the scale of data generated—and evaluative possibilities—can expand. Scholars have argued that expanding datafication ultimately leads to the transformation of students into perfect neoliberal subjects who pursue learning processes with outputs that are seamlessly yet comprehensively metrified (Biesta, 2018; Grimaldi & Ball, 2021; these ideas also link later to short-circuiting).

By aiming to make every interaction machine-readable, datafication relates to other HE transformational processes that reduce educational provision into actionable units, as we discuss later in this chapter (i.e., modularisation, crowdification, peer-to-peering, unbundling and skillisation). Datafication also enables and is sustained by assetisation of data by EdTech platform providers.

Sub-Theme 1.2: Assetisation or from Commodity to Asset

Assetisation, as Komljenovic (2020) cogently argues, indicates the increasingly ‘rentier’ nature of HE platform providers. The latter transform data from a commodity into an economic asset. Assets are legal constructs and are usable in a proprietary way by their owner. Assets have different supply and demand logics from commodities. As an asset’s value increases, so does the demand for it, as its consumption does not imply its depletion. This can leave no incentive for further competitors to enter such a market (Komljenovic, 2020; Savona, 2019). Digital platform businesses, regardless of what they charge users for their products and services, rely on assetisation for profit-making. They capitalise on big data collected from a massive set of user interactions taking place inside their EdTech platform systems. They aggregate collected digital traces or ‘data rents’ effectively paid by platform users. For HE EdTech, students and faculty knowingly or unknowingly feed data about themselves into platform machine learning algorithms. These then shape pedagogical norms in educational tools and build EdTech platforms’ market value. Provider firms can also repackage and sell this data to brokers in data marketplaces. This will be done according to the terms and conditions users accept when agreeing to use platforms, irrespective of whether they understand they are paying ‘data rent’ by so doing (Birch, 2020; Komljenovic, 2020). Data can feed and shape algorithms used by EdTech firms to offer products or services tailored to consumer profiles. Repackaged learner data can also be sold to industries that recruit from universities.

We know that individual privacy rights can be threatened by datafication (Benjamin, 2019; Crawford & Schultz, 2014). This has only just begun to be explored for data assetisation. Transparency here can be costly. Data may flow in ways that are hard to regulate or trace (Lynch, 2017). Use of deep neural networks within assetisation can by its very nature be not inspectable and thus inherently opaque. It

involves complex, multi-stage decisions hard to scrutinise with human oversight (Lynch, 2017). EdTech platform users may also be unable to meaningfully opt-out. For social network platforms, opt-out may be possible (Benjamin, 2019; Mau, 2019). Opting out of EdTech may restrict learning and career possibilities (Lynch, 2017). Similarly, apparent protections like the European Union General Data Protection Regulation (GDPR) can mitigate data rent risks (Komljenovic, 2020). However, the use of such standard protections can make users less likely to scrutinise fine details of the capitalisation of their data rent, because they assume it is protected by the regulation. A further complication is that assetisation can also occur at an aggregate group level, and yet still enable the identification of traits of unique individuals who may assume they are protected (Lynch, 2017).

Sub-Theme 1.3: Modularisation or from Continuum to Fragmentation

Modularisation, like unbundling (discussed later in this chapter), is connected to the segmentation of HE degrees or courses into smaller units of educational provision (HolonIQ, 2020b; Martínez Guillem & Briziarelli, 2020; Ovetz, 2020). From the platformisation meta-theme perspective, modularisation relates to how such segmentation affects the organisation of labour and education provision, and to how digital technologies mediate these changes. We see a move away from the role of the academic as a well-rounded professional that delivers education as a holistic experience, and towards a proliferation of discrete tasks and roles to do with, for instance, ‘course design’, ‘course delivery’, ‘course evaluation’, and so on. This also enables the employment of temporary and cheaper labour to perform some of these tasks (Stewart, 2010; Taylor, 1997). In HE this has been seen in the separation of research and teaching positions, and of content design from actual instruction (see also ‘occupational disintermediation’ in Mazoué, 2012, p. 21).

Modularisation is not new and predates platformisation, but the latter can support and accelerate the former. Similar to public service delivery systems, transaction costs for modularisation in HE are lower for digitalised technical processes (Schuppan, 2009). In a physical environment, some process energy is dissipated between actors. A digital environment instead allows seamless, optimised interactions. Platforms take this to a new level. Networks are denser, and more chain links can be datafied. At

one level, EdTech providers here can be thought as ‘neoliberal “disruptors”’; they advocate fragmentation of HE in order to ‘break up, disperse, automate, privatize, outsource, and off-shore the components of the HE value chain’ (Ovetz, 2020, p. 3). Effects can be multi-directional, with platformisation powering modularisation, even as modularisation generates more interactions between newly disconnected modules that can then become datafied.

Sub-Theme 1.4: Crowdfication or from Class to Crowd

Crowdfication (our label) involve processes exemplified by MOOCs, particularly in their free-to-access versions, offered on platforms such as edX or FutureLearn, where EdTech providers partner with universities (Ruipérez-Valiente et al., 2020). These courses need certain technological infrastructure to support massive or ‘crowd’ scale attendance. Hypothetically, once launched they need only marginal costs to run again repeatedly, or to update content. Successful MOOCs seemingly target ‘consumer-learners’ who make ‘rational choices’ based on the reputation of universities as brands. MOOCs are taken in larger numbers if they involve high-level universities or ‘star’ lecturers (Shanley et al., 2020). These courses often do not generate profit for universities or platform providers. However, some revenue can be derived from ‘freemium’ schemes added to them, like selling completion certificates for small fees, or from outsourcing or reusing their content, and by assetising student data (Belleflamme & Jacqmin, 2016; HolonIQ, 2020a; Langseth et al., 2019).

MOOCs have been critiqued for not using ‘connective’ pedagogics and thus for not fostering interactive learning communities. They instead service ‘crowds’. Some do afford space for critical thinking (Mazoué, 2012; Shanley et al., 2020) and enable interaction between learners, and with course content. However, such courses are still typically constrained by platform architecture, and so utilise potentially lower quality pedagogy like automatic quizzes, tests, games, or lightly curated forums. Such constraints are often necessary for MOOCs to be affordable to run or to take at scale, and these in-platform interactions may be datafied and assetised regardless of their quality (Lynch, 2017). Separate from MOOCs, other EdTech platforms that aim to massify learning can become ‘crowd-ifying’, so long as there is datafication sustaining it. Another aspect of ‘crowdfication’ is that it does not necessarily imply inclusiveness.

However, this may be a discourse used to justify it, even by high-level politicians such as former US President Barack Obama who has championed platforms aimed at mass education (Mirrlees & Alvi, 2019). Crowdfunded online HE may not end up being better quality or higher reach than traditional HE. However, mass credentialing allied to crowdification does imply scaling up of data renting and datafication (Lynch, 2017).

Sub-Theme 1.5: Peer-To-Peering or from University to Web

Peer-to-peering (our label) relates to transformative possibilities of information technologies such as peer-to-peer (P2P) networks and decentralised transaction online registries or ‘blockchains’ (e.g., for course credentials). These are claimed to challenge traditional HE course provision (HolonIQ, 2020a). P2P necessarily relies on platforms, so user interactions are again ultimately shaped by providers. EdTech HE platforms such as Canvas or Moodle largely replicate in digital form a traditional teacher-class-student model. True peer-to-peering instead involves shifting teaching roles where anybody can learn anything from anyone, not only from a formally appointed instructor. The Skillshare platform promotes a model where users teach skills to each other (Pierce, 2021). However, Skillshare does not confer traditional credentials. These typically need to be granted by a formal, authoritative actor, like a university. Using blockchain infrastructure can promise to decentralise such certification away from traditional authorities, meaning users could, for instance, fill ‘learner-wallets’ instead of receiving diplomas from universities. Certain industry commentators indeed view such approaches as potentially more secure and relevant for learners. Courses in this domain often address industry-relevant skills. Here, decentralised credentialing could be more robust than perhaps more forgeable physical university certificates (HolonIQ, 2020a; Sanchez, 2020; Williamson et al., 2020).

Together, crowdification and peer-to-peering could weaken the institution of academia. Peer-to-peering does not rely upon a coherent and well structured common learning space in the same way as a university campus does. It could thus radically transform the organisational dynamics of HE course delivery, and not necessarily for the better. In highly regulated HE contexts such as the Nordics, these kinds of radical ‘disruptions’ are unlikely to gain much traction in the short term. Yet, the ideological power of peer-to-peering as a critique of the

academic lecturer's traditional authority in the classroom is widely felt, for instance through increasing emphasis on rhetorical devices in pedagogical discussions such as 'the teacher as learner' and 'students teaching each other'. Here too EdTech platforms play an important role in supporting these trends, as is the case with the flipped classroom, where the traditional lecture is substituted by active participation by students who have already engaged with the teaching materials delivered online before the class (Liu, 2019).

Meta-Theme 2: Learnification or from Student to Consumer-Learner

Our second meta-theme is what Biesta (2018) calls learnification. The core idea is that in the current 'learning age', how learning is understood has transformed from something that exclusively takes place in educational institutions, and at particular life or career stages, to something that can be found across all aspects and phases of human life. This is often encapsulated in the idea of the ever-improving 'lifelong learner'.

Learnification implies a shift of focus from the sites and agents of teaching, to learners and their learning. This is seen in HE now being more typically referred to as 'teaching and learning', rather than as simply 'teaching'. Students are called 'learners', teachers are 'learning facilitators', and universities are 'learning environments'. Here, the meaning of 'learning' has also changed. It has become somewhat individualistic, with each individual expected to yearn to learn and to have capacity to self-learn. Responsibility for learning has been passed from the lecturer and teacher instructors onto the learner (ibid.). This shift has a political component. Learning produces human capital, and lifelong learning is seemingly 'a key strategy to adjust human capital to new requirements' of the global economy (ibid., p. 248). At the same time, learning is individualised and potentially atomised—at least when contrasted with a more campus-based, community experience. Learning that matches competencies required for a specific job may also be fleeting, rather than enriching for an individual. Whether sufficient employment is available can also here be understood from being a problem of the state and the economy, to a belief that learners are at fault by being unable or unwilling to learn appropriate skills to match their labour market needs. Education here ceases to be a right, and becomes instead an internalised duty to learn (Biesta, 2018).

Labelling students as ‘learners’ is itself a transformation. It is a claim that a student lacks something, is not yet complete or competent, and needs further ‘learning activity’ (ibid., p. 251). This implied incompleteness links the dynamics of learning via EdTech HE platforms to consumerism. Learning itself becomes part of an imperative to consume. Lifelong consumer-learners must not only constantly better themselves, they must also become individually responsible for making the right decisions about what they should learn next (see Siemens, 2005). This remains so even when forecasting job market needs can be impossible (Harari, 2019). Similarly, if learning experiences become routine and standardised—as they may be if EdTech platform HE courses are to be affordable and sustainable—this kind of learning may lose meaningfulness (Jarvis, 2018; Usher, 2018).

Sub-Theme 2.1: Unbundling or from Programmes to Courses

Unbundling is related to modularisation, but is more focused on the learners’ dimension of breaking down traditional HE study programmes into component courses or other smaller units. Unbundling is framed as a key aspect of the potential de-institutionalisation of HE, linked to ongoing learnification. The traditional nature of HE as a social institution becomes downgraded by fragmentation. This can lead to re-institutionalisation into new, not necessarily superior arrangements (Biesta, 2018; Komljenovic, 2020). Such fragmentation allows different stakeholders, not only faculty academics, to deliver courses. It enables ‘consumer-tailored’ HE ‘experiences’ that are segmented according to available study time, resources and locations of consumer-learners (Belleflamme & Jacqmin, 2016). Unbundling may be touted as alleviating education inequalities, by splitting perhaps expensive, on-campus long programmes into cheaper, shorter, self-contained, sometimes vocation-oriented online units (HolonIQ, 2020a; Mirrlees & Alvi, 2019).

Unbundling does not depend upon platformisation but can be strengthened by it. Platforms promise lower transaction costs for instructors and administrators, i.e., digital content units can be easily reused or repurposed (HolonIQ, 2020b). Where such materials become available beyond the local scope of lecturer delivery, this may crowd out the need or possibility for other lecturers to make or teach such materials. This can undermine faculty creativity, and contribute to ‘deskilling, disqualifying’ and ‘demotivating the workforce’ in universities (Martínez

Guillem & Briziarelli, 2020, p. 359; see also Ivancheva & Garvey, 2022). Unbundling also helps datafication. This is because the more learning units that exist to be interacted with on a platform, the more data there is to extract.

Sub-Theme 2.2: Skillisation and Short-Circuiting or from Education to Skills and Tasks

Skillisation and short-circuiting (our labels) reflect the interconnected nature of many of these transformation dynamics already reviewed above, and the ongoing ‘blurring [of] boundaries between education and exploitation, learning and labour, students and workers’ (Mirrlees & Alvi, 2019, p. 10). Skillisation is the shift from being educated to acquiring or learning ‘skills’ (HolonIQ, 2020a) that are then credentialled in separate packages via unbundling processes (Mazoué, 2012). Learning—in its profoundest sense of critical thinking, exploration, and growing self-awareness—is replaced by instrumental task completion, with tasks predominantly defined by ephemeral requirements of current labour markets and industry sectors (Ovetz, 2020; Zeide, 2017).

The EdTech company Pearson (Pearson, 2021; Williamson, 2021) exemplifies a platform firm aiming to invest in skillisation. Here, EdTech platforms with sufficient frameworks and tools to (e)valuate student skills connect these to labour market aspects (Deegan & Martin, 2018; Williamson, 2021). For instance, Pearson’s interactive EdTech tool allows learner-users to ‘predict’ what skills they need to acquire, to improve their prospects of being employed in the projected labour market of 2030 (Williamson, 2021, p. 58). Skillisation thus involves not only fragmenting traditional HE ‘knowledge packages’ into instrumental units but also shaping learner behaviour. Similarly, EdSurge Research’s guide to ‘Defining Success Beyond Traditional Academics’ encouraged learners to venture ‘beyond traditional academic measures’ and instead ‘to focus on skills, habits, competencies and personality traits that will enable students to thrive in their future lives’ (Nattoo, 2017, p. 2).

Datafication can thus be used for what we call short-circuiting: in electrical systems, short-circuiting occurs when electricity finds shorter pathways with less or no resistance; short-circuiting also leads to system malfunction. In the same way, EdTech platforms try to use data and algorithms to ‘short-circuit’ traditional paths of moving ‘from learning to earning’, and from ‘major to wages’ (Williamson et al., 2020, p. 355). The aim is to make things easier for students, but in the process, these new datafied, quicker pathways also tend to undermine the legitimacy and viability of traditional higher education provision: why spend years and years in higher education, when you can find the ‘right’ job for you much more quickly and with shorter training programmes? One example is EdTech firm Instructure (primarily known as the provider of the Canvas LMS) acquiring Portfolium (Hill, 2019), an integrated student portfolio certifier and course-evaluation system. Together these two platforms connect student skill information to employers through a platform currently in development called, Canvas TalentMatch (see Instructure Community, 2021). Other examples are Knack, which matches detected skills to employer demands, whilst a user plays games (Canner et al., 2015; Deegan & Martin, 2018; Williamson, 2019, 2021). Short-circuiting then involves EdTech providers embedding ‘backdoors’, allowing employers to inform skill development or pre-approve skills, independent of university-based credentials or certification (Marachi & Quill, 2020).

Short-circuiting changes the notion of who has power over education, shifting this from universities to EdTech platform providers. Such continuous performance evaluation, and embedding of consumer-based logics, can transform HE students into learners that become ‘ready to adopt new techniques for self-management and improvement’, leaving little freedom for ‘alternative imaginings of self, citizens and society’ (Marachi & Quill, 2020, p. 429).

DISCUSSION

Across these nine themes, we see profound, interrelated processes that necessitate further scholarly attention in critical studies of education and call for greater focus on the critical political economy of the relationships between the HE sector and EdTech providers.

From this review, we begin to understand how EdTech platforms and their provider firms may both exemplify and induce transformation dynamics capable of reshaping entire HE systems and traditions. These changes also connect to broader, more contextual political economy developments, spanning many sectors of society beyond HE. This includes how EdTech platform approaches mirror logics and discourses of neoliberal and technological instrumentalism (Shanley et al., 2020). These rationales can be embodied, often invisibly, in platform designs and operating parameters, which then go on to shape student ideologies, norms and expectations about university teaching and learning, both on-campus and in online spaces (Komljenovic, 2021; Mirrlees & Alvi, 2019). Simply by deciding where to deploy their capital, investors in the EdTech platform sector effectively select which models and configure which interconnected platform ecosystems guide this evolution. In so doing, they aim to align new developments in the HE sector more to the interests of capital than to those of citizens (Komljenovic, 2020).

How should universities respond to these pervasive, intense transformation dynamics related to EdTech platform providers? While opting out might not be realistic at this stage, how do we ensure that societal values, such as equity, diversity, inclusion and non-discrimination, inform the algorithms and assumptions that sustain these platforms (see Williamson et al., 2020)? Is, advocating a shift to open access and creative commons principles an option (see Langseth et al., 2019)? Is enough to require that datafication be made more transparent (see Freire, 2000; Hayes & Cheng, 2020)? Alternatively, is a flat-out rejection of digital ideals needed, as proposed by The Analogue University collective (2019)? Should universities profoundly question the legitimacy of neoliberal evaluation systems and datafication processes that enable them? Should they strongly critique current AI-based predictive systems that are often faulty in use and could have wide-ranging effects on teachers' and learners' agency and freedom (see Selwyn & Gašević, 2020)?

Here we recall that 'EdTech is not an island, but part and product of society', and that 'it is shaped by and shapes the capitalist mode

of production' (Mirrlees & Alvi, 2019, p. 14). It seems impractical to propose alternatives without fundamentally modifying current capitalism. Neither should we dismiss all EdTech as necessarily negative technology. Otherwise, we risk a different form of technologically deterministic interpretation of HE digitalisation.

Finally, there may be a higher order theme emerging from our review. All these developments may already indicate the development of, in effect, a new hybrid public–private university organisational form (Christensen & Lægheid, 2011). In other words, HE platformisation might not be the end of traditional universities, even though the closer links it seems to produce between HE institutional logics and market logics are likely to have significant drawbacks. Going forward, it is important that, even in the most marketised settings, an ethos of HE as a public good becomes embedded in such university–EdTech relationships. This could help safeguard traditional roles, as various digitally transformed models co-exist with other forms. Whatever the future of EdTech in HE may be, it is key that we maintain a critical yet sensitive stance to these developments.

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Dual Digitalization: A Framework for Digital Transformations of Higher Education

*Egil Øvrelid, Bendik Bygstad, Sten Ludvigsen,
and Morten Dahlen*

INTRODUCTION

When the Norwegian government, at the outbreak of the COVID-19 pandemic, closed down the country on March 12, 2020, the University of Oslo used only one week to transition into digital education. Many universities around the world succeeded, more or less, in the same way

E. Øvrelid (✉) · B. Bygstad
Department of Informatics, University of Oslo, Oslo, Norway
e-mail: egilov@ifi.uio.no

B. Bygstad
e-mail: bygben@ifi.uio.no

S. Ludvigsen
Department of Pedagogics, University of Oslo, Oslo, Norway
e-mail: stenl@iped.uio.no

M. Dahlen
Centre for dScience, University of Oslo, Oslo, Norway
e-mail: morten.dahlen@mn.uio.no

(Crawford et al., 2020; Dick et al., 2020). How was this possible? The question is not trivial, because many other knowledge organizations, such as hospitals, were not able to do this.

One answer is that universities were pioneers in using digital technologies, and have spent many years establishing digital solutions. Administrative systems, such as student registers, exam systems, HR, and financial systems, were implemented in the 1980s and 90s and owned by the university administration. Further, there has been a vibrant development of digital solutions for research at the various faculties. Based on this, we note that digitalization of the core university tasks has followed two different tracks, which we suggest to call *dual digitalization*:

- Educational solutions, such as Learning Management Systems (LMS), MOOCs, course websites, and library systems, were gradually implemented after 2000 when they became standardized and run by schools or the IT department.
- Digitalization of subjects was mainly developed locally by academics. In particular, research solutions were often decentralized, usually down to research groups or even individual researchers.

What happened in 2020? First, millions of students were transferred from campus to *virtual classrooms*, using tools such as Teams and Zoom (Crawford et al., 2020). One can imagine that the use of digital resources to lecture facilitates the interaction between student and lecturer leading to new pedagogical forms and institutional routines. Second, both students and academic staff and administration embarked on a fast experimentation and learning process on how to teach, learn, and administer digital education (Dick et al., 2020). The jury is still out regarding the long-term effects, but many researchers assume they will be far-reaching.

To investigate and elaborate on these deep and transformative processes we suggest a framework called *dual digitalization* for analysing these changes at a more fundamental level. Our research question is *how can we conceptualize and manage dual digitalization?*

We proceed by reviewing the research on digitalization, in particular, the two processes of digital logistics and digital subjects and summarize the discussion in a framework. The framework is described as a digital infrastructure with four key elements: digital education, digital subjects, boundary resources, and data. We present our method and findings

in Sects. “Method” and “Findings—Three Phases of Digital Innovation in Higher Education” and discuss the implications of our work in Sect. “Discussion”.

DIGITALIZATION IN HIGHER EDUCATION: IDENTIFYING AND CONNECTING SEPARATE STREAMS

Digitalization in Higher Education

Higher education is a central venue for the creation of new knowledge economies for the twenty-first century (Sam & Van Der Sijde, 2014), and digital technologies are key means for realizing this potential (Selwyn, 2016). At the same time, there is ongoing commercialization of the sector, particularly in English-speaking countries, where strategies from private sector industries are seen as beneficial also for higher education (Commission (EC), 2012; Pucciarelli & Kaplan, 2016). Furthermore, some researchers have argued that universities fall behind other sectors in digitalization (Rodríguez-Abitia & Bribiesca-Correa, 2021). However, many universities have a stable financial structure based on state funding. This means that universities differ a lot and use other models for digital transformation/innovation than those used in other sectors.

Historically, universities were characterized by decentralized organizations to address local and regional as well as professional requirements (Sam & Van Der Sijde, 2014). There is, therefore, an inherent tension between the governments’ ambitions to use centralized strategies dominated by strategic thinking (Pucciarelli & Kaplan, 2016), and the various professional specialties’ need for self-management and control dominated by local optimization (Clark Burton, 1983). Further, digitalization provides a good overview of students’ digital readiness (Kim et al., 2019; Horrigan, 2016). This provides a knowledge base appropriate to tailor the teaching to individual needs (Blayone et al., 2018).

Digitalization of higher education is, therefore, both top-down and bottom-up. While the strategic level has focused on centralization of IT and governance to enable more effective processes, academic staff are more interested in how digitalization can support education and research. The tendency is that the various professions are moving towards data science, to which we will return below.

Digitalization of Education

The lockdowns caused by the corona pandemic gave higher education institutions a disruptive shock and required them to establish communication technologies for digital teaching. Massive Open Online Courses (MOOCs) had a breakthrough in 2012 (Kaplan & Haenlein, 2016; Siemens et al., 2015) and were an established communication technology for online learning before Covid-19 (Siemens et al., 2015). In Scandinavia, MOOCs were mainly developed by academic staff, without a nationally governed strategy (Tømte et al., 2020). Moreover, technically, some of these technologies, such as Zoom (Lowenthal et al., 2020) and Teams (Martin & Tapp, 2019), were already in place but had to be configured to fit mainstream teaching. Furthermore, slightly larger teaching platforms such as Canvas (Wilcox et al., 2016) achieved an even more important role in teaching and learning. Educationally, there is a need to distinguish emergency remote teaching from high-quality online education. While emergency remote teaching is caused by crisis circumstances, high-quality teaching requires longitudinal engagement. This indicates that even if we responded quickly to the corona crisis, adaptations to a qualitative online education are a long-term process (Bond et al., 2021; Hodges et al., 2020).

We regard these issues as an important part of education in enabling flow and interaction between professionals or between professionals and students.

Digitalization of the Subjects

The digitalization of the subjects has taken place over time both in the natural sciences and in the humanities, as well as within the study of law and medicine. The discourse around these digitalization processes is, however, often directed towards strategy (Commission (EC), 2012; Pucciarelli & Kaplan, 2016) or towards learning problematics (Aagaard & Lund, 2019; Laterza et al., 2020). Strategy in the sense that digitalization creates increased efficiency opportunities, through centralized governance. Learning problematics since digitalization affects learning, and enables new learning methods (Aagaard & Lund, 2019; Henderson et al., 2017), as well as learning analytics (Viberg et al., 2018). The latter part of the literature is also occupied with pedagogical and epistemic changes caused by digitalization. Pedagogical changes in that digital

transformation also motivated a pedagogical shift within higher education, moving from teacher-led instructions towards more student-active teaching methods (Tømte and Lazareva this volume). This also includes changing pedagogical conventions regarding what is good teaching when education is transferred from physical to digital (Hermansen and Lund, this volume). Further, extant literature also points to epistemic changes caused by digitalization. With increased digital competency, more long-lasting online engagement is made possible (Hermansen and Lund this volume, Tømte and Lazareva this volume). This is also because digitalization transforms conditions for human activity include education, knowledge creation, and governance (*ibid.*).

We extend this discussion to include the digitalization of the subject towards a digital representation of professional knowledge. Within biology, this could be transforming the field from focusing on natural objects to an orientation towards digital objects (Kulathinal et al., 2020). Within law, this applies to the transition from books to digital sources (Øvrelid et al., 2020). In medicine, it is about how human biology is represented digitally (Elenko et al., 2015), and finally, in the humanities, digital corpuses that enable trawling in extensive amounts of data can be developed (Tangherlini & Leonard, 2013).

Data Science

The digitalization of subjects involves an orientation towards data science that also include domain-specific issues. It has been clear for some years that the digital environment in higher universities, primarily not only in research but also in education, generates enormous amounts of data. Well-known examples are particle physics, biology (DNA sequencing), meteorology (computation of weather data), medicine (precision medicine), and economics (econometrics). The potential for new approaches in research and methods is quite high (Berman et al., 2018; Daniel, 2018). This applies not only to the hard sciences. In the article “Trawling in the Sea of the Great Unread: Sub-corpus topic modeling and Humanities research,” the researchers describe a quantitative approach that allows them to identify previously unknown or historically ignored patterns and literature (Tangherlini & Leonard, 2013).

In education, large amounts of data are also generated, since students leave digital traces in the digital environments that they use. Such developments give a set of new possibilities for analysing students’ activities.

Learning analytics will become increasingly important as a resource for understanding new generations of students and how they choose to navigate in their studies (Viberg et al., 2018). The potential for research, learning, and pedagogy is similarly quite significant.

Summing-Up

As we have seen, higher education research has addressed various types of technology used for digitalization of education and subjects, but many questions remain. As this review has shown, most of the contributions are about specific aspects of digitalization such as learning analytics, logistics, pedagogy, and digital agency, which means that it is difficult to get an overall concept of this digital transformation. From the literature, it is not clear how these streams (digitalization of education and digitalization of subjects) are connected. Neither is it clear what the role of data is in the larger picture. To shed light on this, we propose a conceptual framework.

FRAMEWORK

Based on our review of the literature, we suggest an overall framework, consisting of four elements: digital education, digital subjects, boundary resources, and data (see Fig. 3.1).

Education (Teaching and logistics) is process-oriented and deals with the digital classroom and LMS, the provision of digital materials, such as PowerPoints, video presentations, and the communication of learning outcomes, assignments, and exams.

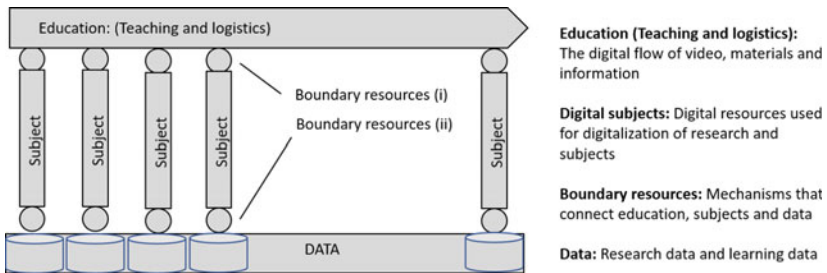


Fig. 3.1 A framework for dual digitalisation (*Source* Authors own)

Digital subjects are knowledge-oriented and deal with domain knowledge. In computer science, this could be programming, in medicine e-learning resources, in economics transactional data for learning econometrics.

Boundary resources are technical and social mechanisms that connect educational processes and data (Ghazawneh & Henfridsson, 2013). We suggest two types of boundary resources. One type (i) is exemplified by LMS functionality, which connects the teaching process with digital subjects. This allows the student to move quite seamlessly from the digital classroom to the digital resources. The other type (ii) connects digital subjects with larger volumes of research data.

Digital data is here primarily research data. It also includes volume data for statistical purposes and educational data for learning analytics. We should emphasize that the framework is conceptual (not a representation of reality), which we use as a sensitizing device in our further investigation.

METHOD

The background is a four-year project that investigated digitalization in higher education. The researchers engaged with faculties such as pedagogics, law, and medicine over time. Building on a sociotechnical approach, we frame our object of study as a *digital infrastructure*. A digital infrastructure is a network of interacting users, technology, and organizations, which is not designed from scratch (Hanseth & Lyytinen, 2010) but evolves through innovation, adoption, and scaling (Henfridsson & Bygstad, 2013). This implies that the evolution of digital infrastructures is a combination of bottom-up and top-down processes, and needs to be managed with this insight. A key aspect of digital infrastructures is the interplay between digital resources at the user level and the interconnected technologies with representations of the domain (Henfridsson & Bygstad, 2013).

Data Collection

The study is a thematic analysis based on interviews with expert informants. To ensure sufficient breadth, we selected key informants from faculties such as Law, Social sciences, Natural sciences, Medicine, Humanities, and Educational sciences. In addition, we interviewed managers and

Table 3.1 Practice area and informants

<i>Digital practice area</i>	<i>Informants</i>	<i>Teaching and logistics</i>	<i>Digital subjects</i>
Law	Professor Librarian	From manual to digital sources of law for teaching	Lovdata
Social sciences	Study leader	Use of Zoom and Canvas during the corona crisis	Statistics in political science
Natural sciences	Professor	The gradual emergence of the digital classroom	Computational modeling
Medicine	E-learning expert	e-learning systems for teaching	e-learning portal
Humanities	Professor	Digital solutions for teaching and research	Digital corpus at NB
Educational sciences	Engineer and researcher	Digital solutions for teaching	Learning analytics
USIT	CIO Manager	IT architecture and digital services of UiO	TSD (services for sensitive data)

Source Authors own

experts from the IT department. The informants were selected for their expertise regarding digitalization. The interviews were semi-structured, lasting 1–2 hours, and focused on the areas of expertise of the informants, and their relation to digitalization. Because of the pandemic crises, several of the interviews were done digitally others physically. In addition to the interviews, we collected available archival materials, such as plans and reports, architectural documents, and web pages (Table 3.1).

Data Analysis

Data analysis was conducted in three steps (Pettigrew, 1985). First, based on empirical material from our study, and the literature, we conducted a chronological analysis of respectively digitalization of teaching and subjects. We framed the two streams as respectively digital flow and digital representation. Second, a thematic analysis of the expert interviews was conducted, identifying key topics and trends. As a part of this, an architectural analysis of the overall digital solutions at the university was conducted, comparing solutions at different levels. Finally, we did

Table 3.2 Data analysis process

<i>Step</i>	<i>Activity</i>	<i>Challenges</i>	<i>Result</i>
1	Chronological analyses	Identifying key events	Chronology of digitalisation at UiO (Fig. 3.2)
2	Thematic analyses	Analysing the two digitalization streams, as well as their interplay and convergence	Findings: Three phases of digitalisation
3	Comprehensive analyses	Analysing and assessing the underlying forces of the digital learning space	Discussion: How to conceptualize and manage dual digitalization

a comprehensive analysis, where we systematically used the framework (Fig. 3.1), to analyse the two digitalization processes; digital education, and digital subjects, boundary resources, and data. Lastly, we responded to our research question by analysing the underlying forces of the digital learning space (Table 3.2).

FINDINGS—THREE PHASES OF DIGITAL INNOVATION IN HIGHER EDUCATION

Based on the chronological analysis, we structure findings into three phases. We follow the development of two separate processes—digital education and digital subjects—how they convergence and become institutionalized in a shared digital space.

Phase I: Two Separate Processes (Unintegrated Digital Resources)

As illustrated in Fig. 3.2 we identified two separate processes of digitalization. *The digital education stream* started in the 1990s with university and course web pages, which gradually were standardized. Around 2005 the first LMS was introduced, but only partly adopted, and never much liked by the students. A new LMS, Canvas, was introduced ten years later, slightly more successful.

The *digital subjects* stream emerged bottom-up, as different disciplines developed digital solutions. Several of the STEM disciplines, such as physics, chemistry, and mathematics, started digitizing their data in the

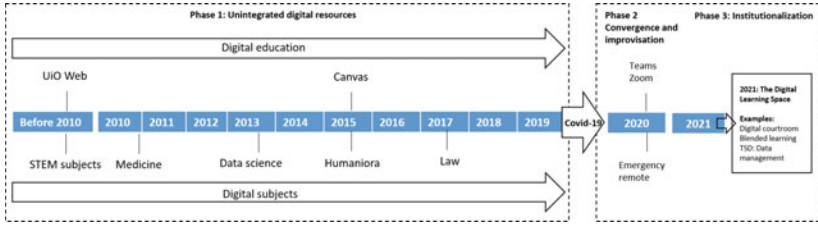


Fig. 3.2 Chronology of digitalisation at University of Oslo (*Source* Authors own)

1980s, some of them (for instance, meteorology) even earlier. But after around 2010 something new emerged, the disciplines became more data-oriented and also algorithm-oriented. An example from biology illustrates this; biology students used to go for walks in the woods to collect and analyse plants. Today they (unfortunately, some might think) sit in the lab, programming gene sequencing in Python. At the University of Oslo, several subjects were digitalized in this period.

Within the Faculty of Medicine, the section for medical informatics was appointed to develop and implement a large e-learning package for medicine students. The initiative arose partly to experiment with new teaching forms, and partly to satisfy students' expectations of digital resources as a part of the learning process.

The initiative does not come from the departments, but from the ground floor: the teachers. We try to involve students in all projects—their view is important because the product is for them, but students are usually far more than “viewers”—they often produce most of the resources under the guidance of teachers. [Professor, e-learning expert]

At the Faculty of Law, a digital resource called *Lovdata* (including all laws and court decisions) was implemented in full-scale teaching. One reason was that the law firms increasingly expected new lawyers to be digitally competent. This system enabled a transition from manually oriented teaching techniques to digitally oriented teaching, learning, and examination. The dean at the faculty emphasized the increased learning mechanisms provided by the system:

The students individualize the material through the semester, through notes, cross-teaching, and so forth. The reward is that Lovdata can be used on the exam. Earlier the students used learning tools no one controlled, there was no clear learning strategy, and the preparation work (done through the semester) was not awarded. Now the practice of law is done more correctly, with less focus on memorizing and more reward given to use of juridical method through the semester. [Professor, Law]

At the Faculty of Humanities, some researchers collaborated with the National Library to create extensive digital corpuses to enable effective searching in vast amounts of data from newspapers, journals, books, and research material enabling a change of focus from concentrating on canonical texts to gain an overview of lesser-known stories and their impact at the time.

The development of digital subjects implied that boundary resources between subjects and data for enabling digital interaction had to be developed. E-learning in medicine implied that physical resources were made digital and that application provider interface (APIs) were used to implement this as a web solution (the e-learning portal). At the Faculty of Law, Lovdata became a digital resource by using APIs to enable the use of digital legal sources and by linking these sources to a specific case in Lovdata. In the Humanities, digital corpuses that facilitated access to digital libraries were created. Digital corpuses are interfaces that enable structured data harvest from extensive amounts of historical sources. These corpuses were potential game-changers in that “sleeping data” was brought into life and used in statistics and such.

Although each subject area underwent extensive digitalization, the data produced were quite fragmented. This was especially true of research data. As a result, the University of Oslo pioneered from 2015 a solution called TSD, a general solution to collect, store, and secure sensitive research data. By 2021, TSD had more than 1000 research projects.

Phase 2: Convergence of Education and Digital Subjects

The situation was dramatically changed with the Covid-19 lockdown in Norway in March 2020. The university closed immediately, and a central task group of deans and CIO made the necessary arrangements for digital classrooms (Zoom and Teams), access and security mechanisms, and online support. Within one week, the whole university operated as a

digital organization, with teachers in home offices and students in campus lodgings or homes at their parents. One expert informant commented:

Most teachers responded by a combination of on-line and pre-recorded lectures on Zoom. Only a few teachers felt that they were overwhelmed by technology, and reported that they were unable to lecture this way. The students have responded positively, accepting the situation, and participating on-line. We do, however, know much less about the students that do not turn up in the Zoom lectures, and we worry that some of them give up. [Professor, Natural Science]

Then a process of improvization and experimentation started, with teachers and students in new roles. First, this process was conditioned by emergency remote education, since Covid-19 and the closedown of the country surprised everybody. Later, lecturers became increasingly knowledgeable and used various educational elements to improve the quality. We interpret this development as a *convergence* between the two streams, i.e., the logistics and digital subjects met in the digital classroom. The integration was made possible by the two types of boundary resources, described in Fig. 3.1. One example is how more advanced use of Canvas offers links between education and digital subjects. Canvas has interfaces towards a range of different educational modules and is as such a rich infrastructure for communication between teachers and students. An example is how Leganto is connected to literature. Leganto is a system for editing and publishing course curriculums. Leganto can be integrated with and be available via Canvas. We can therefore see Leganto as a boundary resource that connects teaching and subjects.

For the students not having to copy articles and borrow books from the library, we register them in Leganto. Then they can access articles and books digitally. This entails a lot of extra work for us [teachers] but makes it easier for the student... They can order books directly from Leganto without using Oria [The library system]. [Professor, Humanities]

Within the Faculty of Medicine, the e-learning portal became a communication channel for subject-related digitalization in teaching, as a central part of a blended learning approach. Resources within the portal were also integrated with examination systems like Question Mark Perception and Inspira.

At the Faculty of Law, Lovdata became central in the education and examination of the students. During the semester, the students had configured their Lovdata profile with knowledgeable resources and were allowed to use this configuration on the exam. This also meant that physical books became redundant. The digitalization of sources of law can also be further expanded to include machine learning and artificial intelligence. The amount of legal sources is gradually becoming quite extensive. This necessitates systematic facilitation so that the lawyer can more easily get an overview of the relevant sources for a specific case. Machine learning and artificial intelligence can contribute to this.

These examples show that logistics and subjects were gradually converged. This was technically supported by boundary resources (such as APIs and other mechanisms) that enabled access to research data in advanced courses. The digital classroom consisted of both logistical elements such as video conference and digital subjects, such as programming lessons and data analysis. One of the informants, however, commented:

This digital classroom consists of many elements, it is Zoom and Canvas and discussion forums, and exercises and data, video clips and simulations. These elements are not integrated, which means that the students have to integrate them. This is not optimal, and I spend considerable time trying to mitigate this. One of the challenges for the students is that the mix of technologies and procedures vary, depending on the subject and the teacher. [Librarian, Faculty of Law]

Phase 3: Institutionalization in a Digital Learning Space

In the spring of 2021, the end of the pandemic was still uncertain, as were the long-term effects of digital experiences. In a nationwide survey (Studiebarometeret, 2021), 71% of Norwegian students replied that the learning outcome was poorer and that 50% felt lonely. Also, 71% felt that the amount of education had been reduced after the lockdown in March 2020, with large variations between institutions. These numbers illustrate, not surprisingly, that the social aspects of both structured education and student life play an important role, and were greatly missed. It is also important to emphasize that the students' at the University of Oslo were as productive as in previous years related to credit production.

Related to digitalization, there were signs that some aspects were in the process of being institutionalized. Our findings indicate some changes that might be lasting. After the convergence of the two streams, teaching and digital subjects will continue as separate processes, but they will be integrated. We see primarily two aspects of institutionalization.

First, the emergence of digital learning rooms. A compelling example from the Faculty of Law is the concept of a digital courtroom. The Digital Courtroom is a comprehensive digital platform for legal learning that includes various stakeholders like students, teachers, law firms, court administration, and judges. This means that Lovdata and other digital resources are embedded in a major reorganization of both education and subject. The institutionalization of Lovdata in teaching means that the student acquires more digital skills as an integral part of knowledge development.

Within Medicine, the e-learning portal is a central part of blended learning practice and a pioneer in identifying how medical objects can be digitalized. The introduction of e-learning in medicine entails a more dynamic organization of teaching that includes the use of digital resources in blended learning. Within the digital humanities, the digital corpus similarly brings forward new institutional practices to conduct research.

“Modern humanities research may use digital corpuses...”... “this enable the identification of new (or forgotten) texts, that challenges the canonical view, or that may bring more contextual insights around the canonical texts”. [Professor, History of Ideas]

Second, we see that the management of data is becoming an area of concern and investment. Research data management has been called a “wicked problem” (Awre et al., 2015) since the fragmentation problem has proved very difficult to mitigate. However, the digital convergence of 2020 has highlighted the need for a more comprehensive and professional approach to research data, in particular as an educational resource. The success of the Tjenester for sensitive data (TSD) solution shows one way forward. Regarding TSD, steps are taken to ensure a gradual transition to a general research data platform for the whole university and perhaps beyond. In parallel, we observe the rise of data science as a general discipline for the university.

DISCUSSION

Extant literature has demonstrated that higher education is an important venue for the new knowledge economies (Sam & Van Der Sijde, 2014), and that digitalization is a key means to realize this potential (Selwyn, 2016). Since knowledge creation at universities is highly decentralized in several research environments (Clark Burton, 1983), centralized strategies challenge the autonomy of the organizing logic (EU Commission, 2012; Pucciarelli & Kaplan, 2016). Transformation of higher education needs to consider this.

Our point of departure was that earlier literature divided digitalization efforts into two separate processes: digitalization of teaching and digitalization of subjects. While digitalization of teaching has concentrated on the educational matters such as the use of Moocs (Kaplan & Haenlein, 2016; Lowenthal et al., 2020; Martin & Tapp, 2019; Siemens et al., 2015; Tømte et al., 2020), and the division between emergency remote teaching and qualitative online teaching (Bond et al., 2021; Hodges et al., 2020); digitalization of subjects mainly focused on strategy (EU commission, 2012; Pucciarelli & Kaplan, 2016), or dataification (Kulathinal et al., 2020; Øvrelid et al., 2020; Elenko et al., 2015, Tangerlini & Leonard, 2013), and the pedagogical and epistemic consequences of this (Aagaard & Lund, 2019, Henderson et al., 2017, Viberg et al., 2018, Hermansen and Lund this volume, Tømte, and Lazareva this volume). Each of these areas of research gives important insight into higher education and selected aspects of digitalization. However few, if any of these studies, take the more integrated perspective on the relationship between the development of a more flexible and innovative digital infrastructure that includes both heavy- and lightweight IT and the development of content and resources in the subjects.

The implication is that we build on this insight but extend and reformulate how educational issues and subject issues converge and transform higher education. Our research question was *how can we conceptualize and manage dual digitalization*. We start by discussing the conceptualization.

How Can We Conceptualize Dual Digitalization?

We conceptualize dual digitalization by our framework (Fig. 3.1). We define dual digitalization as *the process by which educational issues converge with digital subjects, enabled by boundary resources and data*.

We argue that the convergence of the two streams led to a digital transformation of higher education, and finally established a *digital learning space*, integrated by boundary resources. This happened through two steps. First, when the Norwegian government, at the outbreak of the Covid-19 pandemic, closed down the country on March 12, 2020, the University of Oslo needed to respond quickly. The emergency reaction (Bond et al., 2021; Hodges et al., 2020) meant using the lecture material that we had on the subject matter, as well as using lightweight systems such as zoom to communicate the subject matter. The central IT unit (USIT) integrated zoom and outlook to reduce the barriers of online teaching. Lightweight systems like Zoom are easy to adopt. Gradually a reconfiguration of educational modes into a more qualitative hybrid model was made possible.

The transformation lies in the institutionalization of this convergence, which does not merge the two streams, but rather integrates them. Some researchers have warned against this conclusion, arguing that digital technologies are used gradually and pragmatically by the students and that there is no transformation (Henderson et al., 2017). We argue here that this was true before the corona crisis, and in the period right after the covid-19 lockdown, but that the rapid development during 2020 has created lasting and transformational changes. In contrast to the digital transformation of business organizations, which focuses on new business models (Vial, 2019), transformation of universities is more about relationships, and a redefinition of academic domains.

What is being transformed?

First, we argue that the converged infrastructure and the new practices change the relationship between students and teachers, by a redefinition of roles. The traditional 2×45 minutes lecture is less central and is being replaced by shorter, often pre-recorded video sessions. With many digital resources at hand, the role of the teacher will be less direct teaching and more of a facilitator of resources. This is in line with predictions of *digital organization* (Snow et al., 2017). However, we fully agree with Dick et al. (2020) who observed that the increased dependence on online platforms for course management and video conferencing requires these systems to

be as seamless, and inclusive as possible, and added, “The environment in which online classes are offered must be robust enough to be seen to equal that provided face-to-face” (Dick et al., 2020, p. 252).

Second, the campus is changing from a physical location to a hybrid, where the digital classroom will be a permanent feature. The consequences of this remain to be seen, but perhaps the social arenas and personal supervision will be the key affordances of the physical campus.

Third, the increased access to algorithms and data is changing most subjects, in various ways, even redefining the domain. The increased importance of data may also indicate that data science is developing into a foundational discipline.

Theoretically, dual digitalization is a duality that grasps the interconnectedness between digitalization of education and digitalization of the subjects. While the first concentrate on the pedagogical and communicative flow of educational issues, the second focus on the incremental datafication of subjects. The two streams thus have complementary interests and adaptive abilities. Thus, we see dual digitalization as a duality of interdependent although analytically distinct elements.

How Can We Manage Dual Digitalization?

We have argued above that digital transformation of higher education is different from digitalization of businesses. For leaders and teachers, there are several challenges, but also opportunities. While some researchers have been critical of the lack of strategic management of higher education (Rodríguez-Abitia & Bribiesca-Correa, 2021), the rapid response to the Covid-19 crisis shows a way forward. And although there is tension between top-down (of educational issues) and bottom-up (digital subjects) approaches (Pucciarelli & Kaplan, 2016), our findings show that this tension is sound and should be leveraged. However, it should be supported by careful design and implementation of boundary resources. In addition, universities are different in its operation and such variants would need to be included in the strategic development of each institution.

We summarize the key issues in four points. First, the educational processes should be centralized and standardized, while digital subjects should remain decentralized and run by the academic groups, as indicated in the framework, Fig. 3.1. However, the digital infrastructure should appear seamless.

Second, boundary resources, connecting logistics and subjects, and providing access to data should be centralized and standardized. It is expensive and inefficient to do this locally. The consequences of centrally governed boundary resources logically add a lot of burden on the central IT unit. Moreover, the boundary resources must connect the user-oriented services with a digital platform core that stores and maintains all the data. To reach this maturity level, the tension between global and local IT resources needs to be reduced (Bygstad et al., 2019).

Third, the shared digital learning space is still fragmented and creates grave difficulties in facilitating qualitative education based on principles of interaction. The shared digital space, thus, should, for pedagogical reasons, be more integrated. This probably requires a platform structure that can facilitate the integration between different physical-hybrid learning spaces in such a way that the distinction is reduced.

Fourth, research data management is needed to more carefully enable data-driven decision-making, but should be organized as a collaborative effort. The TSD solution is a good example since it demonstrates how platforms can facilitate the management of massive amounts of data.

CONCLUSION

In summary, this paper explores the concept of dual digitalization. We define dual digitalization as *the process by which education converge with digital subjects, enabled by boundary resources and data*. First, we increase the understanding of the phenomena of dual digitalization by emphasizing its role in changing the relationship between student and teacher, its role in the hybridization of the digital and physical at the campus, and the role of dataification in changing the subjects. Second, we describe how dual digitalization can be managed. The logistics process should be centralized while the knowledge-oriented processes should be decentralized. Then, we find that the convergence of the two processes requires appropriate boundary resources, to create the digital learning space.

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PART II

New and Emerging Teaching and Learning
Practices



Educating for Professional Digital Competence? Exploring Teacher Education in a New Learning Space

Cathrine Edelhard Tømte  and *Alexandra Lazareva*

INTRODUCTION: DIGITAL TRANSFORMATION AND NEW LEARNING SPACES

In the Nordic countries, significant digital transformation that impacts the learning spaces has been observed in schools. This means that student teachers are expected to become professionally digitally competent, meaning to gain proficiency in general digital competence as well as subject-specific professional digital competence and professional knowledge and skills (Kelendric et al., 2017; Tømte et al., 2015). The present study sets out to explore one unique classroom, *Undervisningsverkstedet*

C. E. Tømte (✉)

Department of Information Systems and Center for Digital Transformation (CeDit), University of Agder, Kristiansand, Norway
e-mail: cathrine.tomte@uia.no

A. Lazareva

Department of Education, University of Agder, Kristiansand, Norway
e-mail: alexandra.lazareva@uia.no

(‘teaching lab’, henceforth abbreviated as UV) which constitutes a newer initiative within teacher education at a Norwegian university. UV includes a location and resources for varied student-active teaching and to foster professional digital competence (PDC). The location has flexible furnishings and includes resources such as interactive whiteboards, programming and coding equipment, software and apps for gaming, tablets, drones, podcast equipment, scissors, crayons, and pipe cleaners. As a campus-based physical learning space, the UV can facilitate the preparation of student teachers for their future profession. In an international context, this type of classroom is known as a ‘future classroom lab’ and was initiated by policymakers of the European Schoolnet¹ back in 2012. The objective was to develop skills and competences for the future through the exploration of new learning methods in new learning environments (Göçen et al., 2020; Sardinha et al., 2017). Moreover, this initiative aimed to foster active student teaching and learning through redesigning the classroom environments to include various activity zones for different teaching and learning activities, such as focusing on distinct subjects or themes or exploration, production, feedback, and presentation (Arstorp, 2018). Since their advent in 2012, these types of classrooms have spread across Europe, yet they mostly target schools and libraries (Sardinha et al., 2017). However, in 2022, most Norwegian higher education institutions (HEIs) that offer teacher education have established this type of learning environment for student teachers and teacher educators as an integrated part of their campus-based learning environments. Similar initiatives have been observed across the Nordic countries, for example, the FCLab serves as a nationwide network of future classroom labs in Finnish HEIs and teacher education programmes. In Denmark, an FCLab is hosted by the Educational Resource Centre and the Department of Didactics and Digitization at University College Copenhagen. Despite the various technical and practical solutions for the design and organisation of these classrooms, they share some common features: (1) serving as a place for challenging the traditional roles of teachers and students, (2) having different zones that allow for practicing various pedagogical ideas, (3) employing student assistants to manage the space and support the pedagogical and technological needs of the users, and (4) inviting established teachers from the district to come to try out new tools and devices

¹ The European Schoolnet includes 33 European Ministries of Education that aim to bring innovation in teaching and learning to key stakeholders (<http://www.eun.org/>).

for teaching and learning, thereby becoming ‘a resource for the community and not just teacher education’ (Arstorp, 2018, p. 2). Nonetheless, there is still limited research on how these new classroom organisations are perceived and used by teacher educators, student teachers, and local schools. This chapter aims to explore teachers’ perceptions on the promotion of professional digital competence for student teachers in this new learning space/classroom.

Our two guiding research questions are: (1) how teacher educators plan to use UV as part of their teaching and (2) what they expect students to learn in this type of learning space/classroom. The work presented here derives from a broad study with various types of data, including observations of four UV sessions, each with a different group of 15–16 student teachers, interviews with the three teacher educators who accompanied the students, and interviews of the three student assistants employed at UV. This chapter is focused on the interview data obtained from the three teacher educators.

THE DIGITAL TRANSFORMATION OF TEACHER EDUCATION IN NORWAY

In Norway, teacher education programmes are provided by HEIs, which follow national guidelines for teacher education for primary, lower, and upper secondary education. Moreover, these programmes ought to address the ability of student teachers to critically assess when and how information and communication technology (ICT) should be used to promote learning and support learning outcomes. Student teachers should also be taught about ethical and legal issues such as copyright and privacy issues (Kelendric et al., 2017). Teacher education institutions are facing many challenges in trying to provide future teachers with all the skills that together constitute professional digital competence (Lindfors et al., 2021; Olofsson et al., 2021). Moreover, the national authorities have high expectations for teacher education programmes and their capability to meet these new dimensions of the teacher role (Arstorp, 2021). One initiative is the creation of this new type of technology-rich classroom, which follows the guidelines and templates of the Future Classroom Initiative from the European Schoolnet (Arstorp, 2018; Göçen et al., 2020).

UNDERVISNINGSVERKSTEDET AS A FUTURE CLASSROOM LAB

The UV constitutes one higher education institution's interpretation of a future classroom lab. FCLab classrooms usually have different zones to enhance various teaching and learning activities, such as distinct subjects or themes and techniques of exploration, production, feedback, and presentation. At the UV, these zones are called 'stations' that students may move between, either randomly or by following a plan. The UV includes flexible furnishings, including tables and chairs with wheels, that can be easily rearranged for diverse purposes. Nonetheless, the room is often set up with predefined stations maintained by the staff of the Faculty of Teacher Education responsible for the room. Each station offers distinct resources that students can familiarise themselves with. Figure 4.1 demonstrates some of the resources provided by the UV.

The learning environment that the UV offers is designed to help students understand student-active learning in detail through their own experience and practical testing of various resources. Practical testing of various resources and the associated reflections can increase understanding of the knowledge domain in question and strengthen didactic reflections (Rands & Gansemer-Topf, 2017). Such practical experiences are central to how both students and teachers evaluate further use of resources in the

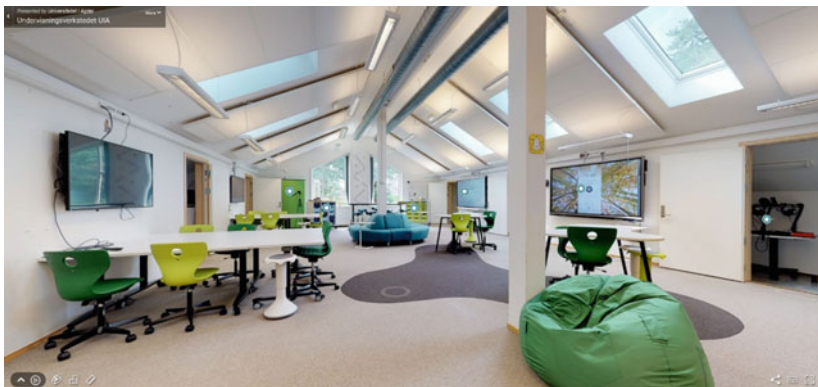


Fig. 4.1 Undervisningsverkstedet (Source <https://my.matterport.com/show/?m=1oCzzy1ExpD>)

classroom setting. While the UV can be used by students for individual activities, the collaboration element is an integral part of the designed learning environment. The ‘open-space’ characteristic of the UV also facilitates interaction across the room.

UNDERVISNINGSVERKSTEDET AND FUTURE CLASSROOM LABS AS LEARNING SPACES

To understand the learning potential that comes with the FCLab and UV, it is worth looking at the emerging research that addresses so-called ‘learning spaces’ (Donkin & Kynn, 2021; Ellis & Goodyear, 2016). These multidisciplinary studies explore how various environments and contexts influence learning. Ellis and Goodyear (2016) suggest three practical and two theoretical arguments for promoting research that addresses the implications of physical environments for learning. The first practical argument is that after the emergence and spread of Massive Online Open Courses (MOOCs) and the related investments in digital infrastructure for providing them, there is a renewed interest in understanding the use of physical space in HEIs for teaching and learning. According to Ellis and Goodyear, it might be worth further exploring the benefits of learning in various physical environments compared with online offerings. While their paper was published in 2016, Ellis and Goodyear’s argument became even stronger after HEIs around the world started puzzling with the ‘emergency remote teaching’ caused by the pandemic. One key issue has been the advantages and challenges of online teaching for teachers without prior experience, and another is the benefits of campus-based teaching and learning (Bond et al., 2021; Karakaya, 2021).

In the second practical argument, Ellis and Goodyear (2016) state that the increasing number of students accessing HEIs requires better use of the physical space of a campus, which again leads to exploring how digital technology may ameliorate this situation. In addition, the growing diversity of student populations together with a pedagogical shift towards more student-oriented teaching methods has put pressure on the use of campus physical spaces (Boys, 2015). Their third practical argument suggests that it could be interesting to investigate how the physical organisation of a campus may foster a closer connection between research and teaching (Furlong, 2012).

In their first theoretical argument, Ellis and Goodyear (2016) suggest that the learning spaces in higher education remain under-researched

and that the existing research has limited theoretical grounding. They also recommend that higher education researchers look to the existing research regarding learning spaces within school systems. We believe this second theoretical argument is particularly relevant for our research on teacher education as we observe students being educated to become schoolteachers who will teach in the physical environments of schools. In the Nordic countries, digital transformations are apparent in schools and other forms of compulsory education and certainly impact their learning spaces. Student teachers are expected to become ‘professional digital competent teachers’ (Kelendric et al., 2017; Tømte et al., 2015) and the UV as a campus-based physical learning space may facilitate the preparation of student teachers for their future profession.

The distinction between *studying* and *learning* is important to consider when describing learning spaces. The term *studying* focuses on students enacting their role as students and fails to address the question of whether the students are achieving any specific learning outcome whereas the term *learning* is focused on understanding, acquiring a skill, or sometimes even changing attitudes. Ellis and Goodyear (2016) argued that university spaces should not only accommodate studying but also support effective learning. Another observation from recent studies on classroom design is that the resources within an environment, such as various digital devices, can enable engagement and collaboration (Jeong & Hmelo-Silver, 2016). Following this, researchers have suggested that learning outcomes can be improved by investing in technology-enabled collaborative learning spaces for professional educational study programmes, as engagement and a sense of professional practice are enhanced by active learning in technology-rich learning environments (Donkin & Kynn, 2021). For professional educational programmes, such as teacher education, this can help student teachers gain insight into how to develop as professionals in their teaching with digital resources.

Ellis and Goodyear (2016) have also been influential to our work in how they, inspired by Sfard (1998) and Paavola et al. (2004), metaphorically approach learning spaces as either learning as acquisition (Sfard), as participation (Sfard), or as knowledge creation (Paavola). For example, thinking of learning spaces solely within the acquisition metaphor would limit their use for just enabling the acquisition of knowledge and skills. With this approach, bringing student teachers to the UV would not necessarily provide them with any practical experience other than testing out diverse tools and resources. Using the participation metaphor, on the

other hand, would allow the space to be used both for ‘enabling social and/or epistemic practice’ (Ellis & Goodyear, 2016, p. 8) and learning how to use available the tools and resources that are involved in the actual practices. In our study, this could mean the methods that student teachers use to master diverse tools and digital resources to experience how schoolteachers can develop professional digital competence. We also suggest that joint reflections between student teachers and their teachers may contribute to new insights.

Learning as knowledge creation suggests the creating of new tools and understanding how ‘to build or reconfigure work/learning spaces’ (Ellis & Goodyear, 2016, p. 8). In the UV, an example of this approach could be when a student teacher constructs a new resource (e.g., podcast, videos, apps) that they can use in their own student teaching, as part of their education, or with future pupils as schoolteachers. Our analyses are inspired/influenced by these three metaphors for learning.

RESEARCH APPROACH: STUDENT TEACHERS WITH THEIR TEACHERS IN THE UV

As part of a campus seminar, teacher educators brought their first-year student teachers to the UV. The students were divided into groups of 15 that each spent one hour in the UV. The aim was to familiarise the students with this new learning space/classroom. The students were just five weeks into their teacher education programme and were yet to attend their first work-based period in schools. Due to the Covid-19 pandemic, half of them had only met online prior to this day on campus, while the other half had had campus-based lectures and seminars from the start of the course. They had their UV sessions in these existing groups, meaning that the two groups only met face-to-face that day while the two groups had met several times on campus prior. The teachers did not further divide the students before they entered the room; they formed groups spontaneously, according to their interests, at the stations prepared for them.

These sessions at the UV had an open character in that the students were allowed to choose among the suggested stations. They did not receive any rigid task or instruction from the teacher or the assistant on what type of conclusion or product they were expected to achieve when the session ended. Instead, they were free to choose how to explore and use the selected tools at hand. Each station included brief instructions

on how to start working with the tools and devices and suggested a few tips that could help the students explore their functionality. The student assistant and the teacher were always available for help.

After the sessions, we interviewed the teachers who came with their students. The two main reasons we wanted to learn the teachers' perspectives and their motivations for bringing their students to the UV were because the UV is new at our university, and to our knowledge, they came without guidelines for their students on how to use UV.

Teacher Interviews

The three teachers interviewed were all affiliated with a joint pedagogy course for first-year students within a teacher education programme (5th–10th grade) at the university. The teachers had varied academic backgrounds; one (T2) had previously worked as a schoolteacher, while the other two had not. The interviews were semi-structured. The first teacher was interviewed both prior to and after the UV session. The second and third teachers were interviewed only after the visit to the UV. The rationale for selecting these teachers was because none of them had 'specialised' in UV as a learning space but all were positive about using it with their student teachers.

The introductory part of the interview included questions about the teachers' expectations for the UV session in terms of the students' learning outcomes. The main part of the interview was developed around the model of inquiry-based learning, and the questions focused on such aspects as the opportunities students receive for inquiry, collaboration, and reflection while working in the UV. It also included questions about how students were prepared and guided during the session. The concluding part of the interview included questions that encouraged the teachers to reflect on the outputs of the session.

The teachers provided their informed consent prior to the interviews. The interviews were recorded and later transcribed. Data from the interviews were coded by both researchers following the content analysis approach (Krippendorff, 2018). We read the interview transcripts with different reading techniques, such as wide and narrow reading (Krippendorff, 2018); based on this, we developed several categories that emerged as relevant to the overall aims and scope of our study, such as initial plans for the session, expected outcome from the session, perspectives on collaboration, use of digital technology, and the like. As part of a

later close-reading process, we identified subcategories to give more detail to the larger categories. For example, in the category regarding initial plans for the session, we identified several subcategories like ‘having fun’, ‘learning about the UV and its resources’, and ‘exploring the new devices and tools used in schools’; likewise, subcategories were developed for the category of expected outcome. The process, categories, and subcategories were discussed and agreed upon by both researchers and thus serve as empirical contributions to our research questions. In the following sections, we will elaborate on these findings. The quotations have been translated from Norwegian to English by the authors.

THE TEACHERS’ PLANS FOR THE UV SESSION WITH THEIR STUDENT TEACHERS

The three teachers (T1, T2, and T3) accompanied distinct groups of student teachers to the UV. Even though the sessions were jointly coordinated and planned by all three teachers, the interviews revealed that their individual plans for the sessions varied. For example, they expressed slightly different perspectives on the organisation of the physical learning space, how they wanted their students to use the UV, and their own role as teachers while visiting the UV. The following sections elaborate on their views of these three aspects.

Teacher Perspectives on the Physical Learning Space, Stations, and Available Resources

None of the teachers were involved in the initial dialogue regarding which resources and tools should constitute the stations for the sessions with this cohort of student teachers. T3 commented that the UV accommodates a lot more creativity and flexibility than the usual classrooms in the university, e.g., that it is easy to move the furniture around to facilitate group work, which is often problematic in typical classrooms. Yet, when in the UV, T3 observed that the available stations and their devices did not fully meet her expectations, and she would have preferred additional devices:

Yes, I would have liked for them to try the VR since they really wanted to, and I also wanted them to try the green screen. Neither were available, nor was the 3D printer. I think many of them would have enjoyed trying more, especially the green screen, because it can be linked to absolutely everything.

Thus, it appears that T3 wanted her students access to explore more devices than those that were selected for the UV session, and she saw the specific devices that she mentioned as being highly relevant and/or attractive for them or herself. This was not the case for T1 and T2, who were both content with the available stations and the devices attached to them. Moreover, T1 considered the pre-selection of the stations suitable due to time constraints, saying, *‘there are so many stations that students will not have time enough to visit all of them during this first session’*. Time limitations were also addressed as a challenge when offering students access to various stations. T1 said, *‘Now they had to choose two stations. When I’ve come before, we had them try more stations, but it has to do with time’*.

Exploring the UV with an Inquiry-Based Learning Approach

All three teachers highlighted that they wanted the students to approach the UV and its stations with an inquiry-based learning approach, and T3, pointing out that the UV as a learning space itself offers this type of approach, said, *‘The UV is exploratory in its nature [...]. We certainly do not have that in a seminar room’*. While an explorative and inquiry-based approach is grounded in interests and curiosity towards new situations and/or resources, the teachers had slightly different perspectives on this type of approach. All three teachers underscored that the explorative, inquiry-based, and playful approach towards digital resources and UV as a learning space is especially important for first-year students. T2 did not push the students in any clear direction but rather chose to let them explore the possibilities and constraints that come with this type of learning space. The aim was to observe how they engaged with the resources and to help them reflect on why they did so. For example, students with interest in gaming chose the gaming stations, and students interested in media production chose the podcast station. T1 observed, *‘there are so many stations that not everyone can attend all of them. That’s why it’s a bit individual. They can choose what they think is interesting’*. However, after the first round, and before the students were to select a new station, T3 chose to guide the students’ next steps. When the second round started and the students were to select new stations, T3 motivated them to choose differently and to familiarise themselves with something new. T3 argued, *‘they cannot just choose the one thing they really want. They must experience a variety, and they will get some*

time for that at each station. Everyone will have access to five stations'. In contrast, T1 maintained the students' availability to choose stations according to their own interests, without any steering from her, and did not consider their choices as a problem at all:

Those who wanted one thing went there, and those who wanted another went there. And it continued like that for one round after another. It went so smoothly that I have not reflected on it. One would think it could be a problem, but it has not been. If one station is full, they see it and adjust. Yes, it has just fixed itself.

Nonetheless, T3 said that by maintaining this perspective, students may end up with just doing what they like to do, and not challenge themselves to learn something new. This approach may hold students in the role of pupils, instead of future teachers, and T3 sees her duty as a teacher educator to raise awareness about changing roles and perspectives. Interestingly, none of the teachers stressed how the UV as a learning space may foster/motivate this inquiry-based learning, other than claiming that the UV fosters 'an explorative approach' (T3). We believe that this experience might be interesting for the students and their teachers to reflect upon. T3 touches on this when she talks about how she could have prepared her students for their UV session as a collaborative event, rather than as individual for each student, and whether this could have triggered a more collective inquiry-based approach and experience:

I think I should have prepared my group to collaborate. Because I had not done that. It might have been different then. Maybe I could have talked a little more with them about it being exploratory, so not just going in as students to have fun.

Nevertheless, the students paid attention to their peers' activities across the stations. This was possible due to the open-space and organisation of the stations across the room. Here, T3 noted that the students were curious about what their peers were doing, especially when there was laughter across the room. Unfortunately, movement around the classroom between stations was limited due to the Covid-19 restrictions.

The time students spent in the UV was primarily used for the inquiry-based activity itself, while most of the reflection took place in later classroom sessions. In her classroom teaching, T1 facilitated students'

reflection on the devices they experienced in the UV and how they could be helpful for teaching the students' specialisation subject, both during their student teaching and in their future work as teachers. T1 noted that a short reflection round was carried out at the very end of the UV session, but that reflection was more for concluding than extending. T3 believed that the UV sessions could be improved by connecting them more directly to pedagogical concepts, e.g., inductive and deductive learning. T3 also said that the reflection could be improved by, for example, giving students questions to guide them while working. In general, T3 thought it would be beneficial for students to receive a concrete task that would make their work more focused.

All three teachers agreed that the UV should be used more often during a semester and not just as a one-time experience. They suggested that it would be a useful hands-on addition for seminars on specific topics (e.g., class leadership or station teaching).

Teacher as Facilitator or Spectator?

The teachers approached their students differently while in the UV. While T1 and T2 held themselves in the background and let students move around to choose stations as they liked, T3 was more actively involved in their station choices and motivated them to choose 'something new'. T2 explained that her reason for staying at the back was that she wanted the students to explore the devices without intervention, saying, 'It's better that I just put myself in the background. They often get a little uncomfortable when we're there, right? They become a little different'.

While the teacher interviews did not provide any direct information on their own PDC, it might be worth considering whether T1 and T2, who kept in the background and left the experiences to students (with some limited support from student assistants), themselves have limited experience with the digital technologies available at the stations. Compared with T3, they were less critical of the actual devices and tools available, and they were also less involved in how their students oriented themselves in the UV. Our data do not give any clear answers to this, but it might be interesting to investigate whether—or how—teacher educators' own PDC impacts their approach towards using the UV.

TEACHERS' EXPECTATIONS OF HOW STUDENTS ARE TO LEARN IN UV

While all three teachers shared an overall understanding of the purpose of the session, namely for students to learn about the UV as a learning space, other motivational factors for bringing them emerged during the interviews. Those were (a) to engage with the digital technology and devices available in schools, (b) to prepare them for their first student teaching placement, (c) to enhance their pedagogical–technical competence, and (d) to simply have fun and socialise. In the next paragraphs, we will elaborate more on those motivations.

How Can the UV as a Learning Space Promote Collaboration and Socialising?

T1 and T2 underscored the importance of their first-year students having fun in this first UV session. Their main argument for this was the pandemic-caused limited access to campus-based socialisation. One said, '[...] just having fun together is important. It does not always have to be linked to subjects. It's possible to have subgoals and get to know each other. They have just started'. T1 and T2 further supported this by saying that the students had told them they enjoyed being in the UV 'for fun'. As previously mentioned, T3 was more hesitant to this open approach, and she would prefer her students to have some tasks while in the UV, since this could have triggered reflection about the benefits of the UV as a learning space:

I actually think they would have gotten more out of that session if they had been given a task. Not one they should answer in writing, but a task that had made them think a little more while they were doing things. They probably had a bit of a 'fun room' attitude when they went in. Yes, that's it. You're supposed to have fun there somehow. But maybe with a little more framework and some requirements, they can think about some concepts that they should be able to articulate afterwards. I think they would have gotten more out of it.

T3 exhibited a more thoughtful approach towards the UV as a learning space. She tried to connect the session to her students' teacher education programme in terms of improving their digital proficiency and demonstrating how the UV may enhance their reflections on their roles as future

professional digital competent teachers. Moreover, T3 underscored the value of the UV as a learning space for students to get a taste of how to organise classrooms to foster collaboration and learning dynamics:

It is a room that invites creativity and I think it is the flexibility, that there are wheels on both chairs and tables, and you can move around. This is super important in relation to cooperation and in relation to being able to think a little outside the box.

Exploration of New Digital Devices and Tools Used in Schools

All three teachers highlighted how the UV as a learning space with a variety of devices and resources may help students learn about digital technologies in schools. They also agreed that it is important for students to visit the UV before their first student teaching placement, so that they can prepare themselves for how technology-rich classrooms may look. T1 said, ‘There are many fine technological things in school. Therefore, this visit has been scheduled before the internship period’. T2’s perspectives align with T1 as she claims:

We started discussing what they [students] learn in practice at schools, and what they learn when they are at [name of the university]. I think it is important that they should know a little about what exists in schools, and not feel that they are lagging in relation to the field of practice. Even if the students are young, and it is only a few years since they went to school themselves, a lot has happened [in the schools].

T3 presents a more nuanced view on the digital state in schools, in that not all schools are fully equipped with digital technologies. She states that ‘The [digital] equipment in the UV does not exist in Norwegian schools in general. Of course, some schools have invested in some equipment, but others have not’. She also commented on how the student assistants working in the UV helped the students to see how they can improvise if the schools they work at do not have the technology they planned for their practice. She said, ‘I think it was very nice that the student staff pointed out that it is possible to make a podcast with your mobile. You do not need a studio or microphones’. Thus, T3 added another perspective to how students may develop their PDC, namely by learning how to improvise when technology fails or is not available as planned for.

T3 pointed out that the reflection at the end of the session was quite challenging, possibly because some of the students saw the room as a ‘future classroom’ rather than representative of the equipment currently available in schools. Thus, some of the students focused on the limitations rather than the possibilities of the different technologies in terms of their practical effectiveness in schools. The role of the student assistants was very important here as they emphasised how much can be achieved without expensive equipment. T3 also emphasised the role of the student assistants as role models for the first-year students to look up to. The student assistants were in their second or higher year of their studies.

How to Use Digital Devices Pedagogically (and Technically)

All three teachers highlighted how teaching with technology includes elements of digital and content competence crucial to the development of PDC. T1 said, ‘We want them to receive as much training as possible in how to facilitate good teaching with the help of digital technology, [...] think carefully about why they do it, and what it is they want with it’. In other words, as part of their teacher training, student teachers need to learn about, and experience, how various digital resources work for pedagogical purposes. Their future professions as teachers will include mastering these resources and adapting them to their own teaching. Thus, the UV serves as an important space for becoming familiar with the educational technology that is already implemented into school contexts. The teachers all agreed that UV visits should be integrated into teacher education so that active trial and error and an explorative approach towards digital resources become embedded in the study programme, as framed here by T2, saying, ‘It takes some time to master the technical sides, and that’s why I think it cannot be just a one-time event. It must be repeated. [...] We do not use things we do not feel safe about’.

One observation is that some of the students did not see how the different technologies could be used for teaching their subject (which may have been related to the nature of the subject). This is another reason why T3 emphasised that the reflection needs to be more connected and relevant to the practice. T3 also pointed out that it is important for the students to first experience all of the available opportunities before they can make an informed judgement of whether a certain technology can be used purposefully in their subject.

DISCUSSION: NEW LEARNING SPACES AND NEW WAYS OF LEARNING?

In this chapter, we have studied a newer learning space at a university campus that is available for the teachers and students of a teacher education programme, and we have discussed how teachers perceive and plan for the use of it. Our aim was to explore teachers' perceptions on how to promote professional digital competence for student teachers in this new learning space/classroom. Our guiding research questions were:

1. How do teacher educators plan for the use of the UV as part of their teaching?
2. What do they expect students to learn in this type of learning space/classroom?

We studied teacher educators' perceptions about how this future classroom lab can promote and enhance professional digital competence by holding interviews with three teachers who had organised sessions at the UV with their students. From our analysis of the interviews, we suggest several areas for discussion, which may lead to important practical implications when it comes to further use of the UV in terms of fostering professional digital competence, and to the design of inquiry-based teaching and learning sessions. In the teachers' plans for the visit to UV with their students, we observed a joint motivation for an inquiry-based approach and allowing for students to move around in the classroom without any guidelines or prepared group organisation. Two of the teachers planned for students to explore the tools and resources that they found most attractive, thereby motivating them to pursue an interest-driven approach, while one teacher used a more steered approach. This teacher was more inclined to align the UV session to the educational programme.

The teacher interviews regarding their expectations for the students learning in the UV revealed that they expected students to familiarise themselves with the UV as a learning space and to try out at least two of the stations offered to them. They also encouraged the students to reflect individually and collectively on their experiences at the stations, but this task was given less attention due to time constraints. If we look at the three metaphors of learning (acquisition, participation, and knowledge creation) and how they can help us to understand the UV as a learning

space, we can recognise elements of all three metaphors in the ways the teachers expected and experienced students' learning in the UV. For example, the acquisition metaphor could be recognised when the student teachers managed to test out the diverse tools and resources within the stations without being fully capable to start using the tools. For example, some students were reported by their teachers as being 'puzzled' about what to do at the station rather than doing what they were expected to do. Nonetheless, according to the teachers, most of the students learned how to use the tools and resources, practised them while at the station, and consequently gained some knowledge on what provides (technical) PDC for schoolteachers. The participation metaphor may serve as a good description for most of the students in that the UV setting enables social and epistemic practice. During their visit, few students had sufficient time to construct new resources for later use, yet some students that attended the podcast station managed to produce a podcast which they saved for later teaching purposes. Here we might interpret their activities in the UV as knowledge creation in that the students were able 'to build or reconfigure work/learning spaces' (Ellis & Goodyear, 2016, p. 8).

CONCLUSION: UV AS A LEARNING SPACE THAT FOSTERS DIGITAL COMPETENCE

This study on the digital transformation of teacher education and the establishment of a new learning space such as the UV exemplifies how professional educational programmes may develop and change as a response to the digital transformation of society. It also demonstrates the value of campus-based learning and how this may be facilitated through the construction of new learning spaces. This is an important observation after some years of emergency remote online teaching and learning caused by the pandemic. Moreover, our study demonstrates that the digital transformation of teacher education affects the role of the teacher and the syllabus, and it may also cause epistemic changes (Lund & Aagaard, 2020). For example, our study indicates that integrating UV sessions with the pedagogy course could be beneficial. This could lead to the design of more authentic tasks that would demonstrate the relevance of the different educational technologies to student teachers and allow them to practice a chosen technology for a specific teaching objective. Instead of treating UV sessions as one-time unique events, the UV could be used several times during the semester in connection with the topics discussed

in the actual course. Moreover, students could be asked to work at the UV to complete compulsory course assignments as part of the curriculum.

This study also shows that this transformation is linked to governmental guidelines and strategies on digitalisation of HEIs, as in our case with the national curricula of teacher education, the national strategies and plans on digitalisation of higher education, and the institutional responses to them. A key message here could be that the HEIs need to support the transformation with adequate digital infrastructure and new learning spaces that enhance active student teaching and learning, as in the case of future classroom labs. Teacher educators should be included in the planning and integration of these kinds of learning spaces/infrastructures and learn how these learning spaces may foster future PDC for teachers. If the teacher educators themselves do not see this potential, this expensive infrastructure may come to no good use. Nevertheless, this study has demonstrated the potential inventiveness that can come from providing digital infrastructure that allows for collaboration with stakeholders outside the university, such as schools, schoolteachers, and school owners.

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Beyond Implementation: Enabling Sustainable Transformations of Digital Teaching and Learning in Higher Education

Hege Hermansen and Andreas Lund

INTRODUCTION

This chapter examines the following question: What does it take to develop sustainable, digitally mediated teaching in higher education? The COVID pandemic sparked what is often referred to as the largest digitalisation experiment in the history of higher education. However, transitions to online forms of teaching were shaped by the context of the crisis. Higher education institutions (HEIs) had to quickly produce emergency solutions to maintain basic educational services. On the face of it, this was a highly successful operation. From a large number of countries, reports emerged that HEIs had managed to put in place measures that allowed

H. Hermansen (✉)
Oslo Metropolitan University, Oslo, Norway
e-mail: herm@oslomet.no

A. Lund
University of Oslo, Oslo, Norway
e-mail: andreas.lund@ils.uio.no

students to continue their studies. Some notable exceptions included courses centred on practical skills, and contexts where the infrastructure for internet was limited (Al-Kumaim et al., 2021; Tsang et al., 2021). Multiple concerns also emerged around academic, social and technological challenges. However, the turn to online teaching allowed a vast number of students to complete their studies in spite of a global pandemic.

As the higher education sector is moving from a pandemic “crisis mode” to a “new normal”, questions are being raised about the limitations of the initial move to online teaching. Some argue that the situation has been characterised by “solutionism”, in which responses were shaped by the need to provide quick fixes to a sudden crisis (Ajjawi & Eva, 2021; Teräs et al., 2020). During the initial months after the outbreak, key questions included which digital platforms to use, how to provide academic staff with the minimum level of skills to teach online, and how to engage students in online learning environments (Dhawan, 2020; see also special issue Goedegebuure & Meek, 2021). These are important issues, but in the heat of the moment, they appear to have been dealt with disconnected from broader questions about how digitally mediated teaching can be addressed in a long-term and more strategic perspective.

At the time of writing, more than two years have passed since the global closure of HEIs. Academics are now pointing to the need for more sustainable approaches to enabling and enhancing digitally mediated teaching and learning (Sharma & Sharma, 2021; Zuo & Miller, 2021). This chapter is a contribution to this debate. More specifically, the chapter examines how the notion of *sustainable transformation of digital practices in higher education* can be conceptualised and point to practical implications for HEIs. We use the term “sustainable” to denote particular characteristics of change processes, in which change efforts are to some extent irreversible and impact multiple levels of human activity. The key question informing our discussion is: How can sustainable transformation of digital practices in higher education be conceptualised and enacted?

We explore this question in two ways: The first is a theoretical discussion where we delineate the concept of sustainable transformation of digital practices, building on cultural-historical approaches to teaching and learning with technology (Kaptelinin & Nardi, 2006; Rückriem, 2009). Based on this discussion, we develop an analytical framework aimed to support empirical research and educational development.

Second, we illustrate the value of this analytical approach with reference to the experiences of one faculty at a research-intensive university in Norway, with specific attention to how this faculty addressed the COVID crisis over a period of nearly two years. As is the case with many Nordic universities, this is a tuition-free, state-funded HEI located in a country with a high rate of digital adoption. However, its teaching practices are to a great extent informed by its long history of face-to-face, “traditional” university pedagogies, which greatly impacted the emergency response to the pandemic (Langford & Stang, 2020).

Methodologically, our examination of this faculty draws on narrative inquiry (Mertova & Webster, 2019) to recount some key stages of the faculty’s work with digitally mediated teaching over a two-year period. The narrative is primarily based on document analysis and qualitative interviews with the deanship, and emerges from a broader data material that documents the faculty’s work during this period. Our analytical focus is not to evaluate whether the measures adopted were successful, but to trace the faculty’s effort towards transformation from crisis management to strategic and sustainable approaches to digitally mediated teaching. The narrative therefore focuses on key stages of an almost two-year trajectory of developmental work at the faculty, with analytical attention to how these efforts aimed at integrating institutional practices and organisational levels that typically are de-coupled in HEIs.

SUSTAINABLE TRANSFORMATIONS OF DIGITAL PRACTICES: A THEORETICAL PERSPECTIVE

Theoretically, we adopt a cultural-historical perspective that emphasises the contextual and situated nature of technological development. We start by briefly outlining some implications for how we conceptualise the development of digitally mediated teaching and learning.

First, the development of digitally mediated teaching and learning in HE is viewed not as a simple problem that can be solved via “solutionism” (ref), but rather as a complex and wicked problem (Bower, 2017; Rittel & Webber, 1973) that involves deeply conflicting motives among the involved actors (Engeström et al., 2022; Haapasaari & Kerosuo, 2015; Lund & Vestøl, 2020). As e.g. Rückriem (2009) and Lund and Aagaard (2020) have shown, digitalisation cannot be reduced to instrumentalism because it transforms conditions for human activity. How we

come to knowledge and under what conditions emerge as epistemological questions that accompany digitalisation.

The definition of digital transformations outlined in Chapter 1 (cf. Pinheiro, Tømte, Barman, Deg & Geschwind) takes *disruptions* that trigger *strategic responses* as the point of departure. An implication is that sustainable transformation does not merely involve single initiatives aimed at resolving concrete challenges, for example, in the form of the introduction of new tools or increased capacity development among university teachers. By contrast, we use the term “sustainable” in “sustainable change” to indicate a more profound nature of transformation. Drawing upon cultural-historical theory (Lund & Aagaard, 2020), we highlight three further characteristics as significant of such change processes. First, sustainable change indicates a transformation *of both the problem situation and of actors*. When breaking out of critical situations, the use of resources (material/digital, discursive, social) involves a learning experience that leaves the actor(s) with new insights, whether transforming the original situation was successful or not. “Learning”, in this case, does not primarily denote the acquisition of a distinct knowledge or skill, but rather a qualitative change in how the problem situation is perceived and conceptualised.

Second, sustainable change indicates a transformation that is in some ways irreversible. For example, irrespective of actors’ specific positions on the use of technology in higher education, the COVID pandemic has radically changed the terms of the debate about how technology should be used to support teaching and learning in the higher education sector. The terms of this debate cannot simply be “rewinded” to November 2019 even if the corona virus is eradicated. However, whether this qualitative shift in discourse implies a corresponding change to educational practices is highly uncertain and remains an empirical question.

Third, sustainable transformation of digitally mediated teaching involves the integration of multiple organisational levels and institutional practices of HEIs. In the Norwegian context, the development of digitally mediated teaching has often been driven by what we might term individual “pioneers”, who have typically engaged in significant innovation but without being connected to institutional and organisational practices at their institutions. Hence, the practices they generate are prone to disappear with them. Longer-term, strategic change therefore requires a much stronger degree of embeddedness in institutional and organisational structures.

To conceptualise this notion of change further, we draw upon Hedegaard’s notion of institutional practices (Hedegaard, 2014), which has been adapted for the analysis of HEIs (Hermansen, 2019). A cultural-historical approach assumes that human and societal developments operate along different trajectories that intersect in complex ways. In HEIs, this implies that a range of developmental processes are continuously being played out at different levels of the organisation, and within different institutional domains. Hedegaard offers an approach to analytically account for this complexity through different planes of analyses, recounted in an adapted version below in Table 5.1.

Below, we outline these planes of analysis in more detail. A key point is that they are empirically interwoven and that change at one level is insufficient for sustainable transformation. On the one hand, individual educators will rarely achieve institutional impact beyond transient novelty and “pockets” of innovation at the HEI. On the other hand, change initiatives on the societal or institutional levels need acceptance, legitimacy and enactment among academic staff for new practices to take hold. Sustained transformation emerges from the interaction between levels.

Table 5.1 Planes of analysis

<i>Structure</i>	<i>Meaning structures</i>	<i>Empirical example</i>
1. Society	Societal traditions	Social conventions governing the purpose of higher education Political legislations such as national reforms, privacy regulations, procurement legislation
2. Institution	Institutional practices	Epistemic, educational, organisational and governance practices of higher education institutions These practices shape how digitally mediated teaching is developed but can also be challenged by new conventions for digitally mediated teaching
3. Social situation	Activity settings	Recurring activities in HEIs, such as university teachers planning, enacting and evaluating digitally mediated teaching
4. Person	Actions	A university teacher introducing new digital tools and practices in a course module

Source Adapted from Hedegaard (2014)

Societal Traditions

Societal traditions refer to conventions that govern higher education on a societal level. This includes legal and political frameworks, but also societal notions about the purpose and role of HEIs. Digitalisation has to some extent challenged but also renewed established notions of what a university “is”. For example, the earlier introduction of MOOCs led to predictions both about the fall of the university as an institution, and about the democratisation of knowledge and extension of knowledge to marginalised groups (Rhoads et al., 2013; Whyte, 2015). Both of these predictions engaged with notions of what the university should be and how technology can challenge those assumptions.

Institutional Practices

Institutional practices are understood as routinised actions that are historically shaped, value-laden and reproduced through engagement with conceptual and material artefacts (Edwards, 2010; Hedegaard, 2014). In cultural-historical theory, institutional practices represent a notion of structure, which stands in a mutually constitutive relationship to human agency. These institutional practices are associated with formal and informal demands that provide direction for human actions (Edwards, 2017; Hedegaard, 2014).

We analytically delineate some key institutional practices that have been widely documented in research on HEIs (Becher & Trowler, 2001; Blackmore, 2007; Knorr Cetina, 1999; Maassen et al., 2017; Mårtensson et al., 2014; Stensaker, 2018). In brief, these can be summarised as (1) *pedagogical* practices related to supporting student learning; (2) *organisational* practices regulating universities as organisations; (3) *epistemic* practices associated with developing and safeguarding knowledge; and (4) universities’ *governance* practices, which in the Norwegian context remain characterised by relatively horizontal structures and “soft” modes of governance.

Pedagogical practices are conventions governing teaching and learning in higher education. They include established conceptions of “good teaching”, ideas about appropriate student and teacher roles, as the roles that digital tools should play in teaching. New digital practices may challenge such conventions. For example, many academics experienced that the lecture format did not work well when it was directly

transferred to zoom. The phenomenon of “teaching to black screens” has been much discussed and exemplifies how digital platforms can fundamentally transform the conditions for social and academic interaction (Damsgaard, 2020; Heaton, 2020). More generally, a shift from face-to-face to online teaching requires the re-contextualisation—and potential transformation—of existing teaching practices (Royle, 2021).

Epistemic practices refer to the practices that characterise the production, organisation and safeguarding of knowledge in higher education (Knorr Cetina, 1999), and are specific to particular disciplines and professional fields. Existing research has highlighted how digitalisation of teaching and learning involves the re-contextualisation of epistemic practices (Lund et al., 2014). For example, in legal education, practically all data sources now appear in digital format, opening up for machine learning and artificial intelligence to accompany human epistemic work. In STEM subjects, simulations allow for work with models in which a high number of variables can be manipulated without any fear of unwanted real-world consequences. When languages go online, languages emerge as multimodal texts that provide opportunities and affordances that differ radically from linear texts. In the social sciences, the sheer amount of available data, often in the form of competing narratives and contested information (US elections and Covid vaccine debates are prime examples), results in the need for new forms of expertise for assessing, organising and analysing data.

Thus, the need for epistemic recontextualisation is another reason why a linear understanding of “moving teaching online” is problematic. For university teachers, epistemic recontextualisation requires creative and constructive work with their respective knowledge domains as they design forms of digitally mediated teaching. However, the subject-specific dimension of technologically mediated teaching and learning has received limited attention in higher education.

Organisational practices refer to the organisational roles and routines that characterise HEIs. Over the past decades, the organisational and administrative management of academic work has significantly increased in complexity. Such routines are typically justified with reference to quality assurance. However, it is well documented that tensions can emerge between the organisational and academic logics of HEIs (Shields & Watermeyer, 2020). One example is the introduction of quality assurance systems, which has been found to become administrative systems

that are de-coupled from academic work (Stensaker et al., 2011). This de-coupling of systems, which is widely documented in HE literature, presents a potential challenge to sustainable approaches to digitally mediated teaching. If innovative practices are to have a transformative effect and span beyond pioneering individuals, they need to be supported by the organisational infrastructure of HEIs, including routines related to ICT support, exam regulations and the organisation of academics' working hours.

Finally, *governance practices* in HEIs are complex in the sense that historical modes of self-governance and collegial autonomy co-exist with formal governance structures. Educational leaders who set out to support collective change processes related to technology-mediated learning will often be in situations where they have relatively limited formal authority and few explicit incentives to present to teachers (Ellis & McNicholl, 2015). In an international perspective, academic autonomy remains strong in the Nordic region. Hence, the ability to navigate taken-for-granted conventions of informal leadership while simultaneously mobilising formal incentives—typically a challenging balancing act—is key to facilitate transformative change processes. This further complicates initiatives aimed at transformative change, since this balancing act requires a strong combination of interpersonal skills and the capacity to navigate complex formal and informal political systems (Fig. 5.1).

At the general level, two questions are important to conceptualise the role that these practices play in the development of digitally mediated teaching. The first question is to what extent new approaches to the use of technology challenge or align with existing institutional practices. This is likely to significantly impact developmental efforts, both in the short and long term. The second question is to what extent, and how, these institutional practices interact. Universities have for a long time been characterised as loosely coupled systems (Weick, 1976), which implies that these institutional practices can exist somewhat independently of each other. However, they may also interact in ways that create tensions and contradictions. The characteristics of this interplay, or lack of such, can be important for how conditions are created for the development of digitally mediated teaching.

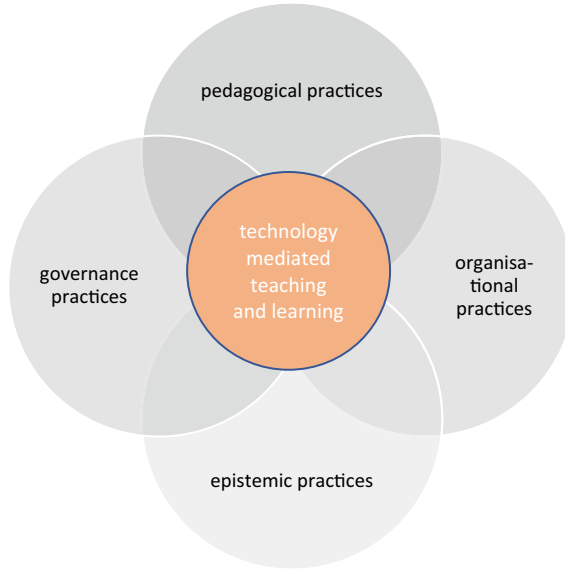


Fig. 5.1 The intersection of institutional practices in the development of digitally mediated teaching (*Source* Authors own)

Activity Settings

Activity settings refer to the recurrent activities that typically characterise HEIs. These include the planning and enactment of teaching, research group meetings, work in laboratories, the development of academic texts, and different forms of supervision. As staff and students engage in such recurrent activities, they simultaneously reproduce and renew the institutional practices of universities. The COVID pandemic significantly challenged the constitution of activity settings related to teaching. For example, the use of zoom drastically changed the conditions for teacher–student interaction, and the turn to digitally mediated teaching more generally altered the established routines for planning and enacting teaching.

Actions

Actions refer to the specific things that staff and students say and do as they go about their work at HEIs. The important point here is that these actions are shaped by the demands of a range of institutional practices, which are sometimes disconnected and sometimes conflicting. To understand how academics respond to expectations of increased digitally mediated teaching, we therefore need to understand how they interpret and respond to such demands and how they enact different forms of agency to shape the conditions of teaching in HEIs.

We find Hedegaard's planes of analysis to be useful because it provides a heuristic to conceptualise the intersections of different analytical layers of HEIs. This provides analytical depth to the more general assertion that HEIs are complex institutions that are notoriously difficult to change (Jónasson, 2016; Niedlich et al., 2020; Stensaker, 2018), also with regard to the development of digital practices (Aagaard & Lund, 2020; Selwyn, 2014; Stensaker, 2018). The model also outlines the relations between individual agency and the institutional practices that shape how such recurrent activities at HEIs are carried out. This allows us to analytically and empirically examine the mutual interactions between structure and agency, and hence to examine how change occurs. Finally, attempts to develop digitally mediated teaching and learning can be understood as efforts to align divergent approaches to teaching and learning that have strong historical and cultural roots. Hedegaard's planes of analysis provide a perspective for exploring what this work of re-alignment might involve for actors working in HEIs, through multi-level analysis.

TOWARDS SUSTAINABLE TRANSFORMATIONS? EXPLORING CHANGE EFFORTS AT A FACULTY OF EDUCATION

In this section, we illustrate our analytical approach through the empirical example of change efforts undertaken at a Faculty of Education at a Norwegian, research-intensive university. At the national level, the Norwegian response to the pandemic was quite swift. One month after the lockdown, a survey showed that 80% of HE educators used Zoom or similar video conferencing applications, even though 70% of the informants had not done so previously (Langford & Stang, 2020). More generally, the Norwegian population broadly complied with state measures against the pandemic. As outlined in Chapter 1 (cf. Pinheiro,

Tømte, Barman, Deg & Geschwind), HEIs are state-funded and offer tuition-free education, which also carries significance when analysing the Faculty's response to the emergency. The pandemic did not constitute an immediate or long-term loss of revenue for HEIs. These facts correspond with the image of Norway as a high trust—low accountability society (OECD, 2013), which can be said to characterise all of the Nordic countries.

The Faculty is an interesting empirical case because it attempted to move away from solutionism and “quick fixes” towards more strategic responses to digitally mediated teaching quite early after the outbreak of the pandemic. We start by briefly outlining the overall context of the development processes carried out by the Faculty. We then discuss some selected change dynamics, with a view to demonstrating (a) how the different planes of analysis in Hedegaard's framework interacted in this process, and (b) how different institutional practices informed the change efforts.

Our data material on the change process at this Faculty includes relevant documents, interviews with two Deans at the Faculty, six interviews with selected academics and a group interview with student representatives. In this chapter, we zoom in on the part of the data material that provides the most insights into the strategic changes efforts. This includes relevant documents (task force reports, faculty web pages), qualitative interviews with two Deans at the faculty, and participant observations of meetings conducted by different task force groups that worked towards developing digitally mediated practices at the faculty after the outbreak of the pandemic. Relevant documents and other documentation include a Canvas space for the entire Faculty (an outcome of the first task force), which aimed to support the exchange of digital approaches to teaching and learning; the final report written by the second task force, which responded to the call by one of the Deans for more strategic approaches to digitally mediated teaching; and the web site of a Faculty support unit that was established to support the ongoing change efforts. Combined, such documentation provides insights into the strategic choices that were made by Faculty during the period of spring 2020 to fall 2021. The interviews with the two Deans were conducted in the fall of 2021, and generated their retrospective reflections on the Faculty responses to the covid pandemic. This is interesting because, as Pinheiro et al. point out (confer Chapter 1), we know little about how HE management attempts to shape bottom-up processes of digitally mediated teaching.



Fig. 5.2 Overview of key stages in development process (*Source* Authors own)

As was the case around the world, the Faculty converted to online teaching in response to the COVID pandemic. The initial period of the pandemic was oriented towards crisis management and finding solutions to the immediate demands of the lockdown of HE institutions. However, the Deanship soon started emphasising the need to engage in more strategic and longer-term thinking around digitally mediated teaching. This resulted in a series of initiatives that aimed to develop more comprehensive and sustainable approaches to digitally mediated teaching at the Faculty. Figure 5.2 provides a brief outline of some key events in this process. In the next section, we account for the qualitative changes in these responses, as they developed over time towards more strategic approaches that aimed to foster sustainable change.

INITIAL RESPONSES TO THE CRISIS SITUATION

The initial response was characterised by managing the rapid conversion towards online teaching. This included how to introduce Zoom at the Faculty, providing staff with infrastructure such as headsets, cameras and digital boards for handwriting, and emergency competency development for staff in the use of new technologies. According to the Dean, this initial crisis management phase took a couple of weeks and went, in his words, “surprisingly smooth”. In this phase, digitally mediated teaching was primarily addressed as a technological-logistical issue, combined with a focus on developing organisational support structures for digitally mediated teaching such as adequate IT support. Staff competence development was aimed at supporting individuals to master the technological affordances of new digital tools (Level 1 in Table 5.1), as opposed to addressing these tools as mediators of established pedagogical and epistemic practices (Levels 2 and 3 in Table 5.1).

Shortly after this phase, a task force was established to address key issues in digitally mediated teaching. The task force consisted of the Vice Dean of Education, Heads of Education at the three departments at

the Faculty, and a member of the university's Centre for Teaching and Learning in Higher Education. The task force cooperated with the Dean-ship to further develop the technical infrastructure at the Faculty, such as equipment needed for so-called hybrid teaching, where some students are on campus while others attend via Zoom. Through this work, they extended efforts towards developing the organisational infrastructure to support new practices, but the infrastructure was primarily addressed from a tool perspective. The task force discussed what kind of digital tools were needed, but they did not go into depth on how such tools would interact with established pedagogical or epistemic practices.

The task force also attempted to facilitate collegial support among academic staff, with an aim to create support structures that could help teachers address emerging pedagogical and epistemic issues. Typical questions included how to facilitate student–teacher interactions on Zoom, how to actively engage students in online learning environments and how to use the university's learning management system (Canvas) in ways that could support the teaching carried out on Zoom. Some meeting arenas for experience sharing had already been established at one department, and such practices were extended to other units. The task force also established a Canvas space accessible to all staff members, to facilitate the asynchronous sharing of experiences and resources. The Canvas room included links to relevant resources, discussion threads, and practical examples of online teaching from the different departments at the Faculty.

Through such efforts, attempts were made to re-frame staff members' orientations towards the new tools. Whereas the initial transition had focussed on the technical aspects (such as where to “click” to share a screen or organise break-out groups in Zoom), attention was now directed to more underlying questions, such as how tools like Zoom could support student learning. The Canvas space also represented an attempt to support more collectively based approaches by making individual experiences visible, and to connect individuals with organisational resources such as web pages with technical and pedagogical content. In these ways, the relationship between the digital tools and established institutional practices were placed more strongly on the agenda. This implied a shift in focus from individual competencies and approaches (Level 1 in Table 5.1) to established practices of teaching in the context of specific knowledge domains (Levels 2 and 3), as well as efforts to connect academics with newly developed organisational support structures (Level 3). However,

these efforts did not reach all staff members, and there was significant variation in how initiatives aimed at experience sharing were taken up at the departmental levels.

During the spring of 2020, the Deanship, in collaboration with the task force, also initiated measures to support the social and academic learning environment for students. Students were assigned to groups intended to provide social and academic support. Financial resources were made available for the departments to hire student assistants that could support online teaching, for example by facilitating chat conversations and break-out rooms in Zoom. These efforts were based on the recognition that established learning environments for students had been greatly disrupted. However, according to the Dean, both staff and students struggled to mobilise these emerging practices in ways that were experienced as meaningful for students, and there continued to be disruptions between individual actions, activity settings and the new emerging organisational structures for social and academic support (Levels 1–2–3 in Table 5.1). The students reported significant variation in the organisation and interaction of the support groups, and the student assistants were only used to a moderate extent.

CONTINUED EFFORTS TOWARDS MORE SYSTEMIC CHANGE

In the fall of 2020, the Deanship intensified efforts to develop more strategic and transformative approaches to digitally mediated teaching, with increased attention paid to multiple levels of the organisation. In the interview, the Dean also emphasised a desire to address what he saw as a significant variation across the Faculty in the quality of online teaching, and that simple “delivery” of content online needed to be replaced with more rigorous pedagogical course designs. A new task force was established, consisting of the Vice Dean of Education, one academic staff member from each department, and a member of the university’s Centre for Teaching and Learning in Higher Education. In this task force, the academic staff members were selected due to their track record of working innovatively with teaching.

The mandate of the task force asked them to produce a “strategic policy paper” which could address three challenges: (1) lack of coherence across offline and online sites of learning; (2) the need to strengthen students’ opportunities for online collaborative learning; and (3) the need

to strengthen social relations among students in online learning environments. This mandate reflected a more in-depth focus on transforming existing pedagogical and epistemic practices, by targeting key aspects of teachers' work such as course design, the facilitation of subject-specific collaboration in small student groups, and an increased emphasis on students' learning environments. In theoretical terms, it represented a clear ambition to connect several levels of analysis in Table 5.1, by more tightly coupling institutional practices and emerging representations of digitally mediated teaching both at the levels of individuals and activity settings. Online teaching was no longer to be treated as an emergency measure. In the interview, the Dean stated that he purposefully asked the task force to develop a *strategic policy paper* in order to balance short- and long-term needs at the Faculty. He also emphasised the need to de-privatise teaching practices at the Faculty, and to re-frame notions of autonomy from an individual to a collective perspective: "we need to preserve our autonomy not as private individuals, but as an academic collegium". In the interview, the Dean also emphasised how this strategy entailed bringing the epistemic dimension of digitally mediated teaching to the fore. This was a topic he had been concerned with for several years, reflected in his research and in opinion pieces published in higher education newspapers. From his perspective, the characteristics of specific knowledge domains needed to be the driving force behind digitalisation of teaching. In this way, he positioned epistemic institutional practices as a key factor shaping digitalisation efforts at the Faculty.

The task force delivered their report to the Faculty the first week of December 2021. For each point addressed in the mandate, the task force outlined overall approaches based on relevant research and practical implications. This document situated ongoing digitalisation efforts at the Faculty in relation to existing research on teaching and learning, thus positioning these efforts not as a question of emergency measures, but as a developmental process that should be research-based and founded on key insights from educational science. In theoretical terms, the process was connected both to institutional practices and general societal expectations that emphasise teaching at universities as a research-based activity. This document thus spanned all levels represented in Table 5.1. The document also explicitly framed digitalisation efforts as being shaped by, and having the potential to shape, existing pedagogical and epistemic practices at the Faculty. The task force also added a fourth point to their mandate, which addressed organisational and institutional factors for digitally mediated

learning. In this section, the task force addressed organisational routines and practices that they considered necessary conditions to support the other recommendations in the report. This intervention from the task force represents an effort to more closely link organisational practices (Level 3 in Table 5.1) with the emerging activities that were developing around activity settings and individual work with teaching (Level 1 and 2 in Table 5.1).

The Deanship decided to follow up on several of the recommendations from the task force. In January 2021, a new Dean took over the Faculty, and the Deanship was expanded with an additional position entitled Vice Dean for Innovation and Digitalisation. Based on the report of the previous task force, a new unit was also established with the overall objective of supporting innovation and digitalisation in education. This unit emerged from the immediate needs caused by the pandemic, but was established with more longitudinal and strategic goals in mind: fostering research-based innovation in the Faculty's study programmes and developing student learning and academics' teaching practices via digitalisation. The establishment can be said to represent a further institutionalisation and strategic approach to digitalisation efforts. This initiative was complemented by relatively extensive changes to the digital and physical infrastructure of several classrooms at the Faculty, that served to strengthen the material and technological support structures for digitally mediated teaching. Finally, in the interview, the new Dean emphasised that lasting changes had taken place not only in the organisational infrastructure but also in established pedagogical practices, exemplified through the transformation of campus-based exams to home-based, digitally mediated examinations.

DISCUSSION

Following this condensed narrative of a two-year trajectory, we return to our key question of how sustainable transformation of digital teaching practices in higher education can be conceptualised and enacted. The case of this Faculty does not provide any firm conclusions about the extent to which long-term, transformative change was achieved, and this remains an empirical question as change efforts are still ongoing. However, this empirical example illuminates some key points about how transformative change can be understood and pursued in the context of HEIs pursuing strategic change in the area of digitally mediated learning.

First, this case exemplifies a shift from techno-centric and emergency measures towards attention to more fundamental questions about how digitalisation efforts shape—and are shaped by—established pedagogical and epistemic practices of universities. A key concern of the first Deanship and the task force working during the fall of 2020 was to produce a tighter coupling between the emerging use of digital tools and established principles for teaching. This included directing attention to how digitally mediated teaching challenges key aspects of teaching processes, such as social interactions with and among students, representations of disciplinary knowledge and approaches to curriculum development that align on-campus and online teaching activities. These efforts recognised the shortcomings that phenomena such as “black screens” on zoom represented, namely a failure to re-contextualise existing pedagogical and epistemic practices in the transition to online teaching.

Second, these efforts to link digitalisation to pedagogical and epistemic practices were also institutionalised in organisational and material terms: in action plans (the task force), in the establishment of a new unit dedicated to connecting digitalisation and innovation, and in the material and technological development of classrooms to facilitate new forms of teaching. New forms of technical support structures were also established, together with online resources that highlighted pedagogical principles for digitally mediated teaching. Whereas the long-term results of such interventions remain an empirical question, the approach of the Faculty recognises the importance of organisational routines and support structures for the sustainable transformation of teaching.

The Deanship’s change efforts also included a shift in governance practices. A key concern for the first Dean was also to promote more collective approaches to teaching, in which autonomy was positioned within academic communities rather than individual staff members. This involved the establishment of new routines that de-privatised emerging digital teaching practices and supported experience sharing among academics. The Dean also temporarily shifted some decision-making authority away from the departmental level up to the faculty level. A general implication is that the pursuit of transformative change in higher education is likely to, at least to some extent, challenge established power relations and the established division of labour in formal and informal decision-making authority.

In summary, our narrative inquiry has revealed how a range of institutional practices and activity settings (Levels 2 and 3 in Table 5.1)

were subject to strategic transformative efforts at the Faculty. The relations between individual agency and the institutional practices that shape human activity, were persistently and systematically addressed by the Faculty in an attempt to “couple” systems that have historically been decoupled (Weick, 1976). We propose that these attempts to couple systems and pursue changes across different planes of analysis (confer Table 5.1) is at the core of enabling *sustainable* and *transformative* change. It is sustainable because it aims at a change that is not easily reversible, and transformative in the sense that both the problem situation at hand and the actors involved undergo qualitative changes in the course of the development process.

Third, the combination of our conceptual framework and narrative inquiry makes it possible to unpack human agency as a driver for sustained transformation. While the pandemic materialised as an exocentric intervention and with an impact that initially stunned educational institutions, our study reveals how human agency became an increasingly powerful resource in breaking out of dilemmas and impasses. All through the narrative, we trace efforts that span Levels 2, 3 and 4 in Table 5.1; agency that is sometimes executed individually but more forcefully in collaborative and collective/institutional modes and with a future-oriented and strategic objective. The interplay between structure and agency at the Faculty demonstrates actors who “may challenge and transform situational contexts of action themselves (although, given the contingency and uncertainty of interactions, the consequences of their actions cannot be controlled and will often ‘feed back’ in ways that necessitate new agentic interventions)” (Emirbayer & Miche, 1998, s. 994). Thus, there is no end point of transformative efforts.

While transformative agency with strategic aims can be identified at this Faculty, there are also indications that the accumulated impact of the pandemic on educational systems has brought about non-reversible changes on an international level (Schleicher, 2020). While these are not pursued in the present chapter, it indicates how the Faculty’s local efforts are embedded in the larger societal level (Level 1 in Table 5.1). Analysing counter-pandemic agency across nationally diverse institutions would seem to emerge as a pressing research initiative. We have not pursued in detail how the individual student or teacher has perceived or been agentive in transformative efforts (but see e.g. Börgeson et al., 2021; Byrom, 2020). This, too, calls for further research in order to get a truly multi-level representation of sustained transformations in HE.

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Engendering Transformative Learning in an Institutional xMOOC

Ammar Bahadur Singh 
and Halvdan Gaute Søvik Haugsbakken

INTRODUCTION

The rise of online learning has caused higher education institutions (HEIs) to think differently about how they can provide and expand online learning opportunities for students. Massive open online courses (MOOCs) have become a popular alternative for HEIs when it comes to flipping their existing pedagogical practices in online learning environments. The debate around the transformative potential of MOOCs has not faded. Research has suggested that MOOCs can become agents of change and innovation in HEIs because they foster self-directed, flexible and ownership-taking learning (Ossiannilsson et al., 2016). They

A. B. Singh (✉) · H. G. Søvik Haugsbakken
Department of Education, ICT, and Learning, Østfold University College,
Halden, Norway
e-mail: ammar.b.singh@hiof.no

H. G. Søvik Haugsbakken
e-mail: halvdan.haugsbakken@hiof.no

can promote meta-literacy (e.g., critical thinking, reflection about one's goals, roles and action) because learners get opportunities to engage with learning resources both independently and collectively (Mackey & Jacobson, 2022). Learners can develop 'action confidence' (the willingness and courage to act to learn because of the changes in one's previously held thinking) throughout their participation in the MOOC learning process, which is reflective of transformative learning (epistemological change in learners) (Pomeroy & Oliver, 2020). This action confidence is developed when students engage in course resources to make sense of and expand their conceptual understanding of learning content and problems. Thus, we argue that engagement with resources (both human and nonhuman) is required to develop, expand and advance a conceptual understanding of learning contents and problems, leading to a gain in transformative learning experiences.

Several studies have indicated the transformative potential of MOOC resources for student learning. For example, Beer (2019) observed that students demonstrated transformative learning because the activities of listening and watching audio–video resources and posting questions and comments on discussion forums promoted reflection and discussion of students' understanding. However, such activities remained at the lower levels of Mezirow's (2003) seven stages of critical reflection (disorienting dilemma and self-examination). In the Norwegian context, research studies drawing on cultural-historical theory (CHT) have indicated that resources in institutional MOOCs offer opportunities for student teachers to enact and develop their transformative agency (ability to take action to develop knowledge and solve problems) because they reflect on their prior knowledge, pitfalls in their understanding, devise strategies and take actions to solve their problems, enhancing their professional digital competence (Brevik et al., 2019). Student teachers also develop their digital identity and agency in learning by engaging with resources because they learn how to use and engage in those resources to develop a conceptual understanding of learning tasks (Engeness, 2020; Engeness & Nohr, 2020; Engeness et al., 2020).

According to Robson (2018), digital identity is a dynamic and ongoing process of sense-making and reinterpreting one's beliefs, values and educational experiences that develops through one's engagement in work activities in a new learning context. Students can develop their digital agency by understanding how to engage in the dynamic process of sense-making and interacting with the digital learning environment (Engeness,

2020). Thus, it can be argued that digital identity and agency evolve by engaging with learning resources in a digital learning environment and fostering transformative learning experiences.

Therefore, it is crucial to examine how students perceive and experience learning resources in MOOCs as a failure to engage students, along with how this then results in massive student attrition rates (Borrella et al., 2022). Understanding how students prefer learning can contribute to designing and offering good learning resources for promoting student engagement in an online learning environment where students remain remotely located, often unknown to fellow learners and instructors. The current study examines students' perceptions and experiences of engaging in learning resources of an institutional xMOOC and discusses to what extent those perceptions and experiences contribute to fostering transformative learning experiences by analysing postcourse surveys of the MOOC. The following research questions were addressed:

1. *How did students perceive and experience their engagement with various course resources (e.g., video tutorials, assessment tasks, guidance and feedback) in the institutional xMOOC?*
2. *To what extent did students' engagement with course resources contribute to transformative learning?*

The chapter is organised as follows: First, we establish a research perspective and outline a theoretical perspective and current research on the learning potential of MOOCs in Norway. Second, we account for the research methodology used in the present study. Third, a data analysis section follows, which describes the learning design of an institutional xMOOC before quantitative and qualitative data are analysed to show its effectiveness. Fourth, the findings are critically assessed in the discussion section. Finally, suggestions are recommended to promote students' engagement in institutional MOOCs, leading to the promotion of transformative learning experiences.

DEFINING A RESEARCH PERSPECTIVE

To address how our study might contribute to new knowledge or reaffirm research knowledge, a research perspective must be defined. Over the past few years, we have observed that researchers have discussed

and analysed to what extent MOOCs can foster learning. It addresses how students engage with learning resources and research knowledge, resulting in different approaches and research streams.

A series of studies has resulted in the emergence of research streams exploring *student engagement in MOOCs*. Students' engagement in MOOCs focuses mainly on the observable aspects of students' activities in the courses. For example, based on students' activities in the discussion forums of FutureLearn MOOCs, Ferguson and Clow (2015) found four patterns of engagement: sampling (exploring the content of interests), auditing (watching most of video tutorials but not completing all assessments), disengaging (completing assessment in the beginning but slowly dropping out of the course), and completing (completing most of the assessments). Other studies also considered the amount of time students devote to learning course materials (Lu et al., 2017), such as watching videos, answering quizzes, submitting assignments and posting and answering in discussion forums (Kuo et al., 2021; Sun et al., 2019).

According to Kala and Chaubey (2022), students' engagement with the essential resources of MOOCs, such as synchronous sessions, prerecorded lectures, self-directed learning, discussion forums, peer assessment and breakout groups, can influence their learning. However, they found social engagement (engaging in interactions with peers and instructors) to be more significant for students' learning. Social engagement is not a subtype of behaviour engagement (e.g., watching videos, posting questions, completing assignments, etc.) but an essential dimension of MOOCs when it comes to capturing student interactions with instructors and peers (Deng et al., 2020). Therefore, to ensure active student engagement, MOOC instructors should create enticing presentation materials, lecture videos, assignments and online course environments in which students can enjoy the course content, which can move students from mere sharing and comparing information to greater exploration of facts and trends (Meet & Kala, 2021).

Research studies have documented that social, interactive and collaborative learning activities contribute to fostering students' learning, but these activities remain low in MOOCs (Daniels et al., 2016; Gamage et al., 2020). A systematic review of engagement and desertion in MOOCs by Estrada-Molina and Fuentes-Cancell (2022) indicated that fostering individualised tutoring, interactivity and feedback are the main challenges in promoting students' engagement in MOOCs. Alemayehu

and Chen (2021) reviewed a body of literature (2014–2020) on the challenges of engagement for instructors and students in MOOCs; they found that most studies emphasised fostering learners' engagement and interaction in MOOCs because these are fundamental to motivating students to complete MOOCs. The literature has shown that learner engagement is an essential issue in minimising dropout rates in MOOC learning environments. However, quantitative analysis is the most commonly adopted research approach for studying learners' engagement in MOOC learning; Alemayehu and Chen (2021) suggested using a qualitative design to understand learners' engagement challenges so that their feelings can be heard and observed.

However, engagement is a multidimensional construct, including four interrelated components: behavioural, cognitive, emotional (affective) and social (Deng et al., 2020; Ogunyemi et al., 2022). Behavioural engagement refers to observable behaviour, such as watching videos, doing quizzes, posting on discussion forums and completing assignments. Most MOOC studies focus on students' behavioural engagement (Deng et al., 2020), which is the fundamental driving force behind students' learning achievement and persistence (Gengxin & Sheng, 2018). Emotional engagement refers to a sense of belonging, enthusiasm, liking and attachment, but it is limited to students' MOOC discussion forum activities (Deng et al., 2020). Cognitive engagement in MOOCs has been explored by examining students' abilities to engage in self-regulated learning activities. Cognitively engaged students can efficiently self-regulate their learning because they can post and answer questions in discussion forums, but there exists an interrelation between social interaction and cognitive engagement in MOOCs (Galikyan et al., 2021). Here, social engagement refers to participants' willingness to connect, socialise and interact with course participants in MOOCs (Daniels et al., 2016). Discussion forums remain the main spaces and tools for the above-mentioned types of engagement (Ogunyemi et al., 2022). Students' poor engagement with learning resources remains the primary cause of students' dropout rates in MOOCs (Setia et al., 2022).

Another stream of the literature has focused on how video lectures can promote students' engagement in learning. Engeness et al. (2020) examined how *videos* might support pre- and in-service teachers' learning in an institutional xMOOC (2014–2018) aiming to develop digital skills and enhance students' agency in the Norwegian context. Their study found three patterns of participant interactions with videos: '(a) seeking

explicit information about how to engage in learning, (b) seeking assistance while engaged with the assigned tasks, (c) support to compare learning outcomes with the requirements outlined in the videos' (p. 1). Video tutorials might provide three types of orientation support, as conceptualised by Galperin (2023): orienting (knowing how to engage in learning), executive (performing an action) and controlling (reflecting upon understanding) to help students structure their learning processes by using appropriate mediational tools. Most participants used videos for executive support and preferred videos of 5–10 minutes in length. As the findings suggest, videos can enhance participants' capacity to learn in digital settings and might promote learners' transformative digital agency (Engeness et al., 2020). Another study examining how preservice and in-service teachers engaged in an institutional xMOOC suggests that most participants were involved in learning information given in written text, while other participants engaged in learning by watching video tutorials and audio texts (Engeness & Nohr, 2020). Small private online courses can invoke student teachers' transformative agency because the resources in the course allow students to reflect on their understanding, recognise challenges, develop actions to deal with challenges and commit to solving their problems (Brevik et al., 2019).

In contrast, we can observe a research stream that attempts to establish student engagement and the use of learning resources by employing *learning theories*. In CHT, teaching and learning can be seen as a mutual, social and collaborative process of developing and advancing a conceptual understanding or meaning-making (Vygotsky, 2012). Teachers should create a learning environment by arranging resources that can scaffold students' learning, leading to a promotion of their proximal development zone (maximum learning potential) through engagement, interaction and collaboration (Vygotsky, 2012). According to Vygotsky, for the curriculum to be developmentally appropriate, the teacher must plan activities that encompass what students are capable of doing on their own and what they can learn with the help of others (Karpov & Haywood, 1998). The content of xMOOCs can be taken from systematically organised academic concepts that provide an intellectual reference for learners to interpret and reconstruct their everyday event-related experiences, which Vygotsky (2012) referred to as spontaneous concepts. However, it might be challenging—or almost impossible—for instructors to assess what an individual student can do with or without instructional support in a MOOC learning environment because of the exceptionally high

teacher–student ratio, along with the fact that some students never engage in interaction (Chua et al., 2017). Students might fail to develop scientific concepts because of the lack of their engagement in an interactive learning environment, so learning can result in the superficial recapitalisation of adult minds in MOOCs. Learning to develop a deep understanding or systematic understanding of learning tasks demands students' engagement with learning resources because students assess their understanding, figure out pitfalls in their understanding and take actions to develop a thorough understanding with the support of learning resources (Singh, 2022).

Like Vygotsky, Dewey (1933) also emphasised providing learning resources as scientific reference materials to guide students' learning. Dewey's statement is that adults' mature experiences are valuable materials to help learners interpret their experiences and provide guidance and direction, but these materials should be questioned and their usage justified (Dewey, 2018). The adult mind, in the words of Dewey (2018), refers to an organised body of scientific knowledge that creates a learning environment for interaction by which teachers know students' level and way of understanding from where they begin the educative process. These ideas echo Vygotsky's notion of the zone of proximal development, which emphasises creating an interactive learning environment where teachers can assess what students can do independently and what they can do with adult assistance (Vygotsky, 2012). These scholars emphasise that learning resources should help instructors and students assess their current level of understanding and assist them in guiding further directions and possibilities. Vygotsky emphasised that higher psychological functions, such as voluntary attention, reasoning, critical thinking, and higher-order thinking, develop through engagement with resources in an interactive, social environment (Veresov, 2021). As an organised body of scientific knowledge, xMOOCs might create a learning environment offering diverse resources for students' engagement, leading to fostering students' questioning, reflective thinking, communicative and collaborative activities.

Research studies drawing on Vygotsky's CHT have suggested that student teachers in institutional xMOOCs develop their professional digital competence by enacting their transformative agency (taking action in developing understanding and solving learning problems while engaging in challenging learning tasks) (Brevik et al., 2019). In other studies that draw on Galperin's (1989) pedagogical theory, the expansion and development of the pedagogical domain of Vygotsky's CHT

(Engeness, 2021) suggest that teachers and students can develop their digital identity and agency in learning by positioning themselves as active agents in knowledge practices in institutional xMOOCs (Engeness, 2020; Engeness & Nohr, 2020; Engeness et al., 2020). Digital identity and digital agency develop or are developed when students and teachers are in online learning and designing learning environments. (Engeness et al., 2020). When students engage in learning resources, for example, videos (Engeness et al., 2020) or textual information (Engeness & Nohr, 2020), they learn their usefulness in developing their understanding and solving their problems. They also learn how to use and engage these resources for learning, enacting and developing agency—the capacity to meaningfully engage in learning (Engeness, 2021). By engaging in online collaborative learning sessions in institutional MOOCs, students can enact and develop their coagency in learning (Singh, 2022). Therefore, we argue that engagement with learning resources is fundamental in gaining transformative learning experiences. Students learn to make sense of learning tasks, reflect on their prior understanding and take action to develop and deepen their knowledge through engagement and social discourses. Transformative learning is a process of meaningfully engaging with learning resources individually and collectively, here aiming to develop and advance a conceptual understanding of learning problems (Engeness, 2021; Stetsenko, 2017).

Engagement has two interwoven functions: one promotes interaction with resources, and interaction enhances internalisation (growing mentally or enhancing the capability to solve problems) (Engeness, 2021; Vygotsky, 2012). According to Galperin (1989), to transform external social action into internal mental action, learners should go through some dialectically evolving pedagogical activities such as orientation (knowing how to engage in activity), materialised action (using concrete materials to develop understanding), communicated thinking (debating), dialogical thinking (reflection on the target understanding), and acting mentally (developing a mental image or enhanced capability that enables learners to apply the learned concepts to other similar situations) (Engeness, 2021). Agentic learners can also orient the learning processes in their own ways by their own means (Singh & Engeness, 2021). Online learning environments provide a vast array of resources for academic references. Learners engage privately with their own colleagues, peers or others for learning; they can use other interactive learning resources, such as video interviews or podcasts with experts on particular topics, and the MOOC is a rich

learning environment because it contains various resources for supporting learners. For example, video resources can guide academic references for developing scientific concepts. Those learners looking for direct, face-to-face interaction can choose to engage with peers and instructors in an institutional xMOOC that aims to develop students' professional digital competence.

However, scholars have questioned the transformative capabilities of current MOOC-driven teaching and learning practices because of their emphasis on information transmission rather than the innovation of pedagogical approaches (Reich, 2020). Reich (2020) argued that implementing innovative pedagogical design thinking is required to realise MOOCs' disruptive and transformative potential. Engagement, interaction and collaboration lead to innovation and transformation (Harasim, 2017). Therefore, it is crucial to investigate how students perceive the existing learning resources in the MOOC offered by HEIs to develop their professional knowledge because this can contribute to designing and offering good learning resources for promoting students' engagement in an online learning environment where students remain remotely located and often unknown to fellow learners and instructors.

One of the notable differences between the conventional MOOCs offered by big MOOC providers such as Coursera, edX and FutureLearn and institutional xMOOCs (e.g., ICTPED MOOC) is that students' learning activities are rigorously followed and addressed by course instructors and students in and through discussion forums and online guidance meetings with teachers. Because of the lack of teacher engagement in students' learning, there is a large number of student drop out in conventional MOOCs (Mehrabi et al., 2020; Singh & Mørch, 2018) as opposed to accredited institutional xMOOCs. However, in institutional xMOOCs, instructors have the responsibility to follow, assess and guide students' learning activities so that students can enhance their performance and complete the course. Therefore, they remain active in discussion forums, especially on Facebook and Canvas, to answer students' questions and arrange meetings to help them solve their problems. Students are also offered online voluntary learning meetings with instructors, as well as with fellow students in institutional MOOCs. There might be several factors regarding the successful continuation of the institutional xMOOCs. For example, flexible learning opportunities, instructors' ambition to build a digital professional identity, good teacher support and supervision of students' learning and added professional

advantages, as well as digital competence development, are some of the key focus areas in teacher education in Norway. Sustained government support for expanding digital teaching and learning practices, such as MOOCs in Norway, here initiated with support and funding from the government (Tømte et al., 2020), can be one of the crucial factors to the continuity of formal MOOCs.

To sum up, the literature has highlighted students' engagement in MOOCs as one of the crucial aspects of students' learning and reducing dropout rates. Most studies are quantitative and focus mainly on the behavioural aspect of students' engagement, but social engagement remains fully unexplored. Engaging with various resources might also promote students' agency in learning, but these studies remain scant. The current study aims to explore how students perceive and experience their engagement with various resources in institutional xMOOCs, leading to fostering their transformative learning.

METHODOLOGY

Methods and Data

Postcourse surveys were constructed and administered by the course management team as the primary data materials used to explore students' perceptions and experiences of learning with various learning resources in the ICTPED MOOC. We selected the surveys from 2016 to 2021, which generally contained 33 questions with significant variations in response rates—the minimum response rate was 12 and the maximum 142. Nearly half of the survey questions had both closed-ended (quantitative) and open-ended (qualitative) data. The quantitative surveys were based on Likert scale rating scales (5–6). Therefore, the study can be called a longitudinal survey because almost the same questionnaires were used every year to collect data about students' perceptions and experiences of learning in the ICTPED MOOC (Creswell & Creswell, 2018). However, some questionnaires were not found in the postcourse surveys from 2016 to 2018. Therefore, some selected survey data contained information only from 2019 to 2021. For qualitative survey data (open-ended responses), we selected the postcourse survey of the ICTPED MOOC 2020. The survey questions selected for the analysis as provided in Table 6.1.

Table 6.1 Survey questions selected for analysis

-
1. What is your total assessment of your course?
 2. How did you engage in learning in the course?
 3. How important were the assignment tasks?
 4. How important were the video resources for your learning?
 5. How important was the feedback you received from your peer (peer review)?
 6. How important were the multiple-choice questions for you?
 7. How important was the individual guidance you received from course instructors or facilitators?
-

Source Authors' own

Data Analysis

Seven questions from the postcourse surveys were selected for analysis. The primary purpose of selecting 7 out of the total 33 questions was that the questions chosen were found to be more suitable to gain insights into students' perceptions and experiences of engagement in different learning tasks provided to them to support their learning. Because the responses to quantitative survey questions were extremely unevenly distributed, we used them to examine the trend of engagement that had developed since the start of the course. Therefore, we limited ourselves to a simple descriptive analysis (trend of frequencies) of survey responses.

Open-ended responses, which can be called qualitative surveys, were analysed using thematic analysis (Braun et al., 2021). We used the selected survey questions to thematise open-ended responses. Thus, this can also be called deductive thematic analysis, in the sense that the selected themes were already present in the survey questions. The purpose of using thematic analysis was to provide a more nuanced understanding of the students' perceptions and experiences of taking part in the course. Details of the thematic analysis are presented in Table 6.2.

FINDINGS

In this part of the chapter, we address the findings from our study. This will be done in two parts. First, we will describe the learning design of an institutional xMOOC, which includes explaining the learning design, while in the second part, we will address the students' experiences and perceptions of learning resources.

Table 6.2 Procedures of thematic analysis

	<i>Steps</i>	<i>Activities</i>
1.	Gaining familiarity with data	(Re-)reading survey questions, translating, and discussing them with course instructors
2.	Generating themes	Survey questions used as themes
3.	Searching for the themes	(Re-)reading open-ended responses to find new themes
4.	Reviewing the themes	Listing themes, combining or collapsing the themes
5.	Defining and naming themes	Naming and defining themes
6.	Reporting the themes	Presenting themes with definitions in the findings

Source Authors' own

The Learning Design of an Institutional xMOOC

To analyse the effectiveness of learning resources, the learning model of the institutional xMOOC must first be explained. In 2014, the institutional xMOOC was first conceived among a group of teacher educators working at a Norwegian university college offering credit-bearing online studies in continuing education for teachers in topics related to digital learning and education. The educational model has been used in delivering an online course that trains teachers in the pedagogical use of digital technologies, called ICTPED MOOC (Information Communication Technology Pedagogical Massive Open Online Course). ICTPED MOOC has the goal of being organised in a similar way as online courses offered on Coursera and FutureLearn, that is, being open, asynchronous, flexible and scalable. For example, the ICTPED MOOC has a flexible enrolment date: students can join the course a month before/after it has started but often need general entry requirements for higher education to become students. Moreover, to obtain study credits, a student must complete several obligatory learning activities and submit exams about lesson planning. The ICTPED MOOC has been offered as an online university course since 2016 and has roughly 400 students for each run. A majority of the students are teachers working in elementary schools. The online course uses Canvas as the learning platform.

Addressing the learning design of an institutional xMOOC closer, however, a look at learning models employed in MOOC is relevant. Conole (2015) argued that the distinction between xMOOC and

cMOOC is too simple and suggested five MOOC models: associative, cognitive, constructivist, situative and connectivist. The difference between these is their underlying pedagogy. For example, an associative MOOC focuses on individual and operant conditioning and employs a learning design where drill, practice and assessment are important learning activities. In a cognitive MOOC, the learners engage with a learning design in which they reflect on their learning. Constructivist MOOCs challenge the learner to activate previous experiences and knowledge, here aiming to engender new knowledge by engaging in problem-based and inquiry learning. In situative MOOCs, the learner engages in a virtual learning environment through dialogue with other learners, while a connectivist educational model emphasises that peer learning occurs in network and distributed contexts. In this regard, when applying Conole's classification scheme, however, we can place an institutional xMOOC between the associative and associative educational models. In other words, this MOOC type is individual and based on operant conditioning, where the student engages in drill and practice learning activities, here supplemented with some degree of contemplating over the student's own learning.

Classifying the ICTPED MOOC as an institutional xMOOC, it comprises two central components that structure and run the online course. First, the student enrolls in an asynchronous online course and follows a prearranged learning trajectory consisting of learning goals, learning material, learning activities and assessment forms. The ICTPED MOOC uses a model setup and is essentially a lecture-centric campus pedagogy. Each module has more or less the same learning design. In them, the students follow an interlinked and thematically prearranged learning path that teacher educators have carefully designed. The student starts with an introductory page explaining the learning goal and what is to be learned. Thereafter, the student watches a short video or reads a text before doing various learning activities in which learning contents can be tested or demonstrated in practical assignments. Such prearranged learning resources can be practice quizzes with automated formative feedback, small or larger assignments, peer assessment, discussion threads in a discussion forum and module tests. Second, the student is supported by a team of teacher educators and student assistants who provide ongoing formative feedback on assignments and are available in discussion forums, social media and video conference tools to help with practical and technical matters. The ICTPED MOOC contains seven modules, runs for five

months, and the student has an estimated workload of 20 hours per week. A module from ICTPED MOOC is presented in Fig. 6.1.

• Modul 3: Sammensatte tekster	3.3 Eksamensoppgave: Sammensatte tekster
Modul 3 Sammensatte tekster - Læringsmål og Introduksjon	3.3.1 Vurderingskriterier
3.0 Før-test: Hva kan du om sammensatte tekster? 14 poeng	3.3.1.1 Hva er en god originaltekst?
3.1 Teori: Hva er en sammensatt tekst?	3.3.1.2 Tilleggsinfo. vurderingskriterier: refleksjonsvideo
3.1.1 Semiotiske ressurser og semiotisk teknologi	3.3.2 Eksamensveiledning: FELLESMØTE I ZOOM
3.1.2 Modaliteter og læring	3.3.2 Eksamensveiledning: VIDEOINNSPILLING - spørsmål og svar
3.1.3 Lesing og digitale teksters romlighet	3.3.3 Valg av medier
3.1.4 Verktøy for å analysere sammensatte tekster	3.3.4 Valg av verktøy/arbeidsmåter
3.1.5 Analyse av sammensatte tekster fra et retorisk perspektiv	3.3.5 Eksempeloppgaver til inspirasjon
3.1.5.1 Liestøl 2009 Sammensatte tekstors retorikk.pdf	3.3.6 Universell utforming
3.0 Etter-test: Hva kan du om sammensatte tekster nå? 14 poeng	3.3.7 Opphavsrett og lisenser
3.1.7 Litteraturliste del 3.1 (Teoridel)	3.3.8 Åndsverksloven
3.2 Hvorfor bruke og produsere sammensatte tekster i undervisninga?	3.3.9 Å vise til kilder
3.2.1 Kunnskapsløftet og LK06	3.3.10 Bruk av referanser på eksamen
3.2.2 Fagformyelsen og LK20	3.4 Eksamensinnlevering sammensatte tekster - SISTE FRIST 7.mars kl. 14.00
3.2.4 Nye muligheter - og utfordringer	
3.2.5 Læreren som produsent og designer	
3.2.6 Litteraturliste for del 3.2 (Hvorfor bruke og produsere)	
3.2.7 Eksempel: Litteratundervisning og sammensatte tekster	

Fig. 6.1 Structure of a module in the ICTPED MOOC (Source Authors own)

Student Assessment of the Institutional xMOOC

Overall Assessment of the Course

This theme concerns students' overall perceptions and experiences of the course content, structure, presentation and learning activities in the ICT PED MOOC. The analyses of the students' postcourse surveys from the course's inception in 2016 to 2021 showed that most of the respondents were satisfied with the course structure and organisation. Only a few students expressed dissatisfaction (Fig. 6.2).

However, qualitative data showed nuances in the students' perceptions and experiences of learning in the course. Students had very positive experiences with video tutorials. *'I watched videos multiple times and did multiple-choice questions'* (S1). The course had some *'unnecessary texts'* for some students (S2). Most respondents (57/64) found the course content and activities well organised. For some students, the course content was challenging and intellectually demanding, as one student reported:

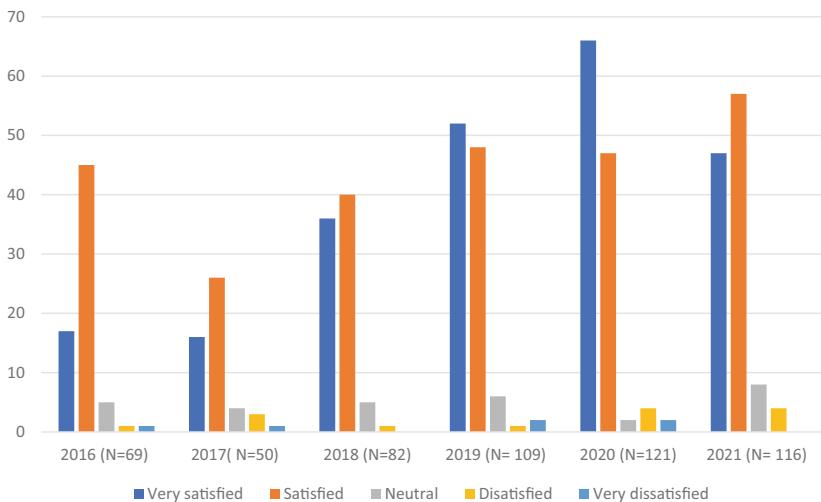


Fig. 6.2 Students' overall assessment of the course (*Source* Authors' own)

Despite the rumours that the course is highly demanding, I joined the course because I like ICT very much. The whole process was a very encouraging and rich learning experience. As Fred De Vito says, 'If it does not challenge you, it does not change you'. The course has changed me, and now I can use digital resources and equipment in my class. This course should be made mandatory for all teacher students. (S3)

Some struggled to understand the assignment task in module six and reported, '*I only knew about what the assignment actually asked for after I read my fellow student's assignment*' (S4). They liked the multimodal texts. Some of them downloaded the pdf version of the modules and video tutorials to learn about their own space and place. In general, they reported that they were satisfied with the course content and learning activities because the course offered multiple communication channels and ways of learning. One student reported this as follows:

I had collaborative learning meetings with fellow students every week and more frequent meetings during exams. Multimodal texts were very convenient for learning. Multiple-choice tests were very useful to check my understanding of the course content. (S5)

Students' Learning Strategies

The students' learning strategies refer to the ways in which students prefer to learn in the course. The analyses of postcourse surveys of the ICTPED MOOC showed that most students preferred learning independently (i.e., using course resources and not engaging with course participants). However, if we combine the three strategies (e.g., learning with course instructors/facilitators, participants and colleagues), the category of students who preferred learning by collaborating with others becomes larger, meaning that more and more students tended to learn by engaging with others. Some students preferred learning by engaging with online resources (e.g., YouTube) (Fig. 6.3).

The qualitative data suggest that the students had mixed perceptions and experiences of learning by engaging with the course. The independent learners preferred using course resources and discussion forums. One student reported, '*I watched videos and read text and articles. I also used discussion forums and followed discussion posts but did not take part in the discussion*' (S6). Most respondents reported engaging with course instructors/facilitators and fellow students on the Facebook and Canvas discussion forums of the course. One student reflected, '*I asked many*

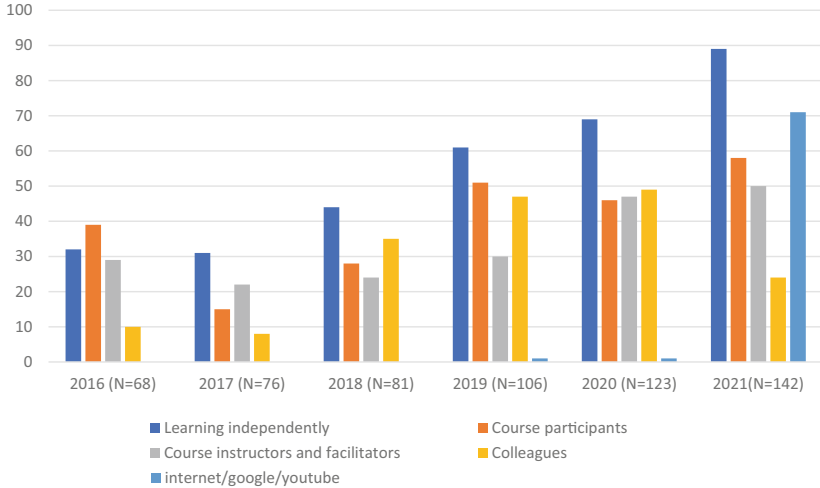


Fig. 6.3 Students' learning strategies (*Source* Authors' own)

questions on Facebook, and instructors answered my questions very quickly' (S7).

Video as Learning Resources

The ICTPED MOOC contained three types of video tutorials: orienting videos that explained how to engage in the course, tutorial videos (describing and explaining course content) and interview videos in which instructors have experts in a particular field or topic. The data showed that the overwhelming majority of the respondents were satisfied with the videos. Only a few were dissatisfied (Fig. 6.4).

The qualitative findings also suggest that most respondents (25/36) preferred learning by watching videos. One student reported that *'videos became very crucial resources for learning in the courses as I frequently watched them and checked my understanding'* (S8). Some students found the videos that contained interviews with experts over the course topic very knowledgeable and valuable. *'Interview videos were worth watching for deep learning'* (S9) because students *'gained insights into others' experiences'* (S10). However, some students found (5/36) the videos to be of a poor quality. It became much easier for some students to understand videos than the information given in written texts. The students might

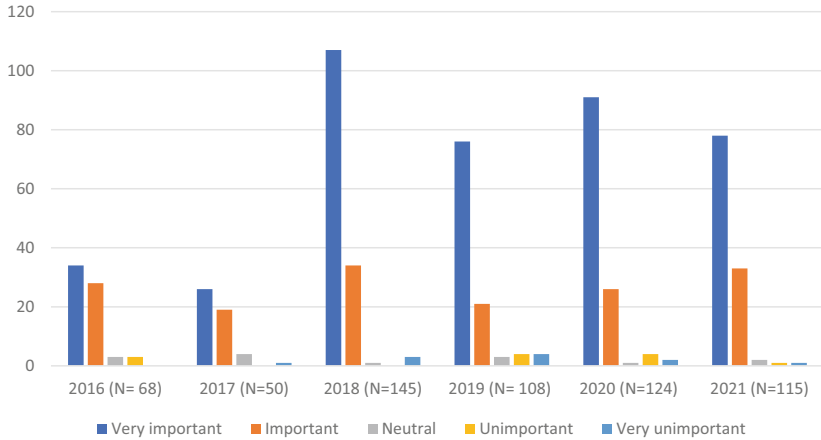


Fig. 6.4 Students' perceptions of the importance of video resources (*Source* Authors' own)

also find it challenging to learn through videos if the videos contained information without references or citations. One student stated this in the following way:

I learned by watching most of the videos, but some were quite long. It was challenging for me to keep track of learning resources. Obvious information should have been about it in the videos. I did not find all references in the bibliographies and spent much time looking for references. (S11)

Learning by Doing Assignment Tasks

Assignment tasks refer to the examination assignments that students must complete to pass the course and obtain a credit point. The data show that most students found the assignment tasks crucial for their learning. A few students found them relatively unimportant for their professional practices (Fig. 6.5).

The qualitative data show that most respondents (32/45) found the assignment task very demanding and time-consuming. They spent a lot of time understanding and completing the task. One student reflected on it as follows:

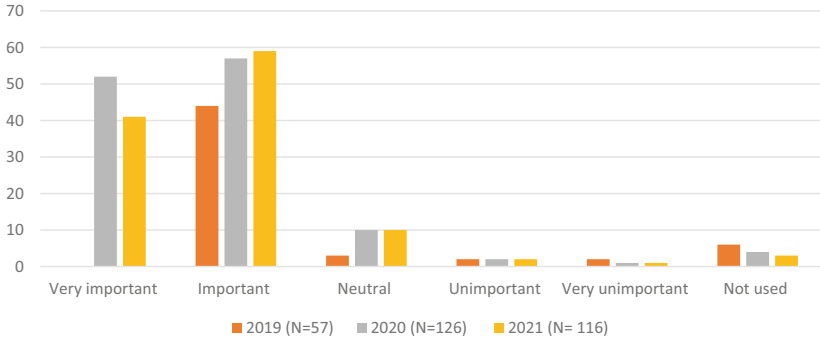


Fig. 6.5 Students' perceptions of examination assignment (*Source* Authors' own)

I wasted incredibly too much time on technical aspects because they did not work satisfactorily. Clear information should have been provided in advance regarding how to submit the assignment. It was frustrating to wait a week to find which Google account was to be used to submit the task. (S12)

Some students found that exam assignments helped them learn digital skills and enhance their digital competence. As one student put it, *'This exam assignment was phenomenal. The assessment criteria were clearly well designed, and completing the first draft was great'* (S12).

Learning by Peer Feedback (Peer Review)

The students had mixed perceptions of peer feedback. Many students perceived peer feedback as important for their learning, but nearly half of the respondents were undecided about whether peer feedback was beneficial for them to enrich their learning experiences. Some students found it unimportant (Fig. 6.6).

The qualitative data also showed mixed experiences regarding peer feedback. Most students (43/61) found peer feedback helpful in expanding their learning. *'Peer feedback helped me generate new ideas'* (S13). They gained insights into how others could understand their tasks; as one student said, *'To see how others could understand my work was fruitful in creating a good task'* (S14). It became a good practice for some students to learn how to give feedback as well; as one student put it, *'I learned and became aware of how to give short and good feedback'* (S15).

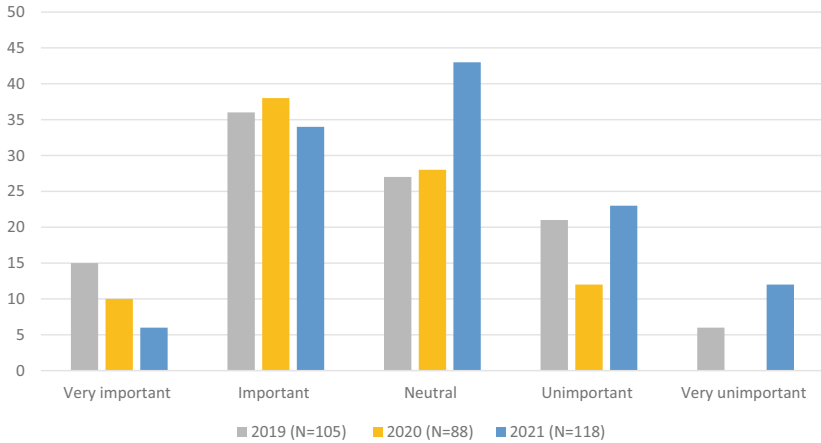


Fig. 6.6 Students' perceptions of peer assessment (*Source* Authors' own)

However, some students reported that they only slightly benefited from peer feedback because their fellow reviewers failed to offer good feedback or gave entirely unrelated feedback. One expressed his experience: *'I received feedback unrelated to my assignment task'* (S16). Peer feedback might raise the issue of privacy and personal data sharing in online learning. One student observed the following:

I like the concept, but do not like someone I do not know to watch my videos. This is unusual. I feel comfortable sharing my stuff with course instructors and facilitators, but not with those I am not known to. (S17)

Some students did not know whether they had learned something by peer review. One student reported this experience as follows:

I do not know whether I learned something by reviewing fellow students' tasks. I was assigned a long and messy text (about 1500 words) and spent much time reading and understanding it. It was stressful, and I think it was also a waste of time. It could have been much better if we could have discussed our ideas in online meetings. (S18)

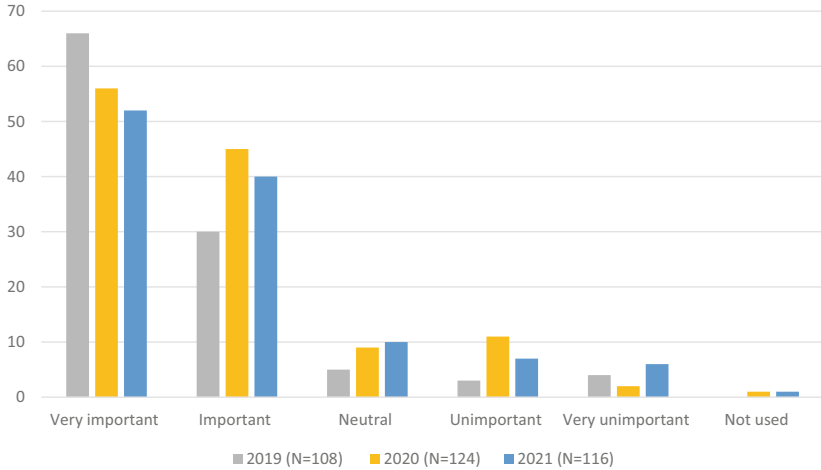


Fig. 6.7 Students' perceptions of automated quizzes (*Source* Authors' own)

Learning by Doing Multiple-Choice Questions

Most of the students found multiple-choice questions crucial for their learning. Some were undecided about the usefulness of multiple-choice questions for learning. A few found them unimportant (Fig. 6.7).

The students found multiple-choice questions (automated quizzes) necessary for their learning. Quizzes helped students learn and know key points about the topic of learning; as experienced by a student, '*Quizzes helped me learn key points in the syllabus*' (S19). While completing quizzes, they went through learning resources (e.g., videos, texts and reference materials) to check the answer. They also used additional resources for doing quizzes. One student reported the following:

I found multiple-choice questions beneficial for my learning. I repeatedly read texts and watched videos and other resources to answer the quizzes. They motivated me to scan the learning resources carefully. (S20)

Individual Guidance from Instructors

The students were offered opportunities for individual meetings with course instructors/facilitators to solve their problems. These meetings were called individual guidance with instructors. Most students who sought individual guidance from course instructors/facilitators found

them important for their learning. Some students were undecided about whether participating in individual guidance meetings was useful. Some found them not useful in solving their problems (Fig. 6.8).

The qualitative data also show that students received the expected support to solve their problems in the individual guidance meetings. The students found them constructively useful for their learning because they received good tips and advice for improving their tasks. As one student reflected on his experience, *‘I felt confident that I would get support if I got problems. It was very reassuring and motivating to get good support from instructors’* (S21). They appreciated the patience and service mindedness of instructors/facilitators *‘Instructors were calm and service minded to help us solve our problems’* (S22). Some students had the preconceived idea that receiving instructors’ support in an online learning environment would not be easy, but it turned out to be much easier. One student reported, *‘I was surprised by how easy it was to get help from instructors. It had trouble submitting a large exam file, but instructors helped me in the individual meeting’* (S23). Some students hesitated to participate in individual guidance meetings on unfamiliar platforms for meetings, but the instructors made them feel comfortable in new spaces. One student

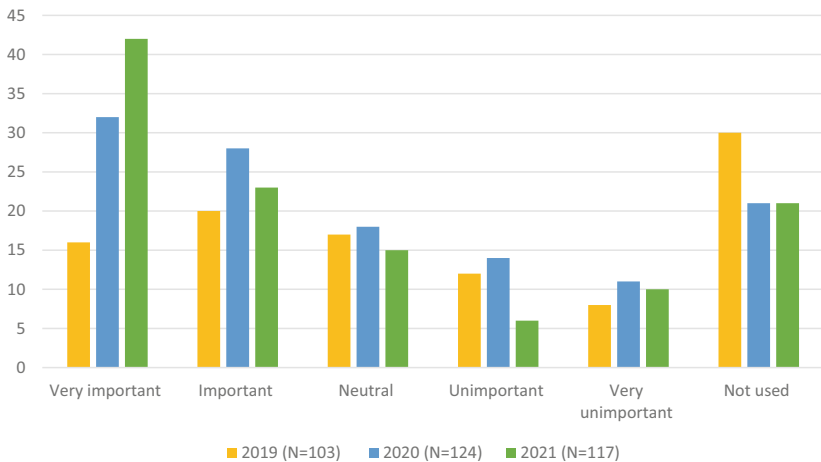


Fig. 6.8 Students’ perceptions of individual guidance meeting (Source Authors’ own)

reported, *‘I was terrified to knock on the Whereby conferencing platform for the first time, but the facilitator made me feel good. I received sound advice and support from her’* (24).

DISCUSSION

The findings have demonstrated that most students were satisfied overall with the given course resources and activities in the ICTPED MOOC, finding them useful in developing their understanding of learning tasks. The learning resources, especially audio and video texts, helped students scaffold their learning because they frequently revisited them to make sense of and check their understanding of the learning content. This finding corroborates with the findings of previous research, which has documented that students engaged in audio–video and written texts to develop their understanding and to solve their learning problems by repeatedly interacting with these resources (Engeness et al., 2020). Videos can become intellectual materials that can assist students in shaping a logical understanding of course materials, which may engender transformative learning in online learning environments.

Second, most of the students found assignment tasks demanding and crucial to enhance their learning. The tasks helped students use, assess and develop their digital skills and competence because they had to create an instructional video and a reflection video explaining how they created the examination task and why they chose a particular approach to content organisation and presentation. It was a rewarding learning experience for most students. Knowing what, how and why one has done something can transform students’ learning—developing their enhanced capability in understanding something that can be applied to other situations to solve similar or different problems (Arievitch, 2017; Engeness, 2021). However, some students spent a lot of time making sense of assignments and figuring out technical issues, such as which tools to use to create assignments and how to submit the completed assignments. A challenging situation can also be productive because it demands active action to resolve the situation, as the concept of double stimulation implicates (Aagaard & Lund, 2019). Also, nearly all the students found quizzes useful resources for engaging with course materials. While doing the quizzes, the students repeatedly scanned and skimmed course resources to consolidate their understanding. Thus, quizzes might drive students to consult with and pay detailed attention to various learning

resources. Regularly scheduled quizzes on reading materials may increase the completion of reading assignments and, therefore, course performance (Johnson & Kiviniemi, 2009).

Third, most students found human resources, especially individual guidance meetings with course instructors, crucial to their learning. Individual students engaged with course instructors or facilitators to develop their understanding of their problems and solve these issues constructively. They found instructors showing good professional qualities, such as being motivating, assuring and willing to offer support to students to solve their problems. As indicated by a previous study, students have their ideas assessed when they engage with instructors, leading to strengthening epistemic validity of students' ideas (Singh & Engeness, 2021).

Another important human resource in the MOOC was peer assessment. The majority of the students found peer assessment to be generative, guiding and useful in deepening their understanding of solving their learning problems. However, some students raised questions about the quality of peer feedback and misunderstandings. Previous studies have reported that peer feedback promotes students' engagement and learning in MOOCs (Gamage et al., 2021). Peer feedback can be one of the important factors for reflectively generative aspects of transformative learning because our understanding is shaped and expanded in and through our interaction with peer or peer ideas (Singh, 2022). Some students raised questions regarding the issue of privacy and personal data sharing with fellow participants that the students were unfamiliar with. Videos that were shared with peers for assessment containing raw personal data were sometimes seen as formidable obstacles to promoting peer interaction in online courses in general.

Finally, the findings show that the students preferred to learn both independently and collaboratively in the course. This suggests that students need resources for independent learning and collaborative learning. Independent learners engage in self-directed learning, while social learners prefer learning by interaction and collaboration with others. Several previous studies have indicated the need to embed clearly stated information for students' self-directed learning (Alonso-Mencia et al., 2020), as well collaborative aspects, in MOOCs (Amarasinghe & Hernández-Leo, 2019). Although the scripts for promoting engagement can be crucial techniques for engagement, when it came to intellectual engagement, the students required quality resources for independent

learning and motivating social interaction in MOOCs. As Dewey (1933) stated, one's thinking provides guidance for others' thinking. The subject matter that institutional xMOOCs offer is the syntheses of scientific concepts (systematic, logical ideas) (Vygotsky, 2012) that instructors have developed to support students' learning activities. By engaging with course materials and course participants, students can transform their learning, which here means developing a scientific understanding of course content and practical experiences.

How Can Learning Resources Contribute to Transformative Learning?

The findings of the current research study indicate that the selected resources assisted the students in engaging in learning. The students frequently used the audio and video resources to understand the course content and solve the given tasks, such as quizzes and assignments. They found solving examination assignments challenging because they had to create a pedagogical task and reflect upon the whole process of creating and solving the assignment. Students' interaction with instructors (individual guidance meetings) and peers (peer interaction) could also assist the students in enhancing their ability to make sense of learning tasks and constructively solve problems. The students wanted to learn independently or engage in self-directed learning collaboratively or by interacting with instructors and fellow students. These findings indicate that the existing resources in the ICTPED MOOC could invoke transformative learning if it is conceived as processes of developing, expanding and advancing systematic understanding or scientific understanding of learning tasks or how to solve learning problems systematically or scientifically by engaging with learning resources: both human and nonhuman resources (Vygotsky, 2012). Critical thinking is developed when we engage with others' thinking (Dewey, 1933) or when we interact with others using various mediating tools, such as videos and language (Vygotsky, 2012). Thus, engagement, either vicarious (engagement with written text or pictures) or direct (interaction with instructors and peers), is required for engendering transformative learning experiences.

We assume students who have developed some knowledge and skills of learning independently online may require more specific guidelines and additional resources for their self-directed learning (Zhu, 2021). From a cultural-historical perspective, agentic students who know how

to engage meaningfully can orient their own learning processes systematically (Engeness, 2021). As indicated by the findings, most of the students preferred learning independently, suggesting that students are capable of engaging in self-directed learning activities. This group of students can be considered agentic students because they might know how to use course resources independently in the course. Therefore, previous studies have suggested offering students clear guidelines and strategies for fostering self-regulated learning (Jansen et al., 2020). We have also assumed self-directed learning as a characteristic of agentic students because they may know how to strategically navigate and use existing resources such as videos for understanding course content and solving their learning problems. Self-directedness in the course might be a characteristic consequence of online learning environments where students remain remotely located and unfamiliar with one another, hence forcing them to choose an independent path of learning (Singh, 2021), but this crucial issue merits further investigation. The number of students who tended to learn by engaging with human resources (teachers, peers and colleagues) has increased in the course since the course was first created, indicating that students need engagement and collaboration with knowledgeable others to understand course content and solve their problems. For them, human scaffolding is crucial in fostering their learning. Engaging in interactions with more knowledgeable others can promote students' capability to learn systematically (Vygotsky, 2012). From the perspective of developmental teaching and learning, students can develop enhanced capabilities to think critically and solve problems constructively by engaging with human resources (Arievitch, 2017). When we engage in learning to solve our problems in collaboration, we get the opportunity to enact, realise and develop our agency in learning. Agency and transformative learning experiences are two sides of the same coin (Stetsenko, 2017). Therefore, we claim that existing resources in the ICTPED MOOC may have contributed to transformative learning experiences. Transformation is a process of engaging individually and collectively in learning and fostering intellectual quality in understanding, interpreting and solving problems scientifically.

CONCLUSION AND PEDAGOGICAL IMPLICATIONS OF THE FINDINGS

Developing positive feelings and attitudes towards learning resources can motivate students to actively engage with learning resources to develop their understanding of how to solve their learning problems. Engagement also increases students' retention rates in the course. Therefore, course instructors should develop and deliver those resources that students deem necessary to enhance their learning and competence.

Another important finding is that the students wanted to adopt both self-directed learning and collaborative learning approaches, suggesting two categories: self-directed students who know how to use online resources independently and social learners who want to deepen their learning by engaging with course instructors and peers. Designing resources that can cater to the needs of these two groups of students is essential but demanding as well. However, why students tend to learn independently has yet to be established.

Developing scientific understanding demands sustained engagement and interaction with learning resources, which can guide the process of understanding. Institutional MOOCs offer multimodal learning resources, leading to the promotion of multimodal learning. Multimodal resources have the potential to promote learning at one's own pace, in one's own spaces and with one's own tools. This may be one of the distinguishing features of online learning that can ensure transformative learning. Systematically organised learning resources might provide a scientific reference for students to understand, interpret and transform their practice-related experience and knowledge claims, leading to epistemic transformation (scientific understanding, developing adequate knowledge about the topic of the discussion and enhanced capability). However, such possibilities remain peripheral because students have limited opportunities to interact intellectually with fellow learners and instructors. Existing interactions tend to promote problem solutionism rather than becoming a reflective and discursive inquiry about issues, which might be a barrier to epistemic transformation. Communication, interaction and collaboration about developing and advancing a conceptual understanding of learning problems is required for epistemic transformation because it involves putting forward, explicating, questioning and assessing knowledge claims. Such processes demand sustained co-engagement and co-contribution to make sense of learning resources and problems.

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Moving Forward or Going Backwards? Understanding Digital Transformations from Teachers' Perspectives of Assessing Students Digitally

Linda Barman  and *Maria Weurlander* 

INTRODUCTION

Digital transformations of higher education (HE) comes with several different *agendas* and thus creates different expectations of what new technology should address. In debates, promises connected to digitalisation include the opening up of HE, improvements in administrative effectiveness, and innovation in teaching and learning. Digital technology (DT) can have transformational effects on the velocity, scope

L. Barman (✉)

Department of Learning in Engineering Sciences at KTH, Royal
Institute of Technology, Stockholm, Sweden
e-mail: lbarman@kth.se

M. Weurlander

Department of Education, Stockholm University, Stockholm, Sweden
e-mail: maria.weurlander@edu.su.se

and impact of HE assessment practices, similar to those van Veldhoven and Vantheinen (2019) describe regarding effects of DT on the business world. Digitalisation is often seen as the enabler of ‘making things better’, but as set out in several chapters in this book, (for example by Tømte and Lazareva, and Scholkmann), it also creates new and unexpected dilemmas and changes faculty roles and responsibilities (Kirkwood & Price, 2014). One example of how digitalisation changes academics’ responsibilities, is that learning platforms enable HE to open up and reach learners other than the merited students that have gone through formal admission processes. To some extent, the opening up of universities broadens the HE mission. Outreach in the form of courses offering lifelong learning, for example, MOOCs (Massive Open Online Courses), changes the way teaching and learning is planned, delivered and evaluated (Barman et al., 2019a; Tømte, 2019). Teachers in HE may find themselves in unusual situations as they are increasingly asked to popularize and create shorter courses with condensed messages in advanced topics, which can be challenging (Barman et al., 2019b). The opening up of HE as a result of digital platforms also involves current initiatives that aim to create joint education offerings between universities across countries in new ways, such as The European Civic University (CIVIC) and University Network for Innovation, Technology and Engineering (UNITE). Furthermore, students can participate in hybrid on-and-off-campus lectures simultaneously, and via digital tools collaborate with each other and external stakeholders situated on other continents (Barman, 2021).

University teachers are known to have heavy workloads and IT applications provide an attractive way to make everyday work faster and easier when data is automatically transferred between systems. The idea is that digitalisation offers administrative effectiveness, and thus saves time, for example regarding teachers’ work during assessments of students’ performances (Mimirinis, 2019). Increased effectiveness includes the shift from having to spend time on copying exam papers to obtaining students’ answers in digital form and grading their performances based on automated assessments in IT systems. In addition, DT offers new ways of assessing students’ knowledge. The transformative potential of using digital tools in teaching and as a support in students’ learning processes is one area where the literature makes promises but empirical findings remain modest (Sweeney et al., 2017). In particular, teachers seem to maintain old habits and their view of how to assess students’ performances even though digital tools are available (Bennett et al., 2017; Deneen &

Boud, 2014). Formative, (ungraded), and summative, (graded), assessments have major impacts on what and how students learn (Weurlander et al., 2012), and is therefore central to HE. The literature reports on efforts to innovate and for example change teachers' and students' roles in knowledge-creation (Bearman et al., 2020; Bygstad et al., 2022; Kirkwood & Price, 2014), and a broad implementation of emergency remote teaching during the pandemic (see Chapter 12 by Wollscheid et al.). However, one important question remains: what is it that really transforms? The overall aim of this chapter is to contribute to the conversation regarding what kinds of transformations occur as a result of digitalisation of teaching and learning in Swedish higher education. The specific purpose is to illuminate digital transformation of assessment practices by exploring teachers' experiences of using digital technology to assess students' performances, including the planning, implementation, grading and provision of feedback.

ASSESSMENT OF STUDENTS' PERFORMANCES USING DIGITAL TECHNOLOGY

One major promise from digitalised assessments is to enable multimodal ways of presenting and representing knowing and knowledge, for example using sound and moving images (Selander & Kress, 2010; Timmis et al., 2016). The change in design and figuration of tasks influences what students get to experience in assessment tasks, such as being exposed to three-dimensional digital models of environments in architecture, or being able to rotate mechanical constructions, or seeing films that illustrate authentic situations from business. The use of digital tools also increases students' opportunities to present their abilities in different ways, which could fundamentally change what kind of knowledge, abilities and approaches are required and graded (Sweeney et al., 2017; Tan et al., 2020). Digitalisation may also facilitate a shift in how assessments and grading are traditionally viewed and conducted in HE (Boud et al., 2018). Research on HE learning emphasises students' involvement in the assessment process, for example during the development of standards or when they practice their abilities to make judgements through self- and peer-assessments (Barman et al., 2022; O'Donovan et al., 2008). Such processes can be facilitated with digital platforms offering flexibility, for example with the use of quizzes or automated distribution of peer-learning tasks. In sum, digitalisation may increase the authenticity

of assessment tasks and broaden students' opportunities to make their knowing and knowledge visible, thereby increasing the ecological validity of assessments and grading in HE. However, developments and transformation of assessments seem to be slow, and researchers argue that old ideas are being locked in by current digitalisation, instead of benefitting from the potential that the new era may offer (Barman et al., 2020).

Research on HE assessments of student learning also addresses some recurrent challenges faced by teachers. These challenges include how to assess and grade students fairly, and at the same time allow for open-ended assignments where students demonstrate their ability to integrate basic facts or science with more elaborate reasoning or problem-solving that resembles abilities required in working life (Barman et al., 2022; Epstein & Hundert, 2002; van der Vleuten et al., 2010). In general, teachers' different epistemological views and understanding of what assessment should enable in combination with locally embedded traditions influence their choices of *what* and *how* to assess students' performances (Boud et al., 2018; Mimirinis, 2019). Such examples include measurement of factual knowledge versus assessment of integrated competencies, and/or providing feedback and thus creating learning opportunities (Hodges, 2010; van der Vleuten et al., 2010).

ASSESSMENT IN SWEDISH HIGHER EDUCATION

In this chapter, we studied HE assessment practices in Sweden. Swedish HE adopts a course-based system in which student completion of each course needs to be summatively assessed and graded (UKÄ, 2020). One course generally requires 5–10 weeks of full-time studies but at some universities several part-time courses are offered in parallel. Obligatory course requirements such as graded assessments must be stipulated in course syllabuses, and additional assignments that aim to provide formative assessment of student performance are not part of formal requirements. In contrast to formal regulations, teachers sometimes include bonus systems so that students gain credits from formative assessments which are then included in course grades. Each course has a formal examiner who is responsible for the assessment including the design of assignments, student grading and feedback. The examiner often has the responsibility for the overall course design as well. In some cases, several

teachers are involved in the assessment process and provide exam questions, conduct assessments and feedback, and provide information on student performances for grading purposes.

THEORETICAL FRAMEWORK

We based this study on the underlying assumption that assessment constitutes social practices embedded in local contexts (Boud et al., 2018). Practice theories views practice as consisting of *'the relations among the everyday interactions, routines and material arrangements in particular environments and forms of knowing generated from these'* (Hager et al., 2012, p. 3). In line with this, we view assessment practices as purposeful, influenced by local routines, available technologies and other material artefacts used, and the views, 'sayings and doings' regarding assessment matters of the various people involved (teachers, students, administrators and others). Assessment of student performance in HE requires a number of decisions regarding what knowledge and knowing students should demonstrate, and standards for judgement and grading. These decisions affect the format, mode and the design of assignments and exams such as the question/problem type. Furthermore, choices regarding the assessment situation are also necessary, including what resources students are allowed to use, such as literature, calculators, or the internet, and the time allocated for accessing and completing assignments and tests (e.g. hours or weeks). Bearman et al. (2016) outline a practice framework for assessing students' performances and define assessment design decisions *'as the corpus of choices regarding assessment, made by university educators who take responsibility for the module or unit or overall program at a curricular level'* (Bearman et al., 2016, p. 548). These decisions are central aspects of assessment practices. Here we are concerned with possible changes regarding teachers' design decisions including their intentions with and implementation of assignments and exams.

Furthermore, we apply the concepts of *convergent* and *divergent* assessment, (Torrance & Pryor, 2001), to discuss the informants' descriptions of the result of their design decisions, namely the format, mode and character of graded and ungraded assignments and assessment tasks associated with the use of DT. Convergent assessment refers to assignments and tasks which aims to *'find out if the learner knows, understands or can do a predetermined thing'*; and is *'characterised by detailed planning, and it is generally accomplished by closed or pseudo-open questioning and tasks'*

(Torrance & Pryor, 2001, pp. 616–617). Such a perspective is associated with behaviourist views of learning and, in our view, similar to the rationales behind the psychometric tradition concerned with reliability and validity of tests (Hodges, 2010; Torrance & Pryor, 2001). Divergent assessment involves more open questioning and tasks that are complex to perform and aims to discover what the learner knows, understands and are capable of. In addition, divergent assessment tends to be oriented towards future development, and are associated with social constructivist views of learning (Torrance & Pryor, 2001).

METHOD

The empirical materials included analysis of 12 interviews with teachers from two universities in Sweden. The teachers were recruited based on their involvement in various strategic education initiatives concerning either pedagogical development by their own choice, or digitalisation of study programmes initiated by their respective University. All teachers had the experience of assessing students using digital systems, and two of the informants were involved in initiatives explicitly aimed at digitalising assessments. The sampling was made to gain access to a broad variation of experiences, and thus the informants consisted of women (7) and men (5) who teach in various subjects such as mathematics, physics, chemistry, law, language, language education, and social science research methods. Their experience as teachers ranged from 18 months to more than 20 years, and some could be considered ‘early adopters’ of educational DT, while others employed digital tools in their teaching due to the pandemic. Both universities provide various digital solutions, such as learning platforms (LMS) and specific IT systems useful for digital exams and/or automated assessment of students’ performances. The informants had the experience of applying these technologies in various ways, both before and during the pandemic. The majority included automated assessments such as quizzes, open responses or online peer-assessments in their courses, and some had used on-site digital assessments as well.

Interviews were conducted in physical meetings or online on Zoom and lasted between 35 and 54 minutes. Questions addressed informants’ experiences of assessing students’ performances on digital systems, for what purposes they used DT in assessments, what type of knowledge and knowing students were asked to demonstrate, and the design of assessment tasks in the digital environment. All informants consented to

participate in the study prior to any data being collected. To protect the privacy of informants, quotes in the findings section of this chapter are attributed to fictitious names.

We performed a thematic analysis, (Braun & Clarke, 2006), to uncover changes in the teachers' assessment design decisions that were associated with their application of DT. During the analysis, we focused on which kinds of changes the informants described and reasoned about (manifest content). Furthermore, in accordance with the thematic analysis, (Braun & Clarke, 2006), we interpreted the latent meaning of these changes which resulted in three overarching themes regarding the nature of change. These in turn relate to possible transformations in either teachers' work processes or their design decisions.

FINDINGS

In this section, we introduce three themes that present changes of different nature as a result of the teachers' use of DT when they designed, implemented and performed assessments of students' learning: (I) *Transformation of assessment processes*, (II) *Redesign of courses and assessment tasks* and (III) *Rethinking student competencies and requirements of learning*. These changes relate to either *how* the teachers worked, (their processes), or *what* the teachers designed and created, (the 'products'). This section starts with an overview of the areas and nature of changes presented in Table 7.1. Each theme is presented followed by a discussion of how these changes may, or may not, be regarded as transformations.

TRANSFORMATION OF THE ASSESSMENT PROCESS

Teachers experienced that the use of digital systems for assessments significantly *changed their work processes* in different ways. What stood out was how the teachers needed to carry out the *planning and implementation of assignments earlier in the work process* and how each task or assignment required a *greater level of detail regarding instructions and possible student solutions*. The shift from paper-and-pen written exams to digitally accessible student assignments and tasks significantly *streamlined the distribution of exam questions and results* to-and-from teachers to students, and between teachers. Marc, a teacher in social science research

Table 7.1 Changes of different nature as result of the teachers' use of digital applications when they designed, implemented and performed assessments of students' learning

<i>Areas of change</i>	<i>Nature of change</i>
Work processes and administration The Process	I. Transformation of the assessment process <ul style="list-style-type: none"> • Teachers planned and implemented assignments earlier in the assessment work process • DT streamlined the distribution of exam questions and student results • DT required additional decision making • Roles and responsibilities were re-defined. Additional support and expertise were needed to implement assignments and tasks in the IT-systems
Design decisions The Product	II. Re-thinking student competencies and requirements of learning <ul style="list-style-type: none"> • Teachers re-considered what forms of knowing their students could demonstrate • Limitations as to what kind of knowledge and knowing that was possible to assess III. Re-design of courses and assignments <ul style="list-style-type: none"> • Change of assessment mode • Implementation of continuous self-assessment • Combination of different assessment modes

Source Authors' own

methods shared his positive view of how digital technology (DT) made the distribution of students' results more efficient.

All you have to do is report it to the students. Fully automated. Then they get access to it, immediately when we hand out everything, all students get their results. (Interview 10)

At the same time, digital applications often required numerous settings or even programming skills, and in those cases, the teachers had to spend considerably longer time than they were used to or had anticipated to prepare each task. Peter, a maths teacher with programming

skills, believed that one of the applications used for automated assessments would be helpful in saving time to assess larger student groups, but only after working with the application for a number of years.

You have to struggle with a certain user interface. Initially it's not very intuitive. But on the other hand, there are several tutorials you can watch, but sure, it's not so easy in the beginning. It's a pretty big threshold to start with. (Interview 4)

With similar experiences, Mona who teaches language education reasoned about how automated assessments saves time for continuous assessment of larger student groups, but that it also takes time and careful planning.

Well, if you create a quiz, I think it saves time since it's assessed automatically. But it's crucial to get all the settings right. We have experimented a bit with using automated assessment of open responses, using keywords. That backfired quite a bit. We had to go in and try to fix it manually. (Interview 9)

Digital systems often required *additional decision making* and teachers carefully needed to think through each possible interpretation of their instructions and problem descriptions. In cases where automated assessment of open responses was performed in the IT system, the teachers had to consider what possible different typos the students might enter in the IT system, such as an extra space between words or numbers. Sally, who had the experience of implementing automated assessments in maths and physics courses, explained:

In some cases, they contacted me and protested. The students had not written exactly as the system requires, and because it's automatically assessed one must write exactly in accordance with the way the system is programmed. (Interview 1)

Mona realised that her idea of using keywords that the IT system should recognise as correct student answers did not always match how students demonstrated their knowledge.

I took the author's name as a keyword, but not all students used this name in their answers. Two students wrote really good answers but did not mention the author by name and their answers were not approved by the system. And

I couldn't change this manually. So, I had to e-mail them and tell them that, their reports says fail, but they did pass. (Interview 9)

Several teachers needed support during remote assessments to ensure that students who experienced problems with the technology received help. Such expertise was not always provided by the university IT support and had to be arranged locally by involving e-learning expertise. During the assessment occasion in several courses, e-learning support, (2–4 persons), were available for half a day every second week during the first half of the semester. In addition, administrators and IT staff created advanced settings that enabled students with special needs to obtain the support they were entitled to. Additional support was also needed when the DT required programming skills to enter assignments into the system. In some cases, the design of assignments and questions had to be edited and adapted based on the DT, in which cases the programmer was involved in taking design decisions regarding the problem tasks and assignments. Hence, the need to involve additional expertise in different ways *changed the teachers' role and responsibilities*.

RETHINKING STUDENT COMPETENCIES AND LEARNING REQUIREMENTS

As the teachers created assignments and exam questions, they considered what *forms of knowing their students had to demonstrate*. For example, factual and declarative knowledge, as opposed to the ability to perform procedures such as mathematical calculations; or that students could demonstrate their skills with a different modality. Due to limitations imposed by the pandemic, the teachers needed to find new ways to assess students remotely. Mona took the opportunity to assess her students using uploaded videos in which they orally presented their skills in language education. She reflected on the importance of offering various modes of assessment to enable different ways for students to demonstrate their knowledge and abilities.

Oral examination has a greater meaning than just being a safety-enhancing measure. It's spontaneous and under time pressure, which makes oral examination contribute other kinds of validity. [...] So, it's good with variation so there are different ways to demonstrate your knowledge. Then, the assessment

might be fairer. I think the flexibility part is important, and technology can help us with that. (Interview 9)

For Marc and his colleague who teach scientific methods, offering remote online exams forced them to rethink the requirements of learning, since students could access course literature and the internet during the exam.

There was more emphasis on providing examples [...] But we've also increased the time students' can spend when taking the exam because it also means increased demands compared to a three-hour exam taken at campus. (Interview 10)

The teachers reported that they had some scope to choose other IT tools than their respective University's LMS or the on-campus digital exam system. The various digital tools enabled students to express their answers in different ways, such as using mathematical language with symbols and signs. Several maths and physics teachers implemented such DT in their courses. While they appreciated the opportunities for students to provide answers with correct disciplinary language, (signs, symbols), they redefined what kind of knowledge the assessment should capture based on platform affordances and available functions. Several teachers reported that the available DT created *limitations as to what kind of knowledge and knowing that was possible to assess*. For example, no available system made it possible for students to draw graphs or assess students' understanding of correct units of measurement expressed in Swedish, as Sally explained:

Since the system language is English, adjustments need to be done. For example, in cases where units of measurement are requested, "min" – is not correct. In these cases, we have already written out the units and the students only need to answer with numbers. (Interview 1)

All physics and maths teachers reported that their aim was to assess students' abilities to perform calculations, which required students to demonstrate every step of the way in their calculations. According to the teachers, such transparency made students' thinking visible and created opportunities to provide feedback and adjust teaching. The use of automated assessments using different IT systems meant that students were instead asked to report the results of their calculations and problem-solving. George and Peter who created assignments in maths and physics

courses, expressed their view regarding some of the limitations of the automated assessments and how they adapted assignments accordingly.

We have tried to make them [digital quizzes] equivalent to the E-level [minimum requirements] on the final exam. But we haven't been able to assess their abilities to solve problems or present solutions. (Interview 3)

It would be optimal if they could write a proper solution so we can assess and check that they use the correct language, refer to the right things, which theorems they refer to, and draw correct figures, that they define everything used in their calculations. The things that are missing right now in the assessment, simply. We rarely think that the numerical final value is interesting, it's how they got there that is of interest. (Interview 4)

The teachers recognised that students' digital competence and previous experiences of using various IT systems affected how well students performed. Margret and her colleagues who teach physics and maths, experienced frustration when the system nomenclature differed from how signs were normally written in Swedish and thus required students to write *dot* instead of *comma* when answers included numerical values.

[System X] has many annoying features that both teachers and students are bothered with. It's so super petty with format and how to enter numbers, it's almost like half a programming task to answer correctly in [system X]. So you start thinking that it doesn't entirely test the things you consider important to assess. (Interview 2)

In contrast, Mona reasoned that HE should train students' digital literacy, and that students are expected to apply such competence in the exam or test situation. Therefore, if students made mistakes due to IT ignorance this would affect their grades. Sophia, a language teacher, designed several quizzes in her course with the double purpose to help students both test their language knowledge and learn how to conduct quizzes in the LMS. Hence, IT was not only a means to an end but also part of the intended learning.

REDESIGN OF COURSES AND ASSIGNMENTS

The use of various digital applications for the assessment of students' performances meant that the teachers adapted the design of their graded and non-graded assignments. This in turn encouraged teachers to consider and change the overall design of their courses. Several teachers *changed the assessment mode*, for example by replacing laboratory reports with automated assessed multiple-choice questions. They also reflected upon the available DT, which they found more suitable for assessing some aspects of students' expected competencies. Teachers reported that it was not possible to make all kinds of knowledge, skills and approaches visible in the digital applications they used. Automated assessments, for example, were considered useful for assessing factual, non-disputable basic knowledge. To this end, the teachers created assignments such as quizzes useful for students' *continuous self-assessment*, something that was implemented in the majority of courses that these teachers referred to. Here, Dina, who teaches law, explained the advantages of using DT.

This kind of formative elements... firstly, it only works using digital environments, at least with these student volumes. [...] From the students' perspective, that they can get automated feedback. They can do it anytime; they can do it several times. (Interview 11)

Most teachers reported that the application of digital assessment made them redesign course activities and assignments, for example, creating home assignments requiring deeper understanding and several multiple-choice questions assessing limited parts of the students' knowing. Several teachers reported using DT to assess 'easy-to-learn' simpler skills continuously throughout the course, and in addition, they created home assignments to capture the students' abilities to apply knowledge. This way of *combining different assessment modes* was implemented by the majority of the informants in response to the different opportunities and limitations that the digital tools offered. Formative multiple-choice questions were regarded as a way to motivate students' engagement and continuous studying throughout courses, and digital tools created an opportunity that for reasons of time could not be justified without the automated assessments.

Teachers were aware that students sometimes collaborated during remote assessments, or that they worked out maths problems using digital

tools available on the internet, instead of doing calculations themselves. This made test scores unreliable. Therefore, teachers introduced several measures to prevent students from sharing information in individual tasks. Such measures included assigning different values to the same maths problem randomly distributed to different students or mixing the order of how tasks were presented to students. In addition, some teachers created libraries with several problem tasks so that students performed different assignments requiring similar knowledge. In these ways teachers made additional decisions and assignments compared to conducting assessments with pen and paper.

DISCUSSION

In this chapter, we illuminate transformations of assessment practices by exploring teachers' experiences of assessing students' performances using DT. Given the time of data collection, the redesign of courses and assessments was also influenced by the pandemic, including the necessity to assess students learning remotely. Thus, DT was a condition for making remote assessment possible. The use of DT made teachers redesign assignments and courses, and they assessed other forms of knowledge and knowing than when students previously used pen and paper. Unsurprisingly, teachers' work processes also changed. DT affected teachers' assessment design decisions in several ways, not only regarding who were involved in making decisions, but decisions had to be brought forward and further detailed and thought-through before implementing assignments that students performed in digital systems. It can be difficult for teachers to imagine and predict exactly how students demonstrate their knowledge including choice of words and possible spelling errors. Open responses or word recognition of student-made texts could enable divergent assessments where students demonstrate knowledge beyond what could be tested via multiple-choice, such as performing calculations or elaborate reasoning. Teachers who used systems for automated assessment of open responses experienced friction between their intentions and the default system settings that did not always correspond to their ideas of how to judge student performances. Automatically assessed answers, although efficient and timesaving, do not allow for small typos and partial mastery (cf. Lesage et al., 2013), and require additional decisions made beforehand to adjust system settings on what possible errors to allow.

The idea that the digitalised assessment process saves teachers' time often drives implementation (Bennett et al., 2017), and was also a reason why teachers in this study chose to use DT. On the one hand, the teachers experienced that the digitized parts of the process (e.g. submitting essays via LMS) significantly changed and made their work easier and increased opportunities to assess large student groups. On the other hand, the *digitalisation* of assessments, such as automated feedback and grading based on student answers, required additional and unforeseen work, and even advanced programming skills. The contradiction between timesaving and workload reduction, and the unexpected consequences of requiring more time for planning and set-up were described in a recent review (Brady et al., 2019). In other words, the digitalisation of assessment seems to change the work process but not necessarily into an overall more effective and efficient process. As one teacher's reasoning in this study reveals, the initial work to implement digital assessment may pay off if the same assignments are re-used in later courses, but programming and system adjustments may not be worthwhile if the digital assessment is a one-off situation.

According to the findings of this study, when digital assessments were implemented, the final course exam was complemented with continuous assessments throughout the course, increasing the number and frequency of assignments. If DT drives assessment practices towards continuous formative and summative assessment of student learning, as in the current study, and even replace the typical end-of-course exam, this would be a significant transformation. Students could be given continuous feedback, which we know is important for learning, and the 'exam stress' associated with the one-time snapshot constituted by a single test, could be reduced. However, such feedback would have to be of high quality to support student understanding. One risk is that the high frequency of digital assessments will be limited to 'pieces of knowledge', which might signal to students that while studying they should focus only on factual and declarative knowledge. Overall, based on the teachers' design decisions in this study, the assessments via digital tools *converged*, making it harder for teachers to allow for variation in student responses. In contrast to the intentions reported by several teachers, the assessments became about measuring students' fulfilment of specified and detailed outcomes of learning ('the correct answer') and limited teachers' opportunities to provide supporting feedback (feedforward). As previous in-class assessment research indicates, the way teachers design assessments, i.e. the type

of questions asked, sends signals to students of what counts as knowledge in a particular course (Weurlander et al., 2012). Consequently, the convergent change of assessment identified here may influence students' views of knowledge. Also, if formative elements mainly assess students' 'lower level of understanding' or, pieces of knowing according to pre-defined and static tasks, the transformation due to DT in HE may foster assignments that epistemologically move in a direction contrary to ambitions of furthering student learning. Such ambitions include equipping graduates with twenty-first-century skills and capabilities to solve multifaceted societal challenges (Barman, 2021; Barnett, 2012; Griffin & Care, 2014).

From a pedagogical perspective, the design of systems for digital assessment can be criticised for facilitating the assessment of 'easy to measure' pieces of knowledge—convergent assessments—for example with multiple-choice questions at the expense of enabling assignments requiring students' integrated and holistic knowing—divergent assessment. Bearman and colleagues argue that assessment *'too often require a high degree of recall and offer little opportunity for student input or choice. Our overall impression is, in higher education, the digital has locked in an old set of ideas about assessment'* (Bearman et al., 2020, p. 8). Digital assessments would thereby tend to conserve views about assessment of student learning than transform new ways of capturing student capabilities. Thus, for digital transformation of assessment practices to occur, we need to re-imagine *what* and *how* we assess students' knowledge. In this study, several teachers were frustrated that students were unable to demonstrate their thinking in STEM subjects and, hence, that they were unable to assess important knowledge. This implies that some of the current transformations due to the use of DT is, in some ways, moving in the wrong direction.

In addition to assessing the intended subject area learning, it became evident that, according to the teachers, students' familiarity with the DT—digital competence—influenced how well they performed. Several teachers found this unfair, messy and an unnecessary demand on students, while a few argued that DT should be an integrated part of learning and a requirement of what students in HE should be capable of. Like other kinds of general competencies, such as writing or presentation skills, supporting students' digital competence will certainly be part of what teachers need attend to if assessments increasingly are performed digitally. It seems though that many university teachers experience shortcomings in

handling issues in the digital environment that are more complex and, in general, teachers need to improve their digital competence, according to a review of the research literature (Zhao et al., 2021).

The teachers' experiences in this study show that the use of DT during the assessment process may require increased support and collaboration in new ways. This implies that the autonomy associated with assessment decisions may decrease due to default settings in IT systems and the necessity of involving non-teaching staff. This raises a question of who should be the decision-makers and how much influence on content IT support or ICT staff and educational developers should have. Scholkmann, (Chapter 6), discusses this with similar and elaborated reasoning regarding frontline workers during HE digital transformation. Pursuing critical perspectives regarding edtech-driven developments in the education system as a whole, Facer and Selwyn (2021) acknowledge that teachers' roles will undoubtedly change due to DT. However, they warn about the deprofessionalisation of teachers if technology assistants start to replace professional decision-making. From one perspective, the implementation of DT facilitates pre-defined and standardised ways to provide education and can serve as an important guarantee for quality in processes and output. In contrast, assessment design of, for example, mode and modality is more likely to address important knowing when based on an understanding of context including subject-specific expertise, and are varied to meet learners with different needs (Barman et al., 2019b, 2022; Facer & Selwyn, 2021). In this study, teachers seemed grateful for help in setting up, redesigning and adapting tasks in digital environments, and some even sought support during assessments. However, consequences associated with the transformation of academics' roles and responsibilities due to distribution of assessment design decisions in HE is certainly something that needs further exploration in coming years.

Digital transformation may be seen as a buzz term and several efforts have been made to define it. Advancements due to DT refer to innovative IT, or the effect on people's everyday lives as well as organisational offerings and internal operations (van Veldhoven & Vantheinen, 2019). Assessment of learning using DT may fundamentally change how HE institutions interact with society in terms of enabling universities to provide credentials to learners other than the enrolled students. However, the current study illuminates transformational processes regarding teachers' roles and work, in particular the assessment design decisions as

defined by Bearman et al. (2016), and described in this chapter. In addition, the use of DT, partly due to the need for remote assessment, resulted in epistemic changes as to what kind of knowledge and knowing that were assessed. While conducting remote assessments facilitated the redesign and implementation of divergent assignments where students were asked to apply and integrate knowledge, which pedagogically may indicate a step forward, currently available technology also enabled continuous, but increasingly convergent assessments. The latter implies transformation towards reduced transparency of students' learning processes and hiding students' learning issues and misunderstandings from teachers, which should be considered a step backwards. In this sense, it seems that using digital technology led to adaptation rather than innovation of assessment practices.

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PART III

Organizational Manifestations of Digital
Transformations—Before and Following
COVID-19



Who Are the Frontline Workers of Digital Transformations in Higher Education? A Conceptual Elaboration

Antonia Scholkmann

INTRODUCTION

With the COVID-19 pandemic at the latest, the term “frontline workers” entered mainstream usage. “Essential and frontline workers” were those who maintained critical social services in the face of a disruptive global crisis (Blau et al., 2020). In addition to healthcare workers and employees in critical functions in the public sector, this also included teachers (Beames et al., 2021). However, the *frontline worker*, and its even more specific counterpart, the *street-level bureaucrat*, were already an integral part of the scientific vocabulary long before the pandemic. At the intersection of public management theory, sociology of institutions and organizational learning, street-level bureaucrats have served, in the wake of the practice turn in these subjects, to explain phenomena of variation in the implementation of policy.

A. Scholkmann (✉)
Department of Culture and Learning, Aalborg University, Aalborg, Denmark
e-mail: ansc@ikl.aau.dk

Komljenovic (2020) has clear-sightedly pointed out that the digital transformation of higher education is taking place “in the time when the practice is superseding policy, where there is no regulation beyond the question of data privacy” (Komljenovic, 2020, p. 1). The COVID-19 pandemic has on the one hand exacerbated this situation: the ad hoc transformation of teaching and learning into online mode has established concrete practices even more clearly than before, without well-drafted supporting policies being in place covering more than the absolute necessity to go online. Many of the negative effects discussed by Komljenovic (2020) appear to have multiplied, such as platformization (i.e., the total or partial re-allocation of both the offer and the use of data-based educational arrangements toward digital platforms and hence out of the ownership and steering capacity of the university) or assetization (i.e., renting out digital offers and data instead of exchanging them as commodities, cf. Komljenovic, 2020). On the other hand, however, the specific situation during the pandemic and the forced shift to digital teaching also highlighted the role of university staff as frontline workers. Building on this, I argue that digital transformation of higher education teaching and learning is a policy in the making. That is, its enactment by frontline workers can and should be treated as an important contribution to its definition—especially in the highly digitalized Nordic countries.

The Nordic countries have been elaborated on before as providing a specific case for the understanding of digital transformation. Following Laterza et al. (2020), they can be argued to provide a unique combination of context conditions, such as a state-funded higher education system that provides a relatively safe space for pedagogical and technological experimentation without the immediate threat of losing students (cf. also Fägerlind & Strömqvist, 2004); also, (higher) education in the Nordics is, albeit with variation, guided by principles that go beyond the prioritization of economic gains, working on the premise that education should serve society and a greater public good (Ofstedal Telhaug et al., 2006). This enactment of the Nordic welfare state demands a level of trust in institutions of higher education, which in the case of policy enactment entails high amounts of discretion, both for institutions and for individuals. Moreover, as the authors argue, the expectation of societal value creation in the Nordic approach can act as a counterbalance to the assumed dominance of platform providers in policymaking and shaping (Laterza et al., 2020).

The focus of this paper is digital transformations in the provision of teaching and learning in higher education. This provision must be understood as a multifaceted enterprise, which involves not only teachers, pedagogy, and students, but also support staff and the wider university ecosystem (cf. Laterza et al., in this volume). Digitally transforming it adds another layer of complexity, since *transforming* entails mutual inspiration and co-creation of new concepts, solutions, and ideas with and by use of new (digital) tools (Wollscheid et al., in this volume). Focusing on frontline workers and street-level bureaucrats, then, is also an acknowledgment that digital transformation of teaching and learning is tied to concrete and emergent practices (Gherardi, 2015). This means, that under this practice perspective, not only formalized decisions, guidelines, or laws should count as policy, but also the actions and practices emergent in interplay with these (e.g., Braun et al., 2011; Hill, 2003).

In the following, I will first provide a short overview of the origins and theorization of the concepts street-level bureaucracy and frontline work, together with an outline of how they have been applied in higher education research, so far. Also, some elaborations will be provided on how research on street-level bureaucracy and frontline work has engaged with the phenomenon of digital transformation, and why a focus on the frontline workers of digital transformations of higher education might be a timely enterprise. Second, I will lay out a map of groups of higher education personnel that can be argued to enact frontline work in the digital transformation of higher education. Third, I will briefly elaborate on the possible consequences of framing digital transformations of higher education as frontline work for future research.

DIGITAL TRANSFORMATIONS OF HIGHER EDUCATION AS STREET-LEVEL BUREAUCRACY AND FRONTLINE WORK

The term *street-level bureaucracy* was coined in the 1980s by Lipsky (2010), who, in his seminal book explored the dilemmatic tensions between policies and their execution in practice by human actors. With his work, he was by far not the only scholar at that time to engage in elaborations comprehensively understood as the “practice turn” in social sciences research (e.g., Buffat, 2015). However, as Rowe (2012) puts it:

Lipsky's work (...) has long been one of the clearest expressions of an idea: that those who work on the front line of public services make a difference to policies and to the way in which they are experienced. (Rowe, 2012, p. 10)

This “making a difference” has been explained by the fact that street-level bureaucrats are endowed with considerable discretion in executing their tasks, i.e., degrees of freedom to act as they see fit. This has been argued to be the case since street-level bureaucrats have to solve problems that “deliberately or not, may have been left unresolved further ‘upward’” (Hupe, 2019, p. 7). The execution of their discretion often puts street-level bureaucrats in conflicted positions, for example between their own professionalism and the concrete affordances of the policies they are about to implement (Rowe, 2012). *Frontline workers* (e.g., Balogun et al., 2015) in this view are considered as the ones implementing and translating policy into practice, for example as personnel in the provision of government services, such as administrative front desks, police officers, social workers, or schoolteachers (Blau et al., 2020; Meyers et al., 1998). They are the ones representing the (welfare) state in direct interaction with clients, customers, or students, by carrying the responsibility for the implementation of various forms of policy, from state service to welfare to school curriculums.

For the purpose of this chapter, it must be noted that street-level bureaucracy and frontline work were not originally conceptualized with higher education in mind. When looking at these concepts from the perspective of their original understandings this makes sense: although it takes place at state institutions, higher education is—especially in the Nordic countries—considered to be enacted with a considerable degree of freedom regarding curriculum and didactics (opposed to the much narrower margins in the actions of, for example, police officers; cf. also the introduction to this text). Despite these differences, street-level bureaucracy and frontline work have also been applied as theoretical lenses in higher education research, for example with a focus on how administrative personnel acts as street-level bureaucrats in the execution of administrative tasks related to admission policies (e.g., Bell & Smith, 2022; Chopra, 2020; Howard, 2017). A more flexible understanding of frontline work in higher education can be found in studies that do not necessarily focus on

bearers of legalized power as the enactors of policies but on “soft” bureaucrats, such as faculty and other teaching personnel, and how they enact curriculum and curriculum reform (e.g., Venance et al., 2014; Witenstein, 2020; Wray & Houghton, 2019). Last but not least, researchers have self-labeled as working on the frontline without this necessarily being the line of implementation of an imposed policy or reform, for example with the concept of diversity (Anttila et al., 2018), or in the implementation of emancipatory pedagogies (Louise-Lawrence, 2014).

Research on street-level bureaucracy did also not start out with a specific focus on digitalized and/or digitally transformed frontline work. However, as Hupe (2019) has pointed out, digitalization must be considered as one of the societal developments which have been challenging frontline work and the execution of discretion by street-level bureaucrats recently. Not only has technology led to transformations in the delivery of (public) services—work roles and assignments are also affected, which brings about both advancement and additional challenges (Hupe, 2019). Frontline work theory has proposed two somewhat competing explanations to interpret these developments. In *curtailment theory*, Snellen (2002) proposed a reduction in the degrees of discretion within frontline work due to computerized standardized decision-making. This can potentially de-power street-level bureaucrats since they will no longer be able to “manipulate information” (Buffat, 2015, p. 152). However, and competingly, *enablement theory* proposes that technological advancements are being used adaptively by street-level bureaucrats, in the sense that standardized digital tools will be used for standardized tasks, while more complex matters are dealt with in a face-to-face manner as before (for an overview see Buffat, 2015). In this way, technology seems to increase rather than limit the discretionary powers of frontline workers (Høybye-Mortensen, 2019).

Recent research suggests that the digitalization of services does indeed lead to interplay with street-level bureaucrats’ interpretation with considerable degrees of discretion, and that these effects are not unidirectionally limiting or enabling but provide a picture of transforming work and practices based on digital transformations (e.g., Pors, 2015). In their study, Tummers and Rocco (2015) found that frontline service workers in e-government services are moving toward clients with rule-bending and overwork to make these services work. This falls in line with findings from Løberg (2020), who showed that administrative frontline workers

engaged in digitalized e-government services in Norway considered digitally transformed processes both helpful in terms of flexibility, but also challenging due to the expected availability 24/7. Also, Breit et al. (2019) have pointed out the “increased availability of the frontline workers to the clients” (p. 1) as a challenge to be coped with. This is done by “handing over responsibilities to the clients through digital platforms” (p. 1), which leads to new divisions of labor and new understandings of roles between frontline workers and clients. In their follow-up study, the same group of authors (Breit et al., 2020) coined this outsourcing and re-integrating of tasks and responsibilities as “cyborg bureaucracy” (p. 149), and Nisar and Masood (2018) have labeled providers that go from street level to screen level as “cyborg bureaucrats” due to the far-reaching transformation of roles, services, and interactions between actors and digital tools.

Finally, it must be noted that digital transformation in higher education is not a legally binding aspect of policy work (like for example the data protection policies elaborated on by Komljenovic, 2020). In this sense, expectations of “going digital” should be considered a soft rather than a hard policy (for a more detailed elaboration of these concepts cf. Blomqvist, 2022). However, not least due to the developments instigated by the COVID-19 pandemic, it will be hard for higher education to revert to a non-digital model. As a result, integrating the digital, and eventually instigating digital transformation, is a concept that will remain prevalent in higher education, for example by making the use of specific digital platforms that a university has agreed on mandatory, or by inscribing hybrid learning models into study descriptions. The enterprise of transforming higher education, digitally, builds on more or less obvious forms of policies, which nonetheless play out differently for different groups. An application of the concepts of street-level bureaucracy and frontline work to the digital transformation of teaching and learning in higher education will therefore need to distinguish stakeholder groups based on their tasks, practices and discretion as well as the degrees and levels of discretion they apply, and in relation to specific other groups.

FRONTLINE WORKERS OF DIGITAL TRANSFORMATIONS OF HIGHER EDUCATION

In the following, I will elaborate on four distinct groups—faculty, students, educational developers, and administrative staff—from the perspective of how they can be argued to execute frontline work and

enact digital transformations. I will do so through the theoretical lens of street-level bureaucracy and frontline work, focusing on the aspects of discretion, curtailment and/or enablement, and cyborgization, specifically. I will supplement this with evidence from existing studies that can be argued to substantiate some of the perspectives I propose. It should be noted, though, this will be a first and approximative elaboration, and that more systematic empirical observations will be needed to substantiate these ideas.

Faculty

Teachers have been elaborated on as frontline workers mostly in primary and secondary education (e.g., Tummers et al., 2015), where they are considered to translate the programmatic curriculum into enacted practices toward pupils and therefore toward the broader society. In contrast, faculty and other teaching personnel in higher education (such as non-tenured faculty and adjuncts) have been argued to work with higher degrees of freedom when it comes to the selection of learning content and pedagogical approaches (Scholkmann, 2020; Venance et al., 2014). In this sense, digitally transformed frontline work of higher education faculty and teachers seem to be driven more by enablement than by curtailment.

Based on principles of academic freedom, individual teachers and specific networks of researchers have—long before the ad-hoc digitalization during the pandemic—been engaged in both the design and the reflection of digitally transformed teaching and learning (e.g., Gourlay, 2012; McPheeters, 2009). As self-defined frontline workers these “digital enthusiasts” (Tømte et al., 2019) have contributed to shaping rather than to implementing policy, as they have explored possibilities and boundaries of new technologies, and experimented with new roles for both the teacher and the learner based on what these technologies could provide. Accounts of this can be found in many of the pedagogical concepts that have reframed teaching and learning under an information and communication technology (ICT) perspective, such as Computer Supported Collaborative Learning (CSCS, e.g., Shamir et al., 2007), Networked Learning (NL, Goodyear, 2005) or Technology-Enhanced Learning (Bower, 2017). Collaborations with software development (often as open-source and open-access approaches) might, whether intentionally or not, have contributed to the rise of the digital platform economy.

However, some researchers have argued that the implementation and enactment of new technologies are a threat to academic freedom and shared governance (e.g., Curnalia & Mermer, 2018). Being forced toward the integration of digital practices as a result of a global pandemic has certainly been aversive to at least some portion of faculty and teaching staff (Scholkmann, 2022), and resonates with research on school teachers that have explored this group's reservations toward a transformation of their professionalism through digital practices (Harrits, 2019; Hupe & Hill, 2007). Already pre-Covid, Sjöberg and Lilja (2019) showed that university faculty do in fact perceive digital technologies as constraining when implemented under an organizational instead of a pedagogical rationale. Also, their informants felt that broader societal developments regarding digital transformations were limiting their technology use, such as juridical questions, the rapid evolution of technology, and shifting literacy practices in new student cohorts. In a way, the feeling of being curtailed rather than enabled by digital technology seems to touch upon digital competences, and overcoming resistance to digital change becomes a question of learning (Scholkmann, 2021).

Students

Considering students as potential frontline workers in the digital transformation of higher education might come as a surprise since students are not part of the workforce of higher education institutions. However, as Buchardt et al. (2022) argued for pupils in Nordic schools, learners' enactment can be seen as part of the curriculum, and their experiences form the basis for policy. Transferred to students in higher education, it can be proposed that this population is enacting the even more opaque higher education curriculum with even more discretion than schoolchildren, which makes their frontline work more relevant with respect to shaping policy, but also more difficult to disentangle. In fact, studies on students' digitalized practices have shown a broad variety of activities, and an adaptation of both university-sanctioned and commercial tools for complying with study affordances (Henderson et al., 2017; Lai & Hong, 2015; Yot-Domínguez & Marcelo, 2017). And the same studies have pointed out that students use digital technology in a less pedagogically transformative way than expected by techno-enthusiastic faculty.

Students' non-transformative use of technology could help to explain the finding that implementing digital technology has not fundamentally

transformed pedagogies (e.g., Reich, 2020). It also challenges us to not put the burden of acting transformatively on a population that is, I would argue, enacting digital transformation precisely as they are expected to: As research on digitally transformed policy enactment in other fields has shown, a digitally transformed provision of services increased clients' and customers' feelings of agency (Høybye-Mortensen, 2019). By making use of digital technology to succeed in their programs, students might in fact embrace their discretionary power to comply competently with the existing educational agenda; i.e., they are acting as street-level bureaucrats as expected.

From a different angle, the policy-enacting frontline work of students needs to be discussed from an equality and inclusion perspective. Tellingly, this aspect has been raised predominantly by researchers from the global south (e.g., Dlamini & Ndzinisa, 2020). Due to economic disadvantages, students might not have access to the full range of technological equipment and services, and this can easily become a deciding factor in determining which students get to participate in digitally transformed teaching and learning. This resonates with what street-level bureaucracy research has been pointing out as crucial for participation in policy enactment, i.e., access to training and community (Hill, 2003). In this perspective, selection processes become dominant in deciding who gets to do the frontline work, and as a result, who participates in informing and shaping policy for the education of the future.

Educational Developers

Educational developers (interchangeably: academic developers, staff developers, faculty developers) have been elaborated on as indispensable actors in pedagogical change (Solbrekke & Sugrue, 2020). Through multiple roles and functions—from offering pedagogical training and consultations, to being engaged in curriculum development, to engagement in higher education research and leadership (e.g., Gibbs, 2013)—educational developers are increasingly being seen as active co-creators in the joint enterprise of higher education. Here, again, the pandemic has brought to the fore digital transformation as an arena that had already existed but gained new attention in the last two years. This is reflected in the close entanglement of educational developers also with digitally transformed practices in higher education. A survey on the professional trajectories of educational developers in Germany has shown that in 2017

approximately 13% worked at positions with a focus on media didactics (Scholkmann & Stolz, 2017). So, for parts of the educational development community at least, we can assume a certain knowledgeability and/or enthusiasm for the topic. Also, a cross-section of these groups (i.e., general educational developers and those working in media didactical positions), it must be assumed, will be engaged with faculty (and students, eventually), in the enactment of digitally transformed higher education.

It should be noted that the roles and capacities of educational developers can differ from institution to institution, based on the local interpretation of educational development work. Taking a broader perspective, national policy can also influence how prominently educational developers engage in the shaping of higher education and digital transformation, respectively. In the Nordic countries, educational development has long been highly institutionalized, due to the implementation of pedagogical development in university laws (cf. Moses, 1987 on Sweden as a case). This has resulted in educational development units—and often separate digital transformation units—being common at Nordic institutions of higher education, and educational developers as being considered legitimate members of the organization. In this sense, also the debate on whether education development is an academic field in its own right (e.g., D’Andrea & Gosling, 2001; Harland & Staniforth, 2008; Shay, 2012) is superseded by actual practices of doing educational development in the Nordics, with educational developers executing frontline work in implementing the state-set policies on pedagogical training, but also expanding their spheres of influence toward consultancy and organizational development, and digital transformation, therein (Havnes & Stensaker, 2006).

As their work is based on relations to faculty and peers at similar qualification levels, and not endowed with any sanctioning capacity, the frontline work of educational developers can be understood as acts of “horizontal” rather than “vertical discretion” (Evans, 2011): by assisting (new) faculty to interpret policy, they can, at best, act as “boundary spanners” (Honig, 2006, title)—even if the notion that they always affect their counterparts in a far-reaching and transformative way may itself be somewhat idealized. Instead, and realistically, we can assume that educational developers act as translators of policies toward their clients, defining (willingly, or maybe even unelected) and driving developments in the zone of proximal development. With respect to digital transformation this can become specifically relevant as there often is no detailed agenda in place—as was

clearly the case during the pandemic—which means that educational developers can hold the power to interpret policy and technological affordances, alike. In how far their work is becoming more of a cyborg-quality needs to be closer studied in the future.

Administrative Staff

Most directly affected by explicit policies regarding digitalization (such as data protection or the mandatory use of specific systems) are, finally, staff in administrative roles, for example, study secretaries. It is they who are probably most clearly under the influence of standardized or automated processes (for example when ordering material, setting up and distributing technical hardware, or when navigating the pre-set demands of a specific electronic system). At the same time, they are most directly able to exert discretion by “bending” rules, “manipulating” systems, and amending procedures in contact with students, faculty, external stakeholders, and administrative colleagues.

In the field of (higher) education, we see advancements in algorithm-based testing, automatic plagiarism checks and standardized job-application tools—technology that often is handled by administrative staff. On the one hand, these tools probably curtail academic staff’s discretionary powers, as they limit the freedom to make exceptions or bluntly reach a verdict where none was in place before (as with plagiarism software, for instance). However, administrative personnel’s actions toward these tools also have shown to result in highly adaptive and even cyborgian practices. For example, a study secretary may receive a booking for a certain event via the electronic reservation system, then get up and physically inspect the room before confirming whether the room is suitable for the intended needs via a phone call or email. Although such accounts are only anecdotal at the moment, it can be said that the frontline work on display here creates a new local policy in which members of administrative staff act as intermediaries in a complex socio-material setup.

It has been argued that with the rise of more digitally transformed higher education opportunities, the digitally influenced practices of administrators will become more manifold (Gornitzka & Larsen, 2004; Pohekar, 2018). As research on the practices of this population is scarce in general, and even more so with respect to digitalization, it is of high interest to integrate this important but often overlooked group into future research perspectives.

WHERE TO FROM HERE?

In the first part of this chapter, I provided an elaboration of the applicability of street-level bureaucracy and frontline work to the topics of higher education and digital transformation. In the second part, I engaged in the exploration of the practices of four distinct populations within higher education which can be argued to execute frontline work in the digital transformations of higher education: faculty, students, educational developers, and administrative personnel. Expanding now on both parts, I propose four potential focus points for future research. These are, again, based on the existing literature and research on both street-level bureaucracy and frontline work, supplemented with empirical and conceptual evidence of practices of digital transformation of higher education. Specifically, I will elaborate on (1) policymaking and policy shaping; (2) the interplay between different groups of frontline workers; (3) local variation in frontline practices; and (4) frontline work and digital transformations under a longer-term perspective.

Regarding the first point, *policymaking and policy shaping*, it must be stated that the digital transformation of higher education stands at a crucial point in time: Accelerated by the Covid pandemic, digital tools are implemented at high speed, making what was previously in part a niche interest of digital enthusiasts the concern of the entire university ecosystem overnight. This comes with the realistic concern that platform providers as (en-)actors of the global digital economy are becoming policy shapers in their own right, as they push for business models of platformization and assetization (cf. the introduction of this paper). Moreover, since policymaking is lagging behind rapid technological and economic developments, we see “the governance of education activities (...) shifting from public education law and public scrutiny, to contract law and commercial sensitivity (...)” (Komljenovic, 2020, p. 14). While the need for better policy regarding digital value creation and data sharing is of high importance, also the enactment of soft digital higher education policy beyond data law should be scrutinized. This could be both the study of how the street-level bureaucrats exert their discretionary power given the current situation; and the study of how their enactment of the given soft policy of “go digital” might influence policymakers and policymaking through processes of selective institutionalization.

Regarding the *interplay between different groups of frontline workers*, the Covid pandemic has shown that, in an absolute emergency, traditional boundaries between actor groups and functional roles in the higher education system broke down, and new and innovative solutions were found across traditional boundaries. As Bessette (2021) in their reflection on this situation calls it, this “breaking down of service silos” (p. 9) has shown the potential to create co-constructive spaces for digital transformation. In light of crisis research in combination with organizational learning theory, collaborating across boundaries is considered an important factor for learning and resilience (Scholkmann, 2022). Additionally, an increasing overlap in academic qualification levels between faculty and what are known as “‘third space’ professionals” (e.g., Whitchurch, 2008, title), who often work on administrative contracts within the higher education system, increases both the probability and need for the execution of horizontal discretion and, in general, for collaboration across traditional status and disciplinary boundaries. A future research program should therefore consider the roles and contributions of the frontline workers of higher education not in isolation, but also in the context of their interplay within and across different groups of actors as well as from an international comparative perspective (Hill & Møller, 2019).

Regarding *variations in frontline work*, Blomberg et al. (2018) have shown that variation in policy implementation is based on frontline workers’ professional backgrounds. Also, research has shown variation in policy adaption in institutions with the same outlay (Bjerregaard, 2011). Based on that, we can state that most likely variation in frontline work will occur on a broad spectrum. However, not many studies focused on this, especially not when it comes to digital transformation of higher education. Among the few that have done so, Haase and Buus (2020) found a broad variety of digital policy translations in Danish institutions of higher education, and considerable challenges in finding a common language about the phenomenon. I would argue that this is not to be framed as a deficit due to insufficiently clear national policies (Laterza et al., 2020), but as an expression of discretionary powers at work in the contextualized and concrete enactment of policy. We should bear in mind that in a time “when accelerating digitalization is producing ever more varied and uneven paths of development” (Laterza et al., 2020, p. 230), variation will also more and more be the norm, and not the exception, and should be explored as a contextualized practice.

As a last point, *frontline work and digital transformation under a long(er) term perspective* must be highlighted as a topic for future research. Studies on policy reform have shown considerable strategies of non-compliance and hidden resistance to welfare state reforms among street-level bureaucrats in the longer run (e.g., Meyers et al., 1998). Therefore, a deeper understanding of how both enactment of and resistance to digital transformation in higher education plays out in the frontline work of its actors might be necessary. Digital transformation in higher education has been elaborated on as a multi-stage process (e.g., Bryant et al., 2014; Graf-Schlattmann et al., 2020), in which the interplay of humans and technology (Ching & Wittstock, 2019) as well as an institution's digital maturity (Marks & AL-Ali, 2020) can play a role. Integrating these perspectives could be worthwhile to disentangle the complexity of digital transformations in higher education—in the Nordics, and beyond.

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Digitalization as a Strategic Goal—The Missed Potential of Profiling Danish Universities in the Digitalization Era?

Lise Degn 

INTRODUCTION

Digitalization has been on the political agenda in the Nordic countries for years, and due to the Covid-19 pandemic the focus on digitalization of (higher) education has increased concurrently with the national lockdowns. However, even before the pandemic forced HEIs to adopt digital solutions to an unseen degree, digitalization was a significant and powerful policy idea and previous studies have indicated that particularly Denmark has—even before the Covid-19 pandemic—had a very high uptake of ICT-solutions, even higher than e.g. Norway, which is also normally seen as very digitally advanced (Tømte et al., 2019). This also indicates what literature on digitalization of higher education has shown for years: that digitalization—long before the acute drive of the

L. Degn (✉)

Department of Political Science, The Danish Centre for Studies in Research and Research Policy, Aarhus University, Aarhus, Denmark
e-mail: ld@ps.au.dk

pandemic—has been seen as a necessary component in enhancing quality in higher education, e.g. by fostering new pedagogical opportunities for engaging students (Henderson et al., 2017), by offering technological infrastructures, or by enhancing internationalization of education (O'Connor, 2014).

But at the same time as these digital transformations have been reshaping the way that we think about higher education, the higher education systems and institutions have also been reshaped. Over the past decades, the pressures on universities have become increasingly intense, and change has become the order of the day for higher education institutions. The increasing competition for funding, the increasing student numbers, and demands for internationalization are just a few of these pressures, and at the same time governance reforms have swept the national higher education systems, transforming universities into self-governing entities, with substantial institutional autonomy to change structures and processes to accommodate the rising pressures (Amaral et al., 2013; de Boer & File, 2009). This rise of autonomy of universities has led to significant institutional transformations, e.g. in the form of mergers (Pinheiro et al., 2016), increased managerialism (Deem & Brehony, 2005) and professionalization of the organizations (Krücken & Meier, 2006). This is not least the case in Denmark, where the amount and extent of reforms have been notable, also compared to the other Nordic countries. Since the turn of the millennium, Danish universities have been reformed and reshaped continuously, both regarding the relationship with the state, the institutional size, the funding structure, their autonomy in relation to educational provision (e.g. the right to decide which and how many study places to offer) and their overall institutional autonomy and leadership (Aagaard et al., 2016; Aagaard & Mejlgård, 2012; Degn & Sørensen, 2015). Together, these transformations have over a relatively short period of time markedly increased the competition between institutions (and across the sector), for both research funding and students, and strengthened the strategic capacity of the institutions, e.g. by implementing self-ownership and professionalizing management structures.

When reviewing these parallel transformations—the digital and the institutional—it seems obvious to ask whether they are connected, e.g. whether the universities are exploiting their increased autonomy and strategic capacity to harness the power of the digitalization idea to strategically profile themselves in an increasingly competitive market of higher

education? As mentioned, digitalization has for years been seen as a vital component in—or vehicle for—enhancing the student experience, and might therefore be seen as an obvious profiling tool for universities wishing to attract potential students. At the same time, digitalization is also a very powerful policy idea, which has been on the political agenda in the Nordics for years. Digitalization might therefore also be used by universities to gain or maintain legitimacy and to demonstrate responsiveness towards policy drives and technological innovations. On the other hand, an abundance of studies has demonstrated how universities, generally, are fairly resistant to change and that institutional pressures are often more influential than competitive pressures (Mampaey et al., 2015). As demonstrated recently by Buss and Haase (Haase & Buus, 2020) Danish universities do, to some extent have strategies in relation to digitalization, but these institutional strategies are somewhat fragmented and do not seem to connect the motivation, the means, and the end of digitalization (Haase & Buus, 2020).

In the present chapter, the aim is to expand on the analysis performed by Buus and Haase and add the notions of strategy and autonomy to this. I wish to explore how/if universities use the idea of digitalization as a profiling measure. Where Buus and Haase examined institutional strategies, I focus on contracts and how digitalization emerges in these contracts, to highlight how/if universities make binding commitments to digitalization. Most studies of digitalization in higher education have focused on digitalization as top-down processes—influenced by international agendas or government policies, or as bottom-up initiatives, driven forward by dedicated individuals (Tømte et al., 2019). In this paper, however, the aim is not to look at the implementation of digitalization to search for effect, nor to explore digitalization initiatives, but to explore if and how the idea of digitalization is used strategically by HEIs and discuss implications and possibilities in relation to strategic management.

THEORETICAL FRAMEWORK

In order to make sense of digitalization as a policy idea that is able to move from context to context, the article uses a theoretical lens which focuses the gaze on policy ideas and how they are translated in local contexts.

The central theoretical concept in this chapter, thereby, is the one of policy ideas. Intuitively, most people would argue that *an idea* is a plan

aimed at solving a specific problem or a specific way of viewing the world, for instance when speaking of political ideas. And actually, this common sense perception of the concept is not too far from the theoretical understanding within the framework laid out in this article, where ideas are seen as *normative and causal beliefs, working within a dynamic network of other ideas, establishing goals and means by which these goals can legitimately be obtained*. In other words, ideas are the fabric of institutions and thereby the filter through which we see ourselves and our surroundings.

This perception of ideas stems from a strand of literature which does not necessarily form a coherent and comprehensive theoretical framework, but is better understood as an amalgamation of many different perspectives, whose overriding common characteristics is a basis in *institutional theory* and an emphasis on *ideas* as having intrinsic importance in policymaking and political action (Degn, 2015). The perspective distinguishes itself by its insistence that ideas are more than mere smoke-screens for material interests as claimed by scholars of rational choice (Mehta, 2010), more than reflections of path-dependent norms as they are portrayed in historical and sociological institutionalism (Campbell, 1998), and is therefore deemed useful in an exploration of how policy ideas enter into new contexts and how they lend themselves to local translation and reformulation.

The basic premise is that no idea can enter a new context unchanged, and on the other hand that no system can remain the same when a new idea is inserted—every idea will be translated and given meaning in light of the context, which changes both idea and context. To grasp this process, we turn to the concept of translation, understood at the process through which policy ideas are reshaped and rearticulated in local contexts, e.g. in organizations trying to implement a notion of digitalization. Translation scholars have mainly been concerned with exploring and understanding how ideas, and more specifically policy ideas, e.g. about efficiency or accountability, move across time and space, and how this traveling process affects both the idea and the context it enters into (Czarniawska & Joerges, 2011; Sahlin & Wedlin, 2008). The main focus thus is how “*ideas are translated into objects (models, books, transparencies), are sent to other places than those where they emerged, translated into new kind of objects, and then sometimes into actions*” (Czarniawska, 2009).

The important distinguishing feature of both the ideational and the translation perspective is that they distance themselves from rational explanations to policy change and implementation and put the actor back

onto the playing field. Structures do not translate—actors do. These actors may be influenced by the structures and institutions, that they are surrounded by and engulfed in, but by way of their translations and transformations, they also change these surroundings, thus engaging and enacting a dynamic environment. The translation process, in other words, transforms both the idea that is translated and the context within which it is translated. This means that translation processes are influenced by the translating actors' environment, e.g. the regulator, normative, and cognitive institutions that comprise an organization or national policy environment of a government, but at the same time has the potential to destabilize these very institutions and infuse them with new meaning and potentially new actions.

POLICY IDEAS IN DANISH HIGHER EDUCATION

As mentioned in the introduction to this chapter, in the Danish context, the pervasiveness of policy ideas is apparent. In this way, Denmark is an interesting case, when looking at policy ideas, as several scholars have pointed out that the willingness and speed in turning international ideas into national policy is quite exceptional (Pinheiro & Stensaker, 2014).

In earlier work (Degn, 2015), it was demonstrated that in the area of higher education and research policy, powerful ideas of e.g. strategy, accountability, and democracy have been instrumental in shaping the path of policy development since the late 1960s. As demonstrated in that study, these ideas have woven together over time, lending meaning to each other and influenced the translation of new ideas at the national policy level. One key finding, however, was that traditional, and highly institutionalized ideas: “*seems to influence the translation in a stabilizing manner*”, making it difficult for radical ideas to become dominant.

The study, however, also demonstrated how more fundamental shift can be detected over time, e.g. when looking at how the perception and political articulation of the role and purpose of the university has:

moved from being influenced by ideas highlighting the institutional characteristics of HEIs to more instrumental and external constructions — on both the problem definition and policy solution levels. This movement becomes clear when looking at how the translations go from defining the ‘problem of higher education’ as a negative problem of internal structures, for example, that the governance and management structures are obsolete, undemocratic

(1970s), or inefficient (1980s), to defining them increasingly as positive problems or problems of potential, such as the need for modernization (1990s) and responsiveness (2000s). (Degn, 2015)

This analysis, however, left off, where the present study begins, namely with the Danish University Act of 2003. And as mentioned, the past two decades have been characterized by intense reforms, influenced by a number of both new and traditional policy ideas.

Digitalization is one of these ideas, but one which is often overlooked in policy analyses. As noted in (Tømte et al., 2019), the use of ICT in higher education was promoted by the Danish government as early as 2007, and was made an explicit political goal. This was particularly directed at the educational and administrative side of higher education institutions (Regeringen III, 2007). At national level this emphasis was expanded, and in 2015 digitalization became a mandatory point in the university development contracts in 2015 (Tømte et al., 2019). It thereby becomes interesting to look at how digitalization was translated by individual higher education institutions, both before and after the mandate in 2015.

RESEARCH DESIGN

As described above, the translation process transforms both the idea that is translated, as well as the context within which it is translated. The research design thus reflects an attempt to investigate what happens to both the context within which something is translated, and the notion/idea; the “something” that is the object of translation.

To explore this, I have chosen to focus on how universities choose to translate “digitalization” into contracts between themselves and the Ministry of Higher Education and Science, namely the strategic contracts between the Ministry of Higher Education and Science and the individual HEI, constituting the central governance documents of Danish higher education institutions.

These so-called “development contracts”¹ were implemented in the wake of the university reform in 2003, as the formal steering instrument, regulating the relation between the Ministry and the individual HEI. The

¹ Later called “Strategic Framework Contracts”.

university reform had increased the autonomy of the HEIs quite substantially, but the development contracts were then implemented to ensure the accountability of the HEIs and a degree of central control of the Ministry. The development contracts are renewed every 4–5 years and stipulate the main performance goals of the HEI, as well as key performance indicators. These performance goals and indicators are set by the institutions themselves (and approved by the Ministry), and the development contracts can thereby be seen as institutional translations of policies, but also as opportunities to promote institutional strengths and priorities in a more binding way than is the case in strategies and mission statements. They are in this sense different from such strategies and mission statements, in that they stipulate targets and priorities that the institutions commit to—rather than the more non-binding statements often seen in other types of branding documents.

DATA AND ANALYTICAL APPROACH

The empirical focus in this chapter is the Danish case, and within that I have chosen to focus on three different HEIs, namely Aarhus University (AU), Aalborg University (AAU), and the Technical University of Denmark (DTU). The three institutions have been chosen because they represent three very different organizational/institutional contexts, i.e. a traditional, comprehensive university (AU), a newer, regional and interdisciplinary university (AAU), and a very old, monodisciplinary technical university (DTU). These different institutional profiles are interesting translation “arenas”, because we might expect them to have different strategic agendas etc., which would prompt differing translations and strategic uses of digitalization as a policy idea.

The development contracts from the three universities were retrieved from the website of the Ministry of Higher Education and Science (www.ufm.dk), where all development contracts are freely available. The content of the development contracts was then coded by the author, initially focused on identifying paragraphs relating to digitalization, digital transformation, or ICT. Once these were identified and coded, a second-order coding was conducted, focusing on grouping statements according to theme, resulting in the four analytical themes that will be unfolded in the analysis. The themes are thus empirically derived and not theoretical constructs. In the following sections, the themes are understood as “patterns of translation”, cf. the theoretical framework of the study.

FINDINGS

As mentioned previously in this chapter, digitalization as a policy idea can be seen in Denmark as early as 2007 and digitalization was introduced as a mandatory goal in the development contracts in 2015. An initial question, is thereby when digitalization emerges in the development contracts of the selected universities; with the political mandate in 2015 or before?

Interestingly, albeit not surprisingly, there are only very few references to digitalization before 2015 in the development contracts, and the only references are in the contracts from Aarhus University, who in 2011 described an ambition to:

*focus on the development of a joint policy for educational IT; that is a policy for the development and integration of educational- and learning oriented IT in education.*² (Aarhus University, 2011)

Additionally, there is an earlier reference to a commitment to establishing new study places within ICT, to “*address the need of the labor market to strengthen the competences in people with short-term education*” (Aarhus University, 2006). This seems, however, to be unrelated to the policy idea of digitalization.

This lack of attention to the issue of digitalization as a policy idea or indeed as a strategic opportunity, suggests a predominantly reactive strategy by the Danish universities. But how has this reaction then played out? In the following sections, I will present an analysis of the translations of digitalization as they emerge in the development contracts after 2015.

TRANSLATIONS OF DIGITALIZATION

Overall, it becomes apparent that there are four overall themes in how the universities address digitalization or digital transformation through their development contracts. These patterns can be summarized as: digitalization in/of education, digitalization in/of research, digitalization in/organization, and digitalization as a societal condition. Each of these themes will be unfolded in the following sections and subsequently discussed in relation to the theoretical framework.

² All quotes are translated from Danish by the author.

DIGITALIZATION IN/OF EDUCATION

The majority of references to digitalization in the development contracts refers to issues of education. Within these references to digitalization or digital transformation most of them concern the development of E-learning platforms or Learning Management Systems. These E-learning platforms are initially framed partly as “efficiency tools”:

A better utilization of the digital learning space will ensure a more efficient use of the teachers' and students' time, as well as accommodate the diversity of the students. (Aarhus University, 2015)

In other words, focus is, in the initial references to E-learning platforms, on their potential for making educational provision more efficient and more aligned to the various needs of a diverse student population. The same attention to the diverse student population is visible in the AAU development contract from the 2015–2018 period where it is stated that:

The intention is to secure a structure and a culture, which supports that an educational programme at Aalborg University is a full-time programme and that the educations at Aalborg University remains at a high standard with formats that are adapted to the students' learning needs and interests, as well as to society's demands for bachelors and masters students. (Aalborg University, 2015)

At the same time (in the DTU case) or as a natural continuation of the initial steps (in the AAU and AU case), educational IT is also linked to enhancing quality in education. This is in the first references (from 2015 + 2018) primarily linked to peer-learning:

Furthermore, the students can engage in mutual evaluation of each other's work and/or get immediate feedback through computer-assessed assignments, which will give them insight into their own academic strengths and weaknesses. The experiences from the university and in general show that the students obtain a better learning outcome and that e-learning in this way can be used as a strategic tool in enhancing the quality of DTU educations. (Technical University Denmark, 2015)

There is to some extent a focus on “utilization” and thereby seeing digitalization as an opportunity to e.g. increase the motivation of students,

support learning processes and increase study intensity (Aalborg University, 2018).

In the later references, feedback and the “utility focus” is replaced by (or supplemented with) focus on enhancing students’ digital competencies—thereby moving from educational IT as a tool to enhance learning, to digital competences as a goal in itself:

DTU will in the future focus on the application and development of new digital learning tools and methods, which will facilitate new pedagogical approaches – like e.g. personally adjusted adaptive learning – and which will enhance digital competencies in the DTU graduates. (Technical University Denmark, 2018)

In general, a somewhat homogenous framing of digitalization in and of education emerges in the development contracts. With few variations, we see similar patterns in the translations across institutions, focusing on the opportunities of digital transformation in relation to enhancing quality primarily through feedback, and through strengthening digital competencies. The universities become more ambitious over time, but in general follow similar paths, which indicates that the digitalization idea is not used as a strategic positioning tool in relation to education.

DIGITALIZATION IN/OF RESEARCH

A second theme which emerges in the development contracts is a focus on digitalization as a research topic, or digitalization in relation to research practices. The latter is the least predominant theme, only mentioned in the latest development contract from DTU, where it is stated that the university will work to:

strengthen digitalization in research and at the same time create more visibility. (Technical University Denmark, 2022)

However, it is somewhat underspecified what exactly is entailed in this particular goal. The former theme, however: digitalization as a research topic, is more frequently mentioned as a strategic goal, at least at DTU and AAU. Interestingly, digitalization as a research topic is not mentioned in the AU development contracts.

AAU and DTU, however, both specify digitalization as a strategic research area in their development contracts, albeit with slightly differing emphasis depending on their institutional profile. AAU, being an institution with a very strong and unique base in Problem-Based Learning, states that they will begin a large cross-disciplinary research project, involving the PBL-researchers at the university, with the aim of:

... form the research based knowledge base for the development of the digital support of learning in AAU educations and transform this to practice in the learning environments. (Aalborg University, 2018)

The university thereby links the strategic goal of digitalization in research to the goal of digitalization in education and to their institutional profile.

DTU has also, in their two most recent development contracts, had a focus on digitalization as a research topic. In the 2018 contract, digitalization was specified as one of three main research topics that the institution would focus on in the contract period, alongside *life science* and *energy*. In the subsequent development contract, this strategic goal was specified further to concern how digital solutions enhance the quality of life, by specifying an ambition that:

...in the future, research should be conducted e.g. on how digital technologies contribute to creating a better life for the individual and a sustainable future for all, by using big data, artificial intelligence and Internet of Things solutions. (Technical University Denmark, 2018)

Again it becomes apparent how the institution uses the idea of digitalization to profile themselves along the existing profile areas, just as we saw in the case of AAU and PBL.

DIGITALIZATION IN/OF ORGANIZATION

A third, albeit very small, theme is one of digitalization in/of organization, which refers to mentions of digital solutions to enhance organizational functions, etc., or the organizational dimension of digitalization. This theme overlaps somewhat with the references to E-learning platforms, digital exams, and other themes that were categorized as digitalization in education. However, there are also a few sporadic mentions of interdisciplinarity as a prerequisite of digitalization, and the need to

organize collaboration between faculties in order to be able to address digitalization as a societal challenge, e.g. in the quote below:

There needs to be more collaboration across the breadth of the university, in order to contribute to the solution of societal challenges to a higher degree. The ongoing digital transformation of society is a particular focus area and the university contributes to this through a strengthening of the IT-disciplines, but many of the academic areas of the university will play a vital role in exploiting the possibilities of the digital transformation and not least contributing with solutions to the challenges that comes with it, together. The university also sees good opportunities to create collaborations across fields. (Aarhus University, 2018)

Digitalization here becomes more of a lever to further other agendas, e.g. the intra-organizational collaboration across disciplines, etc.

DIGITALIZATION AS A SOCIETAL CONDITION

The final theme is one of digitalization as a societal condition. In other words, this theme relates to mentions of digitalization, not as a priority or strategic goal, but as a condition that the university needs to address. These references emerge in all three institutions, mainly in the latest development contracts. One example of this is in the quote below, where we see that digitalization is mentioned as a societal challenge along the same lines as the aging population, international migration etc.

In research policy and in ongoing research programmes nationally and internationally, cross-disciplinarity is highlighted and supported as a pre-requisite in order to tackle important societal challenges, such as international migration, the aging population, digitalization of our society, the scarcity of resources and green transition. (Aalborg University, 2018)

Here we see, again, how digitalization—this time as a societal condition—is used to further or leverage institutional priorities, in this case cross-disciplinarity. This is also visible in the quote below from AU, where digitalization as a condition is used to leverage a focus on humanities and the importance of “softer skills”:

As a consequence of the pervasive digitalization and globalization and the rapid changes this will cause, the world of business will increasingly need to

draw more extensively on competences within cultural comprehension, ethics, relations between people and between man and machine. (Aarhus University, 2018)

However, in the references to digitalization as a condition, there is also a recognition that digitalization is more than a lever that can be used to further strategic goals; it is described as a profound reshuffling of society which is:

.. radically changing the way we work, live, communicate, collaborate and teach. AAU needs to be on the forefront of the digital development, so the technological opportunities are utilized to create even better quality in education. (Aalborg University, 2018)

In this quote we see how the general digitalization of society—beyond higher education—is seen as a condition which frames the strategic opportunities that the university has. A similar construction can be seen in the quote below from DTU, where the digitalization of society is also mentioned as a condition that frames the actions of universities:

The technological and digital development has changed the labour market in a range of fields. This development will only continue and accelerate. To be able to utilize the new technological opportunities there is a need for new competences and skills in the workforce, which changes the demands for educations and educational institutions. (Technical University Denmark, 2018)

The emergence of this final theme in the development contracts could be interpreted as an attempt to react and acknowledge the existence or prominence of the policy idea and use it as a basis for strategic initiatives. Both of the quotes above refer to a general digitalization of society as something that frames action, e.g. that the digitized labour market required more digitally competent graduates, which in turn necessitates a stronger effort towards this from higher education institutions. The theme is thereby related to the other themes, but still underlines that the universities highlight external circumstances as drivers for a development towards digitalization, rather than a pro-active, strategic decision made by themselves. This fits well with the overall impression that the universities are using a reactive strategy to digitalization rather than a proactive one.

DISCUSSION

As mentioned in the introductory sections of this chapter, existing literature on higher education institutions, their branding, and strategic capacity might lead to differing expectations to their behavior in the face of digitalization drives. Based on institutional theory, many studies have pointed to the change-resistant and highly institutionalized nature of universities (Brunsson & Olsen, 1993; Meyer & Rowan, 1977); emphasizing how institutional pressures e.g. for isomorphism, outweighs external pressures for strategic profiling (Mampaey et al., 2015). However, there are also studies pointing to how the increased institutional autonomy and “marketization” of higher education have led universities to “brand” themselves in various ways (Celly & Knepper, 2010; Wæraas & Solbakk, 2009), e.g. based on rankings (Brankovic, 2018), or other types of profiling elements. Following this, it is easy to imagine how digitalization, e.g. of education, could be used as such a profiling element, to attract students. To explore these contradicting explanations/expectations, I have explored how Danish universities have used and described digitalization in their development contracts. The choice to look at development contracts is that these document represent binding contracts and indicators that the universities commit to follow, rather than e.g. strategic documents, which are non-binding and to some extent may also be seen as more symbolic.

As the analysis above has shown, digitalization plays a fairly minor role in the strategic development contracts of the three chosen Danish universities. Given the attention given globally, as well as nationally, to the idea of digitalization in the realm of higher education and research,—and the fact that it was put forward by the Ministry in 2015 as a mandatory focus area, this lack of emphasis might be somewhat surprising, but at the same time also perhaps illustrates the above-mentioned notion of the change-resistant universities. Underlining this point, the analysis in this chapter has demonstrated that the universities studied here have taken a more reactive approach to the idea of digitalization and addressed the idea when prompted to by the ministry.

However, despite the somewhat reactive strategy, digitalization is taken on in the development contracts, and in the analysis, I have identified four “patterns of translation” that shape the way that the universities give meaning to the idea of digitalization and thereby also transform and adapt that same idea. The four translation patterns are digitalization

in/of: education, research, organization, and digitalization as a societal condition. The substance of these translation narratives is detailed above in the analysis, but a point which seems worthy of additional discussion is how two additional patterns emerge within the narratives.

Firstly, it seems that the translations oscillate between two framings of the idea; namely digitalization as a tool and digitalization as a goal. This is particularly visible in the digitalization in/of education narrative, where it also seems like digitalization as a tool is the most prevalent translation. This means that digitalization is often described as a means towards an end, often education quality or efficiency (e.g. increasing the students' motivation or decreasing overall study time). In the digitalization in/of research, the reverse construction is more prevalent, namely digitalization as a goal in itself. In this theme, descriptions of digitalization as a research theme are visible, particularly in two of the universities. This is interesting, as it is one of the few instances where differences between the institutions are visible. The two institutions that mention digitalization as a goal in relation to research are DTU and AAU, both institutions which have a more distinct profile to begin with—one a technical university and the other focusing on a specific educational model. The interpretation of this difference could be that it is easier to link the digitalization idea to these profiles, than to a comprehensive profile as AU has. Digitalization is thereby used to further strengthen existing profile areas (PBL or big data/AI).

Secondly, another pattern is the distinction between digitalization as a challenge vs. digitalization as a lever. These constructions are mostly visible in the (less frequent) narratives of digitalization as a societal condition and digitalization in/of organization. Here we see a continuum emerging, where at one end we have references to digitalization as something which is “changing the world”, i.e. a type of obstacle, and on the other end references to digitalization as a lever: as something which demands specific things/competences, that the institutions are already offering or plan to offer in the future.

Particularly this last category is where we see signs of strategic translations of a policy idea; the universities using digitalization in a strategic manner to further particular areas, to highlight existing strengths or institutional profiles. However, as also seen this is a very small collection of references, which seems to indicate that universities are not utilizing this potential strategic opportunity to a very significant extent.

A final point worth mentioning, is that while digitalization is mentioned in the development contracts, it is rarely as specific objectives or in the form of indicators. Very few concrete targets for digitalization are mentioned in the development contracts, and the idea thereby mainly emerges as qualitative descriptions of goals and conditions rather than specific, measurable, and binding targets. While many academics and scholars studying higher education institutions are fairly critical of the “metrification” and contractualization of higher education and research, one might also argue that by leveraging an existing steering instrument, such as the development contracts, to further strategic goals of e.g. digitalization of education, the universities could use such contractualization and metrification for their own advantage. The present study, however, indicates that the universities are not (yet)—at least in this area—utilizing their agency and autonomy to a very high degree.

CONCLUDING REMARKS—DIGITALIZATION AS A MISSED STRATEGIC OPPORTUNITY?

In the introduction to this chapter, I stated that an aim was to discuss how translations of digitalization as a policy idea are—or could be—used strategically by universities in Denmark. The analysis has shown that the universities, when it comes to digitalization, seem to be more reactive than proactive in their translation of digitalization. In other words, they do react to a policy drive by addressing digitalization, when they must, and this reaction may to some extent be seen as strategic, particularly when used as a lever to further existing strategic areas or institutional profiles. As pointed out in the introduction to this chapter, previous studies have demonstrated that most digitalization initiatives are results of political (or other types of external) pressure, or individual/departmental projects, driven forward by personal interest or ambition (Stensaker et al., 2007; Tømte et al., 2019), and that overall, cohesive, institutional strategies for digitalization are scarce in higher education institutions.

An indeed, the present study also indicates that strategic use of digitalization as a policy idea does not seem to be—or have been—high on the agenda for Danish universities. This might be perceived as something of a missed opportunity for the universities, as there are no indications of institutions being pro-active in any real sense, utilizing the momentum to positions themselves in the national landscape or indeed on the international stage. Digitalization seems to be perceived as less “potent”

in relation to positioning, despite the overall political attention to the idea. The empirical material applied in the present chapter can naturally be argued to only present a fragment of the overall strategic line of the universities, but they are nonetheless the key steering element—and communication channel—between state and institution. If the universities wished to make a strategic stance in profiling themselves, these contracts would be an obvious arena, but it seems that this arena as of now has been left unused, at least in relation to this. Further studies of this, however, would be valuable as it would also illuminate how strategic management in a highly institutionalized field plays out, and which arenas are indeed used in the “positioning game”.

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Digital Transformations in Higher Education in Result of the COVID-19 Pandemic: Findings from a Scoping Review

Sabine Wollscheid^{ORCID}, *Antonia Scholkmann*^{ORCID}, *Marco Capasso*^{ORCID},
and *Dorothy Sutherland Olsen*

INTRODUCTION

There is a growing understanding that upcoming trends in higher education (HE) should be regarded as divided by an invisible line marking world events, before and after the COVID-19 pandemic (Laterza et al.,

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S. Wollscheid (✉) · M. Capasso · D. S. Olsen
Nordic Institute for Studies in Innovation, Research and Education (NIFU),
Oslo, Norway
e-mail: sabine.wollscheid@nifu.no

A. Scholkmann
Aalborg University, Aalborg, Denmark

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2020). At the same time, there is increasing research addressing digital transformation in higher education (DTHE) related to the COVID-19 pandemic, already in 2020 (e.g., Garcia-Penalvo & Corell, 2020; Pazos et al., 2020). In 2022, the pandemic is still ongoing, and this fact is also reflected in growing research activities (e.g., Deja et al., 2021; Garcia-Penalvo, 2021; Scholkmann, 2022; Toprak et al., 2021).

Already before the onset of the COVID-19 pandemic several studies had investigated aspects of DTHE in different countries (e.g., Benavides et al., 2020; Bond et al., 2018; Sjöberg & Lilja, 2019). In their systematic literature review, Benavides et al. (2020) show that DTHE is an emerging field of inquiry that is fragmented across several disciplines. At the same time, they point out that none of the proposals on digital transformation (DT) that were included in the review, have been developed in a holistic way (Benavides et al., 2020). A systematic review on DT carried out by Reis et al. (2018) across a broad variety of sectors found that most of the references were related to technological change in business, followed by new technology in industry, and that education was lower down the list with only 8percent of 206 publications falling into this category. In this sense, we can state that, pre-COVID, higher education was not a frontrunner on DT, and also the understanding of what DT actually meant for higher education was only emerging.

Drawing on studies that have addressed DT in other fields, the phenomenon has been understood as being broad in outreach and “(...) about adopting disruptive technologies to increase productivity, value creation and the social welfare” (Ebert & Duarte, 2018, p. 16). Additionally, based on their literature review, Reis et al. (2018) pointed out that DT is not a goal in itself, but a means to the end of improvement. With respect to their focus on DT in the business world they conclude that DT means “the use of new digital technologies that enables major business improvements and influences all aspects of customers’ life” (Reis et al., 2018, p. 418). Albeit talking about value creation, business and customers we conceive that these definitions hold value also to an understanding of DTHE, as they point out the innovative and transformation potential of new technologies which permeate all areas of life.

However, for the purpose of this chapter we want to argue that DTHE should not only be understood as the outcome, however transformative, but also as the process of transformation. So, as a starting point, this chapter draws on an understanding of DTHE as “a much broader process of change that implies substantial (cross-cutting) organisational

adaptation, in addition to the effective implementation of digital platforms and solutions” (Pinheiro et al., in this volume). Defining DTHE under a processual perspective allows to link it to conceptualizations of organizational learning that take into account the emergent quality of new solutions (e.g. Argyris & Schön, 1996; Brandi & Elkjaer, 2015). We want to argue that such a perspective is highly suited for our purpose, since the DTHE instigated by the COVID-19 pandemic (and written accounts thereof) have been about processes of learning and change as much as about outcomes.

Understood as the “highest disruptive event in [...] recent history” (Fassin, 2021, p. 5305), the COVID-19 pandemic and its outbreak in March 2020 has led to many initiatives to uphold the provision of HE in digital mode, and colleagues world-wide took the opportunity to accompany those with research (OECD, 2021). Using digital technology seemed to be the only alternative to freezing an exponential spread of the virus. The experiences gained when going digital because of the pandemic can be regarded as facilitating transformations in procedures and cultures of higher educational institutions (HEI) comprising teaching and learning. This was done by upgrading and further integrating technologies that already existed to a larger scale, which forms the ground or services to the university community (Coral & Bernuy, 2022).

An exploratory literature search in medio 2020 revealed a dynamic field of inquiry comprising empirical studies and academical discussion papers on the topic of digitally transformed HE. However, while most of these publications claimed to contribute to the topic, the impression emerged that the multiplicity of intentions, perspectives, and voices represented made it hard to extract a common understanding of DTHE. From this backdrop, this chapter presents the findings of a scoping review that systematically retrieves, selects, maps, and describes the international literature on DTHE, published during the first year of the COVID-19 pandemic. We assume that the heterogeneity of solutions to, and interpretations of, the challenges caused by COVID-19 would especially appear in the literature published soon after the onset of the pandemic and before dominant solutions and interpretations are able to prevail. By focusing on journal articles published during the first year of the pandemic, we attempt to capture such heterogeneity both in terms of events, since actors have often had to improvise specific solutions in the absence of previous comparable events, and in terms of academic views on the events themselves. The scientific production on DT might have to accelerate

to inform practitioners and support those involved in handling the crisis without enough time to homogenize new theories. This process of accelerating research and publishing about a critical event and how to address it in HE has probably introduced short cuts in the peer-review process, which is traditionally a more long-lasting endeavor.

Our exploration of the literature during this time span thus allows us to refine the concept of “digital transformations” (DTs), in plural (Laterza et al., 2020). Laterza et al. (2020) argue that we live in a time when the speeding up of digitalization is leading to even more diverse and uneven paths of development. To speak of this concept in singular terms reduces this complexity and multidimensionality, and at the same time reinforces some of the techno-deterministic assumptions of much of the literature on DTs. To add to a holistic understanding Laterza et al. (2020) suggest moving towards more pluralistic and systemic understandings of DTs that take into account the complexity related to the processes under study. The authors refer to three analytical dimensions in the study of DTs, namely the contextual dimension, that of mediators at the system level and types of effects associated with the adaptation of digital platforms and technologies in HE.

AIM AND RESEARCH QUESTIONS

The purpose of this scoping review is to provide an overall description of the literature comprising both, empirical studies and conceptual papers. We aim to identify and describe different forms of DTs in HE published during the pandemic. Further, we address some knowledge gaps in the field of inquiry with implications for further research on DTHE.

Understood as a method of secondary research, a scoping review approach is suitable for examining and describing broad, complex, and dynamically developing research areas, such as DTHE, identifying knowledge gaps and clarifying core concepts (cf. Levac et al., 2010; Tricco et al., 2016). Scoping reviews also describe knowledge according to core characteristics, such as time of publication, geography (country of study), and discipline (Anderson et al., 2008). Drawing on a scoping review approach, the chapter addresses the following research questions:

1. What does international research tell us about DTHE related to the COVID-19 pandemic? Specifically, how can the body of literature on the topic of DTHE and the pandemic be described in terms

- of characteristics such as geography, perspectives, and disciplinary background?
2. How is the concept of DTHE related to the COVID-19 pandemic period, understood in the international literature? Specifically, which conceptual understandings of DTHE can be distinguished, and how are they distributed across the body of material included in the scoping review?

METHOD: SCOPING REVIEW APPROACH

The review includes empirical studies and conceptual papers dealing with digital transformations at different levels in HE, related to the first year of the COVID-19 pandemic as outlined before. We assessed material in English (mostly journal articles) published between March 2020 and February 2021. The relatively short publication period is defined by the scope of this review, DTHE during the first year and critical phase of the pandemic, which implies a temporal restriction to this period.

To identify relevant literature the search strategy was underpinned by the inclusion of key criteria drawing on the Population-concept-context (PCC) framework recommended by the Joanna Briggs Institute for scoping reviews (Institute Joanna Briggs, 2015) (cf. Table 10.1).

Thus, we excluded material dealing with DTs in HE before the COVID-19 pandemic and addressing other, lower levels of education.

Table 10.1
PCC-framework for this
scoping review

<i>Criteria for inclusion</i>	
P-Population	HE
C-Concept	DTHE
C-Context	COVID-19 pandemic
Time span	March 2020–16 February-2021
Publication status	Peer-reviewed journal articles (with abstracts in English)
Language	English
Material	Abstracts of empirical studies and conceptual papers

Source Authors' own

Search Strategy

First, we conducted a systematic literature search in Web of Science (WoS)—namely Web of Science Core Collection—comprising the world’s leading scholarly journals, books, and proceedings in the sciences, social sciences, and arts and humanities and navigate the full citation network since 1975. Further, we searched for literature in the educational database ERIC (Education Resources Information Center), which includes peer-reviewed journal articles and books.

Second, systematic searches were conducted by combining search terms related to the three elements of the PCC-framework. The following search string was applied in WoS and adopted in ERIC: (digital* OR *learning) [Topic] and (“higher education” OR university OR “tertiary education”) [Topic] and (Cov* OR Corona OR pandemic) [Topic].

Further, supplementary searches for the given time period were conducted in national resources for the Scandinavian countries by combining the search terms “digital*”, “higher education” and “pandemic”. We further conducted an additional search in Google Scholar using the terms “digital”, “higher education and pandemic”, “corona” and “covid”.

Data Collection

For assessing the scope of the search, we aimed to retrieve a representative set of publications for the time span between March 2020 and February 2021. The search strategy was validated by two experts, one expert in the field, the second author of this paper (Antonia Scholkmann) and one expert on systematic retrieval, our research librarian at NIFU. We were aware that our search for DTHE related to the COVID-19 pandemic, might require an update after February 2021, as we expected an increasing number of studies over time. At the same time, however, we assumed we had reached data saturation in our original data collection. Thus, we limited the scope of this review to the first period of the pandemic. We are, however, aware of the limitations and biases in the process of data collection of a dynamically developing body of literature. We included some additional publications that we retrieved strategically, limited to the publication period between March 2020 and February 2021.

We imported all entries into the reference manager software Endnote, where we screened titles and abstracts. We used an EXCEL spreadsheet for the extraction of descriptive data and mapping of studies. A screening manual for screening of titles and abstracts was provided based on the eligibility criteria. We independently screened all titles and abstracts retrieved by the literature search. The selected references for inclusion were screened a second time. Each of us screened a subsample of references. In case of disagreement, we discussed the decision which resulted either in inclusion or exclusion.

All four authors coded and extracted data from a subsample of studies, independently, addressing the research questions above. They exchanged their extraction results for cross validation in pairs. This procedure was done using EXCEL spreadsheets including the following information: First author, publication year; country; population; source; methods; understanding of concepts of DTHE. All four authors were involved in mapping the results by using data in EXCEL spreadsheets for mapping and narrative/ thematic synthesis of the main findings according to the review questions.

The selection of eligible studies consisted of several steps. During the first screening, the authors pre-screened together approx. 1138 references/publications (titles and abstracts) retrieved by the literature search in electronic databases (medio February 2021). This first screening resulted in 471 references for further inclusion. A pilot sample of 65 references was initially screened and validated by first and second author, which resulted in further exclusion of six references not addressing the review question, e.g., dealing with students with disabilities and digitalization, or with health outcomes that were related to the COVID-19 pandemic. During the second screening, each of four authors independently screened a subsample of the included references resulting from step 1. Among the sample of 471, 45 were excluded due to the following reasons: poor information/no findings reported; not related to the pandemic; not specific for HE; not DT mentioned; neither research nor conceptual paper. Further, 73 references were assessed as unsure; for validation inclusion or exclusion was discussed in a meeting between the four reviewers. Sixty-one of these were included and categorized as *knowledge for* and/or *knowledge about* DTHE (cf. next chapter). Ideally, the screening process in a scoping review should follow a systematic path and proceed in a linear way. In practice, however, we iteratively moved back and forth between

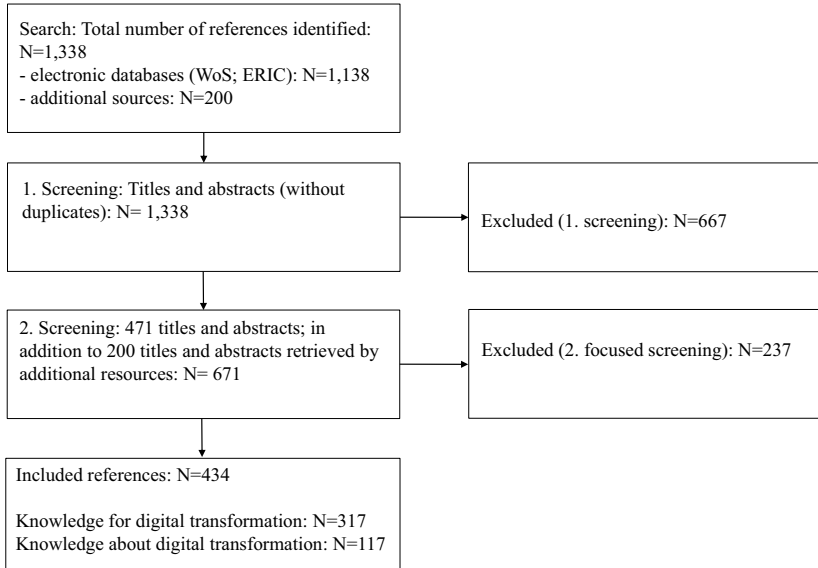


Fig. 10.1 Selection of references

the two screening stages. Finally, we ended up with a total of 434 references and the assumption that we had reached a point of saturation for the purpose of our analysis (cf. Fig. 10.1).

ANALYTICAL CATEGORIES: *KNOWLEDGE* FOR AND *KNOWLEDGE ABOUT* DTHE

During discussion of the data and the iterative process of screening, we inductively developed two main categories in terms of DT: *knowledge for* DTHE and *knowledge about* DTHE, which we assessed as suitable to categorize our data.

Under the category *knowledge for*, we subsumed publications which addressed isolated aspects of DTHE, such as accounts of the implementation of new technology for the provision of teaching and learning as well as teachers' and students' evaluation of these, or the description and evaluation of a specific organizational change that had been implemented during the pandemic. Papers in this category offer research-based advice

which might also be useful for understanding and dealing with more wide-reaching DTs. However, papers in these categories only addressed isolated themes in DTHE, such as “what has been done?” and “how did teachers/students/other stakeholders think about it?” Publications in this category provide knowledge that can be applied when going digital (both ad hoc or in more structured ways). However, they do not explain or elaborate on longer-term processes of transformational change. They present new (and sometimes innovative) solutions to be implemented as part of larger DTHE in the sense of single-loop learnings (Argyris & Schön, 1996), yet they fall short on explanations on how these can form the basis for long-term transformative processes. Quotes from article abstracts that were considered for placing a paper in this category were for example (explanatory passages underlined):

(...) investigating the effectiveness of distance education ... universities in light of the Coronavirus pandemic and identifying the obstacles faced by university students. (Bataineh et al., 2021)

(...) to show, through a real case application, how the digitization of information and the new methodologies for teaching urban planning techniques can contribute to improve the accuracy of the knowledge available at the micro/ building scale, which is at the basis of the definition of tailored regeneration practices. (Conticelli et al., 2020)

(...) to examine if virtual reality can be a suitable option by placing lectures into a virtual setup. (Hopp et al., 2020)

Under the category *knowledge about*, we subsumed publications that looked at the bigger picture and provided reflection on multiple aspects of ongoing DTHE. Such publications were considered to generate knowledge about the processual aspects of DTHE, including critical reflections of these. The publications in this category also suggest an understanding of DTHE as a multifaceted phenomenon that goes across different aspects within the higher education system (Pinheiro et al., in this volume). Also, DTHE is understood as a complex interplay between technology, social, and “business”-aspects (Reis et al., 2018).

Papers in this category had to highlight broader organizational aspects, by describing connections and roles for an array of actors; normative directions, by praising past actions or advocating future ones; and/or

dynamics over time, by pointing also at long-term consequences and indirect effects of actions. We operationalized this in a set of five defining aspects out of which more than one, but not necessarily all of them had to be present in a paper. An overview of these four aspects and exemplary quotes can be found in Table 10.2.

DESCRIPTION AND MAPPING OF THE LITERATURE

In the following, we describe the included body of literature, 434 publications, according to publication year, geography, main perspective, and discipline. In our analysis, we further distinguish between the two analytical categories defined above, namely *knowledge for* and *knowledge about* DTHE, which were inductively derived as a result of the coding process. Our descriptions and analyses draw on data we manually extracted from abstracts and titles of the included publications, and in combination with our interpretations. Thus, we are aware of the limitations related to this information.

All 434 publications, 17 percent ($N = 73$) were published during the first half of the pre-defined period (March–August 2020), while the great majority of 83 percent ($N = 361$) included articles published during the second part of this period (September 2020 and February 2021 and articles where no publication date was given) (cf. Fig. 10.2).

Further, we categorized 117 publications according to *knowledge about* DTHE, while we categorized the majority of 317 publications according to *knowledge for* DTHE. We assume that the category *knowledge about* suggests a greater maturity of thought and elaboration over time in terms of the concept of digital transformation compared to that of *knowledge for*. This is reflected in our finding a greater share of publications in the second half of the period (September 2020–February 2021), for *knowledge about*, we found 65 percent ($N = 70$), compared to the first half of the period (March–August 2020) with 27 percent ($N = 29$) (cf. Fig. 10.3).

For the *knowledge for*-category find the opposite picture with a larger share of papers published during the first period.

Geography

For geography or country of study, we extracted information on *where* the study was conducted, found in the abstract or title. We argue that this is

Table 10.2 *Knowledge about DTHE—operationalization and exemplary quotes (explanatory passages underlined)*

<p>(1) Study provides knowledge <i>beyond students</i></p>	<ul style="list-style-type: none"> • goes beyond a description or evaluation of measures implemented to help students to continue their educations under emergency remote learning-conditions • also considers the views and roles of teachers, administrators, leadership/management or technical staff 	<p>“Research-based transformative knowledge, real situations and practical resources for considering inclusive education curriculum concepts were found that are connecting educators, teachers, learners and communities during this time of crisis.” (Pittman et al., 2021)</p> <p>“A survey of 405 students from the universities across Bangladesh revealed that faculty readiness, student readiness, and economic solvency positively impact the students’ intention to adopt a technology-based design of higher education.” (Kabir et al., 2020)</p>
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(continued)

Table 10.2 (continued)

<p>(2) Study works towards providing some sort of <i>holistic</i> knowledge</p>	<ul style="list-style-type: none"> • considers several aspects of education, for instance the social and the organizational 	<p>“The research findings show a significant variance between the respondents’ perception of digital transformations maturity levels, and the core requirements of digital transformation maturity. The findings also show the lack of holistic vision, digital transformation competency, and data structure and processing as the leading challenges of digital transformation.” (Marks & AL-Ali, 2020)</p> <p>“This case study is divided into three parts. The first part provides an analysis on the policies and guidelines implemented by the country’s Commission on Higher Education. The second part interrogates and reflects on the responses, challenges, and best practices employed by universities in implementing these guidelines. Lastly this paper provides general recommendations and argues that Philippine Higher Education Institutions/ HEIs should form an Education Continuity Plan that outlines the procedures and instructions that should be followed in the face of a pandemic.” (Cuaton, 2020)</p>
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- (3) Study understands actors as being *integrated*
- actors in education or aspects of education are seen as interconnected, as e.g., in a system
- “Our reflections consider social work education comprehensively, as an integrated system. We recount the human and emotional nature of our experience; approaches to interacting and collaborating with colleagues, partners, and stakeholders; ways of innovating on local, provincial, and national levels; and examples of how core social work values guided our work.” (Archer-Kuhn et al., 2020)
- “The paper suggests pragmatic ideas to embolden each of the three strata encompassing the educational “ecosystem”: institutions, faculty and students.” (Colpitts et al., 2021)
- “Universities have transitioned to online education in order to slow the spread of COVID-19. This transition mobilizes the technological utopian imaginary that digital technologies can rescue populations from the disease. It also raises the risk of deepening neoliberal educational reforms and, by extension, poses a threat to democracy itself. This commentary explores this risk and suggests ways to resist the resulting neoliberalization of education that it could entail.” (Burns, 2020)
- (4) Study takes a *possibly critical* stance
- shows some reflection on whether and how digitalization is positive

(continued)

Table 10.2 (continued)

<p>(5) Study takes a <i>longer-term perspective</i></p>	<ul style="list-style-type: none"> • does not limit itself to a short period of interest (the pandemic and/or a specific temporary policy) • reflects on processes and consequences towards a time horizon beyond the pandemic <p>“This study was designed to address the problem of how higher education institutions, as organizations designed to promote learning, responded to the COVID pandemic and the suspension of in person instruction. The purpose of this paper was specifically to explore how institutions go about learning from the pandemic to better prepare themselves for the future that they will face.” (Miller, 2021)</p> <p>“Communication, cooperation, coordination, and collaboration, along with positive organizational strategizing and support contributed to a successful transition during the COVID-19 pandemic; many of the approaches implemented during the emergency transition will continue into the future.” (Mariani et al., 2020)</p>
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Source: Authors' own

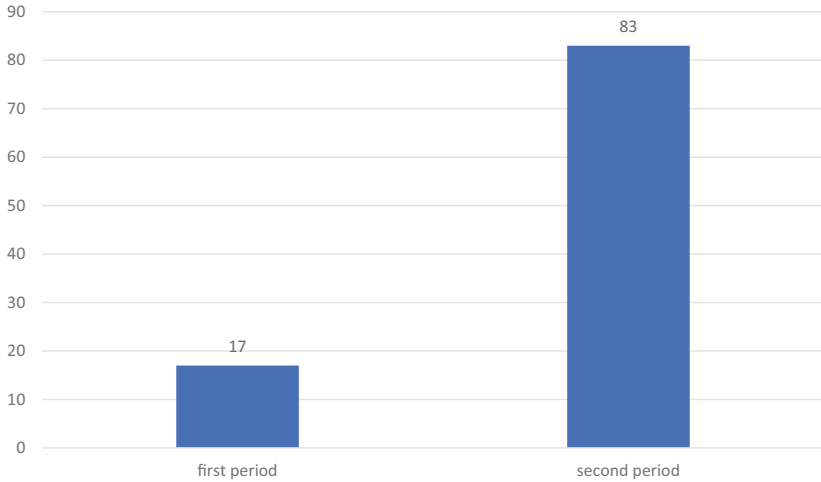


Fig. 10.2 Description of publications according to publication period (in percent), $N = 434$ (*Source* Authors' own)

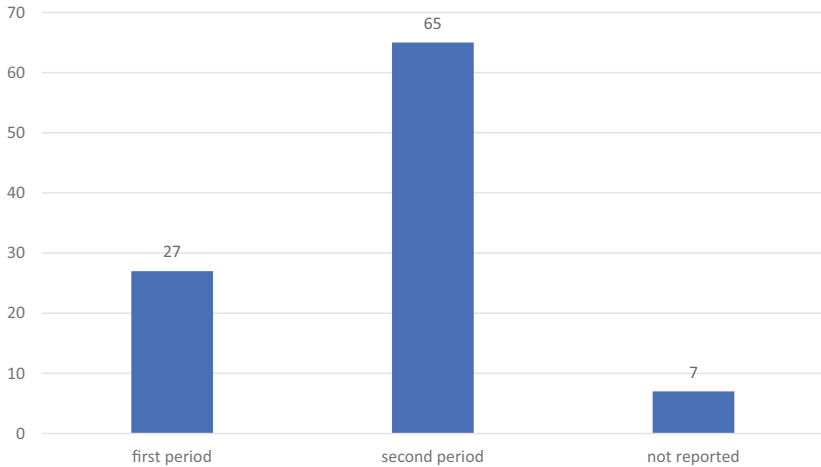


Fig. 10.3 Description of publications (*knowledge about DTHE*) according to publication period (in percent), $N = 117$ (*Source* Authors' own)

more valid than using information about the first author's affiliation as a proxy for study destination, even though this would have reduced the number of cases with no information about study destination. Fig. 10.4 describes the included studies according to geography, i.e., the country they were conducted.

In general, nearly a quarter of publications were located in Asia ($N = 107$), followed by 99 publications (22.8 percent) in Europe and 58 publications (13.3 percent) for the Americas (North and South). The largest group of publications ($N = 123$; 28.8 percent), however, could not be classified according to geography based on information from the abstract. In these cases, we can assume that geography (country of study) plays a minor role for the study in the sense that the publication conveys information that is more generic or universally applicable.

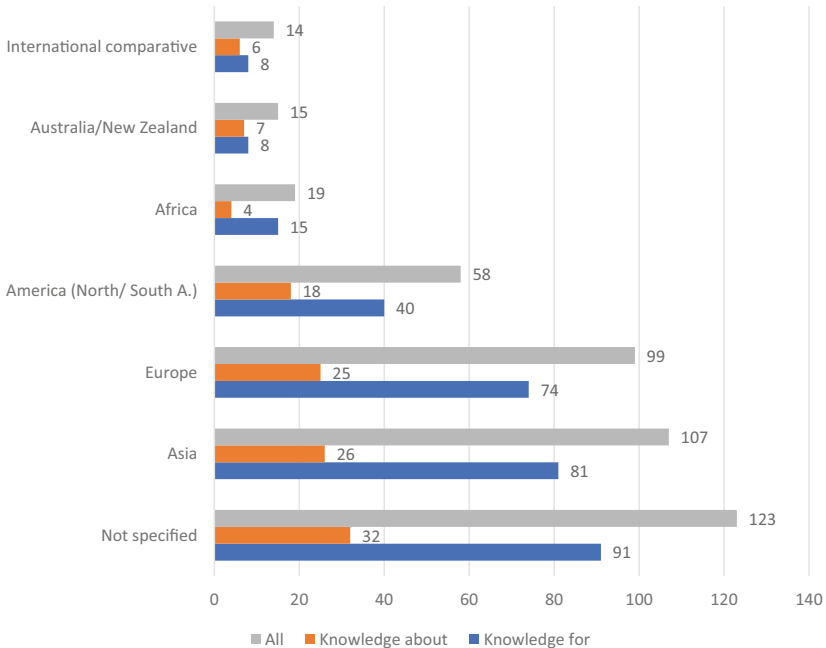


Fig. 10.4 Description of publications according to geography (*Source* Authors' own)

For the distinction between the two main categories, *knowledge for* and *knowledge about*, Fig. 10.4 shows that for all regions the majority of publications were classified as *knowledge for*. For Europe and Asia the ratio between publications communicating *knowledge for* vs. *knowledge about* is around three quarters vs. one quarter. For Africa and for not geographically specified publications, however, the ratio is roughly two-thirds vs. one-third, for the Americas it is roughly two to one, and for Oceania (Australia and New Zealand), the distribution across the two categories tends towards being equally distributed. Although further analysis would be needed to validate this, it is a possibility that, due to increasing total numbers in publications from a specific region, the gap between publications produced in the respective category has widened.

Disciplines

We manually coded information in abstracts and titles according to discipline or subject, reported by the authors. We preferred a manual and inductive coding by re-reading abstracts and titles instead of an automatic and pre-defined coding. In some cases, we collected several subjects or disciplines in one single category. To give an example, the category education included, “education”, “teaching”, and “teacher education”. Small subjects were collected under the general category of “other disciplines”. This procedure enabled a balance between coherence and reasonable number of categories (cf. Fig. 10.5).

In general, Fig. 10.5 shows the highest number of publications for the categories Science, Technology, Engineering, and Mathematics (STEM) ($N = 87$) and Medicine, Health science and Nursing ($N = 76$), in addition to the undefined categories not specified and general.

Distinguishing between the distribution of the two main categories (*knowledge for* and *knowledge about*) in all discipline-related publications the absolute number of *knowledge for* exceeds the number of *knowledge about*, with ratios between roughly three to one to two to one. The difference between the number of publications in each category is largest for STEM and medicine, health sciences, and nursing. For STEM, 69 publications are categorized as *knowledge for*, while 18 publications are described as *knowledge about*. We can find a similar pattern for medicine, health sciences, and nursing. However, in articles classified as general the number of *knowledge about*-publications ($N = 57$) exceeds the number of *knowledge for* ($N = 24$), which is an indicator that *knowledge about*

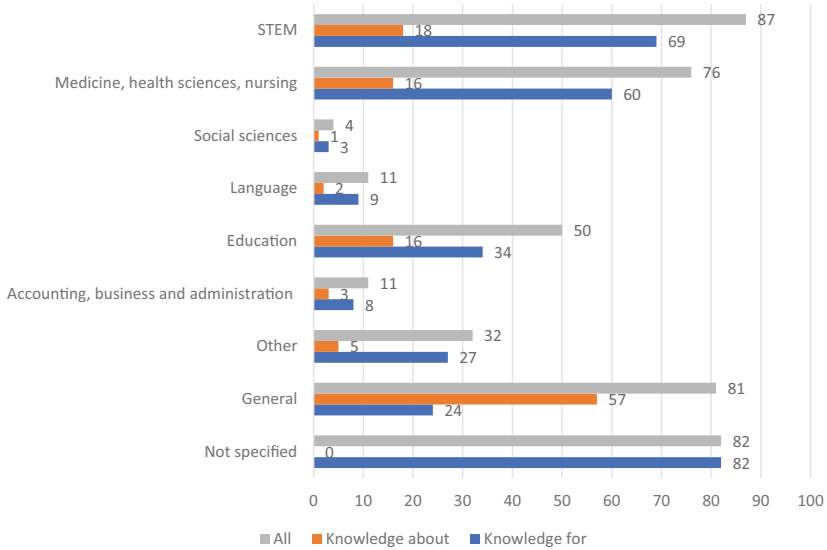


Fig. 10.5 Description of publications according to discipline (*Source* Authors' own)

DTHE is *not* tied to specific disciplinary contexts or constraints, but addresses the phenomenon more holistically (cf. above).

Stakeholder Perspectives

We additionally looked at different perspectives from which the publication was written, based on potential stakeholders in HE. We distinguished between students, teachers, administrators, academics and ICT-support, and the HE institution as a whole. We further introduced two additional categories, one comprising both students and teachers as the community of learning, and teaching, understood as the applied or emergent pedagogical approaches. We are aware that the categories might be overlapping and non-exclusive and that the categorization is limited to the information found in the title and abstract (cf. Fig. 10.6).

Figure 10.6 shows that more than half of the publications address the student perspective ($N = 400$) perspective. Among these publications, the majority deal with *knowledge for* DTHE, which corresponds with our

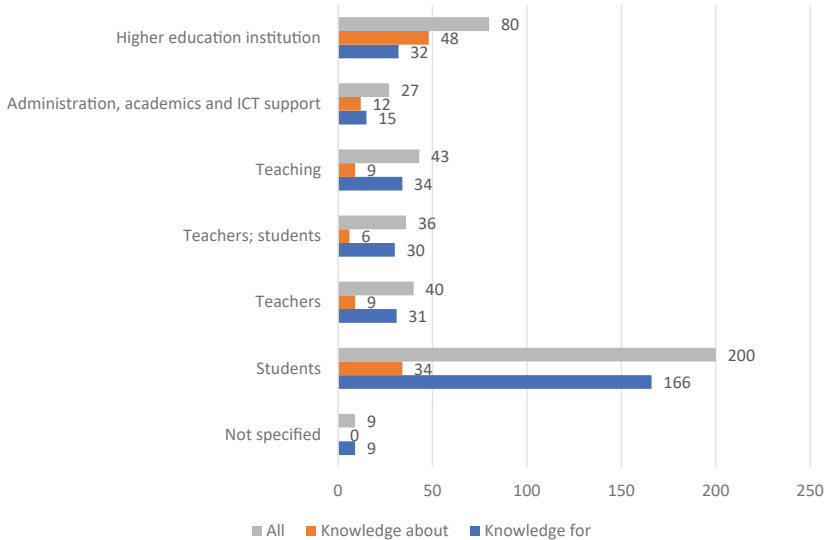


Fig. 10.6 Description of publications according to stakeholder perspective (*Source* Authors' own)

operationalization of this category, in which the learning and social experiences of students was one defining aspect. We found a similar picture for publications with the perspective or teachers, teachers and students and teaching, with smaller numbers in total, but still with the majority of publications being categorized as *knowledge about*.

For the perspective of the HE institutions, however, the general picture is different. Here, 48 publications, which is more than 50 percent, deal with *knowledge about*, while the remaining 32 publications relate to *knowledge for* DTHE. For administration, academics, and ICT-support the distribution is rather equal across the two categories. For students, however, 166 of 200 publications are categorized *knowledge for* vs. 34 publications that are categorized as *knowledge about*.

DISCUSSION

The COVID-19 pandemic has led to important disruptions in HE. These were mainly related to initiatives to ensure the provision of HE in online-mode, partly accompanied by research. However, as elaborated in the introduction, the unprecedented situation created by the pandemic can be viewed as an opportunity to advance our understanding DTHE, which until this point had been understood as a niche compared to DT in other sectors (Reis et al., 2018) and not uniformly understood in itself (Benavides et al. 2020). From this backdrop, the main purpose of this chapter was to systematically retrieve, map and describe the knowledge communicated on DTHE in the international literature based on experiences gained in the first year of the pandemic, and to address knowledge gaps in a dynamic field of inquiry, with implications for further research on DTs in higher education.

Our scoping review shows that the great majority of publications produced in the first year of the pandemic provided a lot of *knowledge for* DTHE, and only a smaller part communicated *knowledge about*, as operationalized by us for this purpose. Given the novelty of the situation of having to convert all university activity to online media in a very short timeframe, it is not surprising that authors first and foremost tried to document their concrete experiences and reflect on their actions, which was by definition the content of the *knowledge for*-category. Most of the papers in the *knowledge for*-category are addressing students, student–teacher interactions, teachers, and teaching perspectives, accordingly. Also, the vast majority of articles in this category comprise STEM subjects and medicine and health. This effect can be explained by the fact that these disciplines together cater for large numbers of students in academic programs in many regions (e.g. Eurostat, 2020), and hence also present the largest group in our sample.

Among publications addressing the perspective of HEIs, however, we find a different picture. For these, the majority of publications is categorized as *knowledge about* DTHE. The same can be found for publications that were not classified according to discipline. Through both aspects—providing knowledge with a perspective on HEIs and not tied to a single discipline but with a boarder perspective—these findings seem to validate our categories. We considered *knowledge about* as leaning towards a social-constructivist and practice-oriented notion of organizational learning; hence, publications in this category partly refer

to changes in organizational culture (Cook & Yanow, 1993), situated learning (Lave & Wenger, 1991) and social learning (Brandt & Elkjaer, 2015). We did not search for direct references to explicit theories in the papers during the scoping process, but pragmatically defined publications in this category as accounting for more than the documentation and evaluation of isolated actions. The fact that a categorization in the *knowledge about*-category overlaps with papers taking an institutionally broad and transdisciplinary perspective confirms that our operationalizations worked as intended.

With respect to geographic region, the ratio of *knowledge for* vs. *knowledge about* contributions is most uneven in Asia and Europe. Since publications from these regions also account for the majority of publications in our sample in total it cannot be excluded that this gap increases with total numbers. This effect excluded, however, it needs to be asked whether other factors in geographic regions could contribute to a more even production of *knowledge for* vs. *knowledge about* DTHE, such as different academic traditions, or different institutional focus DTs during the pandemic.

Limitations and Implications for Further Research

Our method was informed by a scoping review approach to examine and describe a broad and dynamically developing field and to identify knowledge gaps and clarify core concepts (Tricco et al., 2016). Even though this approach aimed to reduce bias and increase transparency and rigor, it implied some limitations in time and resources. First, we have limited our literature search to the first year of the pandemic, i.e., literature published between March 2020 until February 2021 under the assumption that we have reached a certain saturation for the most critical phase. We are, however, aware, that we have missed further and later published studies of relevance. Second, given the ambiguity and non-standardized use of the term DT and a limitation to certain databases, we might have omitted references that have applied a different terminology. Third, given a relative broad research question and a relatively high number of included studies, we limited our coding and analysis to information found in titles and abstracts. Fourth, the scope of our review was limited to abstracts and titles in English, which might have biased the sample of included publications to countries with a high research activity in English language.

This means that countries, where other languages than English might dominate the academic discourse or co-exist, might be underrepresented.

The findings of our review point to a greater interest in *knowledge for* over *knowledge about* in academic writings during the first year of the pandemic, and a focus on hard sciences. With that, potentially underdeveloped research areas are *knowledge about* DTHE, and a focus on soft disciplines. Given the dynamic development of the field and drawing on these findings, a more specified review of the literature with a single focus on *knowledge about* DTHE might provide further insight into this topic over time. This type of review might build on a perspective based on theories of innovation and technological change.

Methodologically, the timeframe that we focused on (due to the urgency of the situation) can only provide a glimpse of developments that have been ongoing before the pandemic, and will continue to unfold in the upcoming years. Focusing on publications on DTHE from the first year of the pandemic provides an opportunity to look at this unfolding. When we look at a split between the papers in our sample, the larger share of those categorized as *knowledge about* DTHE was published in the second period. This indicates an increasing maturity and elaboration of the concept of DTHE over time and with the progression of the pandemic.

Also, the question is still unanswered on whether the COVID-19 pandemic in itself has actually started DTHE, albeit some of the authors of papers in our sample certainly believe this. However, in our review, several papers also mentioned how many of the digital technologies were already developed and many were in use before the pandemic. This would suggest that the pandemic has accelerated a wave of change that was already rolling. Since other areas of society, such as business and industry appear to have come further in their DTs, we may expect education to follow a similar pattern, which should be studied with a longer-term perspective and an eventual follow-up scoping review in a couple of years from now.

Additionally, we must be aware that although some of the technologies are shared across several sectors in society, and that we might expect to find new uses for communications technology in online education as DTHE progresses. Some of these technologies have been around for a while (Tømte & Olsen, 2013), but they may have undergone a rapid development during the pandemic. This also calls for further and future investigation. From a more timely perspective, a further study might draw

on a purposefully selected sample of full-text articles and elaborate more fine-grained dimensions of the category *knowledge about* DTHE, which can inform further primary investigations in different country settings with different innovation paths and in different disciplines.

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Implementing Digital Transformations in Higher Education Following COVID-19: A Norwegian Case Study

Vito Laterza[✉], *Michael Oduro Asante*,
Cathrine Edelhard Tømte[✉], and *Rómulo Pinheiro*[✉]

INTRODUCTION

Over the past two decades, higher education (HE) across the Nordic countries has been the target of numerous government-mandated reforms, including digitalization (Tømte et al., 2020). On the whole, these reforms aim to ensure effective and efficient public service delivery. These efforts have been accelerated since the outbreak of COVID-19 in the spring of 2020. Digital education and the expansion of digital systems

V. Laterza (✉)

Department of Global Development and Planning & Centre for Digital Transformation (CeDiT), University of Agder, Agder, Norway
e-mail: vito.laterza@uia.no

Centre for Education Rights and Transformation (CERT),
University of Johannesburg, Johannesburg, South Africa

M. O. Asante

Department of Government, University of Bergen, Bergen, Norway

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have been an unavoidable alternative for academic institutions the world over (Pinheiro et al., 2019). These initiatives include upgrading and introducing new digital systems, training academic and non-academic staff on new digital platforms and systems, providing online support to resolve connectivity issues and other emergencies, and diffusing new digital technologies to faculties and departments (Orr et al., 2019; Tømte et al., 2019). These initiatives highlight, among other aspects, that digitalization requires a substantial assembly of resources for effective and efficient implementation (Swanson, 2012).

Organizational digitalization entails adjustments in resources, staffing, culture, decision-making, communication, and reward systems (Lokuge et al., 2019). This means that the successful implementation of digitalization does not only depend on the scope and nature of digital technologies but also on ICT decision-makers and a supportive bottom-up organizational culture (Nylén & Holmström, 2015). Scholars have observed that organizations' readiness to change is a critical factor in digitalization outcomes (Weiner, 2009). Studies suggest that many change efforts fail in their intended aims and do not foster sustained change due to the lack of preparation or readiness of the organizational members for change (Fullan, 2007).

Indeed, organizational readiness for change is considered a critical antecedent to the successful implementation of changes and innovation in organizations (Lokuge et al., 2019; Weiner, 2009). According to Gartner (2009), a major technology consulting firm, public and private organizations lose substantial opportunities due to the lack of readiness to change (Gartner, 2009). Studies on HE dynamics show that universities' central administration, faculty, and departments readiness to change are crucial factors in adapting to a new and complex digital environment (Ahmad & Cheng, 2018; Ifenthaler et al., 2021).

C. E. Tømte

Faculty of Social Sciences, Department of Information Systems and Center for Digital Transformation (CeDit), University of Agder, Agder, Norway

R. Pinheiro

Faculty of Social Sciences, Department of Political Science and Management and Center for Digital Transformation (CeDit), University of Agder, Kristiansand, Norway

One element however that is often underplayed in the literature on organizational readiness, is that within organizations, contestations and tensions over different approaches to what constitutes desirable change and how such change should be implemented are the norm, rather than the exception (see for instance Hover & Harder, 2015 on organizational change for sustainability in higher education). A similar trend is found in the literature on digital transformation in higher education (e.g. Benavides et al., 2020; Kopp et al., 2019) and beyond (Vial, 2019): digital transformation is often assumed to be a linear process with, at least in principle, clearly defined content and processes, with obstacles encountered on the way towards what is often described as an inevitable process (Stief et al., 2016). In previous work (Laterza et al., 2020), we have critiqued this stance and proposed instead to pluralise the concept into *digital transformations* (DTs), leaving behind the assumption of a linear move from something worse to something better, but rather hinting at the variety of processes and outcomes that DTs can encompass, with rather uneven outcomes that are often context-specific and cannot be determined a priori, or by uncritically applying what works in one context into a different one.

Drawing on Weiner's (2009) theory of organizational readiness for change and Lokuge et al.'s (2019) conceptualization, and taking a more critical approach to organizational readiness that takes seriously actors' different and sometimes conflicting understandings of change and digital transformation processes, this chapter explores the implementation of digital tools and systems in Norwegian HE prior to and following the outbreak of the COVID-19 global health pandemic. The analysis focuses on the challenges and bottlenecks associated with digital implementation in a complex environment by focusing on contextual and situational factors. The chapter investigates ongoing developments in Norwegian HE in the context of dynamics across the Nordic region, illuminating the micro-level practices, experiences, and responses to digital transformation of university actors at multiple levels in a Norwegian university selected as the main case study. The following research question is posed:

What characterises the implementation of digital transformations initiatives (within teaching) at a Norwegian university, and what has changed following COVID-19?

DIGITAL TRANSFORMATIONS IN/OF NORDIC HIGHER EDUCATION

Digital Transformations Enters the Field of Higher Education

Governments in Europe and beyond have focused on adopting digital transformations (DTs) policies as means for preparing their societies and public sectors to the challenges posed by wicked problems such as climate change, urbanization, globalization, and growing socio-economic inequality, among others. The HE sector has also been the target of such “modernisation” measures, and higher education institutions (HEIs) across Europe have launched digitalisation strategies or added Information Communication Technologies (ICT) perspectives as part of their strategic plans. Such top-down governance processes for DTs of HE are thus observed at multiple levels: at the *macro* level, as governments propose new directions for HEIs to take advantage of the opportunities brought by DTs; at the *meso* level, as HEIs are responding to governmental policies and strategies by developing their own strategic frameworks and organizational architectures that address DTs in its various forms; and, finally, at the *micro* level, as academic communities adjust their norms, values, and practices to the emerging digital environment.

High quality digital infrastructure influences quality work within HEIs, and these may benefit from overall support services and infrastructure provided by governments. Infrastructure as a service thus includes all the data resources stored in data centrals or data rooms, such as servers and networks. The various services have both common features and differences that make them suitable for different purposes. As a result, HEIs may select infrastructure services appropriate to their profiles and needs, such as cloud services and data warehouses. These digital services touch upon key security issues in diverse ways and may encompass areas where edtech-providers, such as Canvas, Microsoft, Apple, Google, and the like (see Chapter 2 in this volume), and HEIs and governments hold conflicting values and strategic interests.

In a study of HEIs in the UK, Komljenovic (2022) calls for regulation beyond the question of data privacy. While digital data property is already a reality, governed by terms of use, and protected by the intellectual property rights regime, the study underscores that, as COVID-19 has led to emergency pedagogy, concerns of data value redistribution have been less

debated. Consequently, there is a need for renewed public awareness and political action to address issues of value extraction and redistribution within HEIs. Similar debates are observed in Norway, e.g., around the issue of intellectual property (IP) rights when it comes to procurement and use of learning management systems (Høivik, 2022).

From a leadership and governance perspective, DTs interferes with a range of HEIs' duties within the broader scope of their relatively autonomous status as public institutions. This raises several challenges for management and administration at multiple levels (Duarte & Martins, 2013). Some HEIs have opted for embedding or integrating ICT in their overall strategic and operational plans, whereas others prefer to have distinct, or separate approaches (Tømte et al., 2019). Nonetheless, to set these plans into practice, there is a need for governance capacity. The latter implies guidelines for what types of digital infrastructures should be pursued, the use of digital technologies and, also how and by whom should these guidelines be elaborated, and in what ways they might be communicated to various user groups. A key finding from a systematic literature review of HEIs in an international context (Khouja et al., 2018), indicates that there are several ways to implement ICT governance. The study concludes that, regardless of contextual variations, there is a need to establish a committee structure for ICT assets and open and regular communications among the actors involved, including ICT staff, alongside university and other external parties.

Digital transformation may impact teaching and learning in diverse ways and at different levels within HEIs. New possibilities for innovative and improved teaching and learning resulting from technological advancements depend, to a large extent, on adequate technological infrastructures and organizational capacity. They also rely on local cultures (norms, values, and identities) that are open to change, and more specifically, willing to embrace pedagogical innovations. In addition, faculty staff and students require adequate (digital) skills and competencies to benefit from these new possibilities (Zhao et al., 2021).

Recent and Ongoing Policy Developments in Norway

The Norwegian government has funded and monitored the DTs of HEIs since 2009, in the form of tri-annual surveys. These surveys shed light on the digital dimension of learning processes and quality development in HE and are centred on four distinct areas: (1) scope and use of digital

technology in teaching and learning; (2) access to digital technology and support functions at educational institutions; (3) competence needs and training; and (4) strategies and educational management. Findings from the 2018 report *The digital state of HEIs in Norway* document an increase of faculty staffs use of technology for teaching purposes since last monitoring (2014), but still points to the need for more competence development insofar as the pedagogical use of technology is concerned (Norgesuniversitetet, 2018). The study also shows that academic staff were positive about the pedagogical potential in digital technology, while emphasizing that the use of technology must not take place at the expense of the academic content. These statements point to the lack of academics' awareness of the fact that, in some disciplines, the technology might also influence knowledge domains by causing epistemic changes (Lund & Aagaard, 2019). The monitoring also revealed that most Norwegian HEIs had in place strategies for DTs with the ultimate goal of fostering teaching quality.

Infrastructure, equipment, and the design of the classrooms or spaces for teaching and learning are important prerequisites for exploring and using digital technology within teaching (Durek et al., 2017). However, findings from the 2018 monitoring demonstrated that the status in these areas remains unchanged. The report suggests that the equipment in the classrooms must support this goal, and that classroom design must accommodate for more flexible forms of digital-mediated learning centred on student-active teaching methods. The assessment also revealed a need for competence development in pedagogical and professional use of digital technology.

Key findings from the 2021 monitoring (DIKU, 2021), reveal a large diversity on the nature and capabilities of local support centres for DTs across Norwegian HEIs. While some were more general in giving pedagogical support, others provided specialized value-added services like media labs and other digital infrastructures. An important observation was that the majority of the existing centres were loosely coupled with both the overall DTs work within HEIs as well as their local governance structures (DIKU, 2021).

NORWEGIAN HIGHER EDUCATION AS A CASE

As alluded earlier, this chapter illustrates ongoing DTs developments across the Nordic region by focusing on Norwegian HE. More specifically, two levels of analysis are investigated; (a) policy (macro level) initiatives as well as (b) institutional (meso level) arrangements. Regarding the latter, we resort to qualitative data derived from one public university, a multi-campus institution (former university college) geographically located in a peripheral setting (with strong links to regional public and private sectors), and with a traditional educational profile centred on the professions; teaching, engineering, nursing, social work, among others. As is the case of its Nordic counterparts, Norwegian HE has, in the last two decades or so, been the target of New Public Management (NPM) reforms centred on quality, efficiency, accountability and responsiveness, alongside implementing the European-wide structural arrangements emanating from the intergovernmental Bologna process (cf. Pinheiro et al., 2019). The system has also been the target of a structural reform that has culminated on a series of voluntary mergers (since 2010) between different types of providers, resulting in larger and more complex universities centred on hybrid arrangements (Frølich & Stensaker, 2021). Overall, Norwegian HE has, since the early 2000s, been gradually moving from a binary system based on fully fledged universities and university colleges towards a unitary system centred on comprehensive universities as the dominant organizational template. The latter is supplemented by strategies of differentiation according to local, regional, national, and global market imperatives and strategic priorities.

READINESS FOR CHANGE

Organizational readiness for change has been defined as a multi-dimensional, multi-level, multifaceted construct or comprehensive attitude that is influenced by the *content* (i.e., what is being changed), the *process* (i.e., how the change is being implemented), the *context* (i.e., circumstances under which the change is occurring), and the *individuals* (i.e., characteristics of those being asked to change) involved (Holt et al., 2007). Collectively, readiness reflects the extent to which organizational members are cognitively and emotionally inclined to accept and adopt a particular plan to purposefully alter the status quo and move forward.

Specifically, organizational readiness for change refers to two key dimensions: (a) at the micro level, organizational members' commitment or willingness to change (*change valence*) and, (b) at the meso level, the sets of resources and capabilities required to successfully implement the planned change (*change efficacy*) (Weiner, 2009).

Lokuge et al. (2019) assert that organizations' success in coping with complex situations or when facing volatile environments largely depends on key factors like flexibility, responsiveness, adaptability, and agile decision-making. As an external shock, and as attested by other contributions in this edited volume, COVID-19 posed unprecedented challenges to HEIs (see also Pinheiro et al., 2023), thus providing an ideal case for studying the degrees of and internal willingness and capacity for adaptation to emerging circumstances and disruptive events. Below we provide further insight on the two constructs underpinning organizational readiness to change.

Change Valence

Change valence is a psychological process associated with organizational members' commitment or willingness to change the course of action (established habits) by adapting new working methods, practices, procedures, mindsets, etc. (Weeks et al., 2004; Weiner et al., 2008). The main argument reads as follows:

[...]the more organizational members value the change, the more they will want to implement the change, or, put differently, the more resolve they will feel to engage in the courses of action involved in change implementation. (Weiner, 2009, p. 70)

Organizational members might value the new system (e.g. set of practices) because they consider it effective in help solving an emerging problem, or because it is thought to benefit internal and external stakeholders alike (Weiner, 2009). As a construct, change valence aids inquiring the extent to which members of an organization collectively value the change and its overall implementation or institutionalization (Lokuge et al., 2019).

In the context of DTs in HE, the assumption is that the value and the benefits that digitalization brings to both teaching and learning as well as administration are expected to positively influence members' commitment towards the effective implementation of digital systems. Yeap et al.

(2021) note that HEIs' staff readiness is crucial for facilitating change and increasing staff commitment towards teaching effectiveness. In terms of DTs in a highly institutionalized organizational field like HE with relatively autonomous HEIs and professionals, the key query is thus (*Research Subquestion 1—RSQ1*):

- *Regardless of individual motivations, do university staff (most notably teaching academics) collectively value DTs enough to commit to its implementation (both before and following COVID-19), and if so, what aspects help characterize this (change) process?*

Change Efficacy

Change efficacy encapsulates the capabilities and resources of the organization, including human, financial, material, and informational resources necessary to implement change policies (Lokuge et al., 2019). Weiner (2020) identifies three determinants of change efficacy: (a) task demands; (b) resource availability; and (c) situational factors. University staff's knowledge regarding DTs, strategies to implement it, and the required time for the implementation are some of the critical *capabilities*, while the availability of sufficient human, material, and financial assets are the needed *resources* for successfully implementing DTs across the board, most importantly within the teaching and learning domain (Gärtner, 2013; Poturak et al., 2020).

Drawing from the change readiness literature, when HEIs' staff at the various levels collectively share a similar and positive assessment of task demands, resource availability, and situational factors, they are also likely to share a sense of confidence insofar as successfully implementing a complex change process is concerned (Weiner, 2020). In the context of COVID-19, HEIs' resource mobilization for effective digitalization, in the form of the adoption and adaptation (localisation) of online-based education and home office during and after the lockdown, are conceived as key variables. Active support to academic communities in the form of flexible digital platforms and access to dedicated training (digital competences) act as facilitators or mediators of the DTs implementation process. Hence, in the context of the DTs of HEIs one key query that needs addressing is (*Research Subquestion 2—RSQ2*):

- *To what extent do Nordic HEIs have the necessary resources to implement DTs effectively, and how has this process been influenced or shaped by the COVID-19 pandemic?*

It is worth noting however that, given the inherent complexity associated with the university as an organizational form (loosely coupled structures, high levels of professional autonomy, multiple disciplinary cultures, local norms, and traditions, etc.) it is unrealistic to assume, at the onset, that university staff conceptions of both DTs and the need for change or readiness naturally converge towards a single model or perspective. Instead, one would expect that internal orientations move away from unidirectional conceptions towards a much more contested notion of organizational readiness around the pros and cons associated with DTs' impact (real and imagined) on teaching and learning. In other words, while unpacking organizational readiness towards DTs in HE it is important to take into account the role played by processes of conflict and contestation manifested as nested tensions, dilemmas, and paradoxes at various levels of the HEI.

CASE STUDY & METHODOLOGY

The case university is a relatively newly established multi-campus institution (former university college up to 2007). As is the case of most of its university college counterparts, it is still primarily a teaching-centred university, yet with some recognized pockets of research excellence, and with strong local ties to regional actors across the public, private and civic sectors. In 2021, the university employed 1538 staff, and enrolled a total of 14,215 students, with the bulk of students in undergraduate and postgraduate courses coming from Norway (statistics are taken from an anonymized company source). Given the qualitative design nature of the study, the aim is not to generalize the findings to a broader population but instead to provide an in-depth, single-case account of the dynamics associated with DTs in Nordic HE, within the context of broader lessons in terms of theory and concepts (scientific audience) as well as best practices and other key insights for HE practitioners. Despite its limitations, single case design allows researchers to probe a specific phenomenon, in this case readiness in the context of DTs in HE, while gathering important contextual information and insights necessary to interpret the results (Yin, 2009).

To gain insights into various levels of the organization, eight semi-structured in-depth interviews were conducted between the fall of 2020 and the spring of 2021 with various stakeholders within the university:

- Three from central leadership (AA1, AA2 and AA3): one academic in the central management team, an administrative leader, and another academic who had recently left the central management team;
- Two middle-level staff (AF1 and AF2): one faculty director, and one employee in a university-wide staff support unit;
- Three department-level academics involved in teaching (AD1, AD2 and AD3).

The organizational units covered by the participants included the central management team, the university-wide learning management system support unit, the university-wide teaching support unit, and members of three faculties (Faculty of Humanities and Education, Faculty of Social Sciences, and Faculty of Engineering and Science).

The informants were recruited based on a combination of strategic sampling and the snowball method (Yin, 2009) due to their active engagement with and prior experiences of DTs. The interview guide was inspired by theories of readiness of change, and previous studies on DTs in HE. Various topics were raised, such as the informants' attitudes and perceptions on DTs (in plural rather than singular, see Chapter 1 of this volume, and Laterza et al., 2020), their perceptions on benefits and opportunities of DTs, and pros and cons towards implementations of digital technologies for teaching and learning (T&L) before, and after the pandemic. All interviews were conducted online (zoom), recorded and later transcribed. A codebook was developed, discussed, and agreed upon by all authors, and all interviews were later coded in the software NVivo. The data was stored in accordance with the recommended ethical and privacy guidelines from The Norwegian Centre for Research Data (NSD).

The knowledge gathered through the interviews was complemented by in-depth background knowledge the authors have as staff members of the same university. This means that we have had the opportunity to follow DTs processes at the university for several years, and this provided crucial insights to interpret the data from this specific sample of interviewees, and enhance the quality and validity of our analysis.

FINDINGS AND ANALYSIS

Our findings and analysis are structured in three subsections: we will first discuss the “antecedents” of organizational readiness, in other words the recent history of DTs at the case university. This will constitute the important background for the two main conceptual dimensions explored empirically in the next two subsections: one on *change valence* and one on *change efficacy*.

Antecedents—The “History” of Digital Transformations at the Case University

Our data suggest that DTs at the case university began well before the COVID-19 outbreak in the spring of 2020. This was manifested through the university central administration effort and policies to build digital infrastructure, introduce the new Learning Management System (LMS), Canvas, since 2017, expand IT support, provide specialized support for video recordings for lectures and seminars, and set up a broad range of support services to increase the digitalization of T&L. This process was not without challenges: a current central management executive (AA1) and a former one (AA3) highlighted the tension between the central management’s push for increasing digitalization of T&L and the unwillingness or inadequate skill set of many lecturers to embrace different forms of digitalization that went beyond conceiving digital tools such as Canvas as mere repositories for lecture content. This theme was acknowledged from different perspectives by almost all interviewees.

I think the sort of challenge is that most of the technology and digitalisation we have seen so far in teaching, has been used more as an administrative tool ... So, what do we need to do? We need to use it in a more pedagogical way. That is more challenging. I think we also see with the COVID-19 situation that we have a sort of speed digitalisation now ... That makes it probably easier to explore the possibilities offered by the technology. But just having lectures on Zoom or record lectures ... we need to do more than just that. (AA1)

The university’s approach towards DTs as a top-down driven process including the provision of overall digital infrastructure and central support services is consonant with similar findings across HEIs in Norway (Tømte et al., 2019). As demonstrated, LMSs, software providing assessments,

communication, and administration support for DTs are offered to all staff across the universities. Yet, as suggested by AA1, these generic types of digital technologies are to be adopted by teachers, and there seemed to be still some way to go, even after some months of emergency remote teaching caused by the pandemic. When interviewing the teachers (AD1, AD2 and AD3), a similar picture emerged as some were quite experienced with the use of digital technologies for teaching purposes, while others had only limited experiences with integrating digital technologies in their pedagogical work. After some months of emergency remote teaching, teachers' opinions remained largely unchanged, although with some new insights on the possibilities and benefits of DTs.

Change Valence

As previously stated, the research literature suggests change valence to be associated with the organizational members' commitment, or willingness to change (Weeks et al., 2004; Weiner et al., 2008). In our case, we explored how the informants considered the pros and cons of digital technologies encompassing T&L. If the pros outperform the cons, we may interpret this as a first necessary step towards their willingness for embracing change.

One main observation would be that there tends to be disagreement among actors' understandings of DTs content and goals. For example, the managers saw COVID-19 accelerated digitalization as a catalyst for DTs, moving beyond "technology as technical tool" towards a transformation of pedagogy via digitalization (a way to push teachers "resistant to change" to actually change), as stated by AA1:

... if you look at the whole HE sector, I think that digitalisation will change the way we teach The new national strategy under discussion actually says that in every [study] subject we need to put in some technology or use some digitalisation. But, not just for the sake of technology. (AA1)

The interviews, and our own experiences as teachers in the university under study, suggest that the interests of central administration and mid-level support services and faculty managers seemed to be largely aligned, reflecting somewhat the managerialist ethos that distinguishes this case university from more traditional (old and research-intensive) domestic universities, also as a result of the former university college cultural ethos

that preceded the upgrade to university status in 2007. While the rector is elected by the university community, all other executive positions at the various levels all the way down to department heads are appointed, creating a rather vertical structure of line management. Tensions tend to emerge between this relatively homogeneous line of management by the leaders at different levels working closely together with each other on one hand, and the academic teaching staff on the other hand. Many of the latter value academic autonomy and freedom as per the statute of the Humboldtian university, a model embodied by traditional universities (in Norway and other Nordic countries) where decentralized autonomy tends to be greater than in more managerialist (younger and more vocational) HEIs such as the one studied here. Central management is aware of this tension:

Because as a lecturer, as a professor, you have autonomy. So, it's very difficult to go to a professor, and say you should teach like this. ... Well, if I think [as a lecturer] this is the best way to teach, then I'll do it [that way]. But in this case, I think we need to be more specific on how we do things. I think that we've got kind of push people in a way. (AA1)

The perspectives of two interviewees involved with providing leadership in and support services towards digitalization of T&L (AA2 and AF2) were also quite interesting in this respect, and reflect this overall structure where administration and support services tended to have quite closely aligned interests with the leaders. Except for two interviewees lecturing at the department level (AD2 and AD3), all the others tended to construe somewhat negatively, even if often empathetically, the lack of skills or resistance from lecturers to significantly transform their pedagogy with the use of digital tools.

Teachers, on the other hand, hold other perspectives. Some of them are rather reluctant towards the DTs that promote online teaching, which one teacher framed as in danger of turning the institution into a “YouTube university”:

I think for the students, I can see some benefits. They can watch my digital lessons and repeat them as often as they want. They can sit at home and they don't have to be [on campus] in this COVID-19 situation. It's beneficial for them. For the society, I'm in doubt. ... I'm very much afraid of that, that we will kind of use the lessons, repeat them and just make the university become a YouTube University. Because that's quite easy. (AD2)

Here it is suggested that the privileged focus put on online learning for campus students may not foster the enhanced seminar- and dialogue-based type of education that is recognized as conventional campus-based education. In addition to these colliding views on DTs between central leadership and teaching staff, we observed differences in views on DTs between support staff and teaching staff, and within teaching staff. Below are two extracts that demonstrate some of these variations. In the first, a teacher (AD3) reflects upon one's teaching online and on campus, in the other, an administrative staff responsible for university pedagogy support (AF2) share their thoughts on how to assist teachers in their mastering of teaching with technology.

Then these students when they are thrown in [an online synchronous classroom] and they don't know each other, it's even worse. I feel that the students' activity is not good. Even if I send them into breakout rooms. They don't know each other, they cannot [do] small talk. They don't know what [to talk] about, they can do the task, but they might be too self-conscious. And it's much easier in real life. Because again, you can read the body language, you can make each other more comfortable by smiling or something like that, which [is not the case] in Zoom. (AD3)

But I guess some will have bad experiences and think "never again" and students will have bad experiences, but not all the lectures are as good as they could be... if we had more time... And this could be to do with both how to use different tools, and also technology itself and not knowing [the technology well] enough, we see the bad side of it now, for instance some teachers have lectures on Zoom ... and they do exactly the same as in [the] classroom, instead of taking advantage of all the possibilities such as breakout rooms, surveys, being able to cut down lectures to [shorter lengths than in the classroom]. (AF2)

Based on our interviews with different actors across the university, a preliminary conclusion as regards change valence would thus be that both before, and during the pandemic the university staff disagreed on the overall value of DTs in teaching. This means that their readiness for change as an organization remains undetermined. While leaders tended to be more positive towards this change, a greater diversity of opinions were observed across teacher staff. Some possible explanations of this discrepancy may relate to teachers' degree of readiness towards changing their ways of working. Here, their readiness for change comprises held (old

and new) attitudes towards digital technologies, their pedagogical beliefs, and their self-efficacy towards technology (Scherer et al., 2021). These are intrinsic tensions at the micro level that may be difficult to solve. Yet, to map this landscape of various attitudes and motivations may be useful in this respect. However, this goes beyond our study, but might be worth pursuing in future studies. That said, we will in the next sections elaborate more on some of these dimensions, as they may relate to the “change efficacy” concept.

Change Efficacy

As shown before, the case university under study is considered as well equipped with IT and human resources in terms of support staff. Yet, in the interviews with the teaching staff, issues related to workplan hours for teaching were not clearly sorted out, for example, who pays for all the extra work when teaching online. Teachers also reported weariness and fatigue as a result of emergency remote teaching. Furthermore, teaching staff were also concerned about the suggested benefits of digitalization from an efficiency and time perspective to scale up. For example, one teacher (AD3) highlighted the fear that once their lectures were recorded and developed in a reusable manner together with online courses, then their work might not have been needed anymore, which again could lead to a major reduction of existing contracts or mass firing (albeit unlikely in a Norwegian context due to strong unions). Teaching staff thus communicated some ambiguity towards DTs of teaching. It provided them with more flexibility and capacity to reach out to larger groups of students, while also spurring fears of losing their jobs due to the potential disruptive nature of DTs in the academic labour markets as commonly reported in other industries.

Central management interviewees showed a more future-oriented positive perspective towards DTs. AA1 and AA3 saw digitalization of DT as a conscious strategy that would favour, competitively, the case university in the future, in the Norwegian and international contexts. While AA1 tended to refer more to the Norwegian context and its policy context with the national government pushing heavily towards DTs in HE, AA3 went further and discussed more openly the issue of global competition for a rapidly changing market, clearly envisaging the case university as a provider of digital education (intended here as flexible and distance, not just an increasingly digitized physical classroom) in order to capture the growing market in that direction. AA3 provided a vision of

a tough competitive market where only those who pushed themselves to the maximum would succeed. So in a sense AA3 was not entirely optimistic about the case university itself, but rather they provided a vision of “inevitable” market competition where the survival of the case university would depend on how rapidly and effectively it could become a digital provider of the higher education of the future.

Virtually all interviewees, on a less visionary level, agreed that one way or the other, there would be no return at the level of teaching practice to the pre-COVID-19 normal. Rather, some of the innovations and radical changes brought in the classroom by the pandemic emergency would stay on as more conscious choices by lecturers and students.

One key theme that was stressed from different angles by multiple interviewees was that of “flexibility”, as something positive and benefiting both lecturers and students (e.g. teaching staff could travel for conferences for a few days without having to interrupt their courses, or students being able to have flexibility of watching recorded lectures in their own time and multiple times).

A preliminary conclusion here would thus be that the university studied did have an adequate technical infrastructure for implementing digital technologies for teaching purposes, although there was still some reluctance and ambiguity among teacher staff on how to proceed. There also remained the question of human resources raised by some teachers: will the university make a plan to properly account for the extra hours needed to effectively implement DTs, or will DTs come at the cost of existing workplan arrangements? These are open questions.

DIGITAL TRANSFORMATIONS, COVID-19, AND BEYOND: CONCLUDING REMARKS

Our findings and analysis show that the historical tension (antecedents in our conceptual framework) between a top-down push towards DTs and the reluctance among several teaching staff to go ahead as fast as envisaged by central management (in alignment with administrative support services) has led to significant differences in conceiving the desirable content and goals of DTs among different actors—especially between central management, administrators and support services on one hand and many of the teaching staff on the other. This is an important dimension that seems to be missing from much literature on organizational readiness: the fact that what constitutes “readiness” is in itself affected by the

level of agreement or disagreement over what the change the organization is gearing up for should actually consist of. In other words, *change valence* is also affected by conceptions of changes—and the desirability or not of such changes.

Our analysis of *change efficacy* also complicates the picture of much existing literature: the issue of what resources are available for DTs is not straightforward, and here too actors' perceptions and understandings influence the assessment of such resources. While there was general agreement among different actors in the case university that the digital infrastructure and support services for DTs were in place and sufficient resources in this regard were available, this was not the case when it came to a crucial part of human resources: the work of academic teaching staff itself. Teachers were more concerned about the extra work needed to successfully implement the DTs discussed in the case university, while managers and administrators did not consider such concerns in their understanding of DTs and the obstacles to their implementation.

The difference of views around the content and goals of desirable DTs are also related, in our opinion, to the differing tacit or explicit conceptions of the role of COVID-19 in the implementation of DTs. For teachers, there seemed to be more of a sense of “before and after” COVID-19, as evidenced more implicitly through constant references to fatigue with emergency remote teaching and the negative effects that the abrupt move to online for physical classrooms and the various adjustments needed afterward produced. On the other hand, central management and administrative leaders openly stressed a conceptualization of the effect of COVID-19 on DTs largely as a positive accelerator of a long-term trajectory towards increasing and pervasive DTs in all aspects of T&L:

I think COVID-19 sort of jump-started digital teaching by a couple of years. Because everyone now has been forced to do it. Again, not all, but I think a lot of teachers actually will bring part of what they have experienced now in [their future] teaching. ... at our university, we are talking about how, what we will be bringing with us, what should be improved, how should we sort of continue to work with digitalization in teaching. (AA1)

There are many teachers who had a reaction that they did everything that they would normally do on campus also digitally, if they were supposed to have a four hour lecture they just moved it from campus to Zoom, and

that is a disaster every time, and now they are thinking more practically, they narrow down Powerpoints, shorter sessions, more groupwork, more seminar-like. And they never return to the old way of doing things. (AA2)

COVID-19 then seems to have brought into sharp relief the tensions and contradictions we highlighted at the beginning of the analysis between a top-down approach from central management and administration on one hand, and the claim for more control and academic autonomy from teachers on the other. But the effects of the rapid wholesale digitalization of teaching seem to have already led to a further stage in this unfolding and still open-ended story of DTs' implementation: even those teachers who were most critical of DTs (AD2 and AD3) seemed, several months after emergency remote teaching, to be ok with blended learning options—i.e., that a mix of online and physical learning modes was now accepted as a new normal to be embraced, rather than resisted. One wonders whether the same teachers would have been ok with the significantly higher level of digitalization of blended learning vs wholly physical teaching even just a few months before the pandemic caused the rapid shift to digital T&L.

The question of organizational readiness then cannot only focus on what is openly and transparently discussed and negotiated among all actors involved. There seem to be structural changes (such as the accelerated DTs brought about by emergency remote teaching) that affect practice beyond what is negotiated more explicitly within a HEI. The words of university leaders seem to suggest that they were indeed aware of such “help” to their cause so to speak, in a way that envisaged COVID-19 digitalization less as a completely unexpected factor to be dealt with as *force majeure* than as an external catalyst accelerating trends already in motion and policies that had already been assertively pursued from central management in previous years.

The tension between top-down approaches to policy changes in HEIs and the rank and file of academic teachers claiming autonomy is a well known one (Hornibrook, 2012), and one that is not particularly distinctive of Norwegian or Nordic HE. But it takes up a particular context-specific dimension in a Norwegian HE setting because of the dominant organizational culture of consensus that still marks Norwegian and Nordic HE. Managerialism in academia might be contested in other settings such as UK, US, or Australia (Anderson, 2008; St Clair & Belzer, 2007), but even more critical voices accept that is an increasingly common

set up in HE in those countries (and in most countries in the world where HE has undergone significant processes of marketization, either in funding or organizational logics or both). In Norway, and in our case university, the idea that major changes to the ways academic teaching staff work could be carried out without a significant degree of employee involvement would be rejected by the vast majority of HEI staff, including those in a leadership position. Leaders accept that their management style is more akin to steering a group (hence also the emphasis on “leader”, as the word “manager” is rarely used, also in English-speaking internal discussions) than providing clear instructions that should be carried out by “subordinates”. It is not surprising then that, once there is agreement among the leadership that DTs should go ahead and that the university should position itself as a national and possibly international leader in DTs in T&L, then the issue cannot be resolved by relying solely or even primarily on vertical lines of management. That is also why the intervention of factors that are deemed by actors as external—such as the unexpected impact of an unexpected pandemic on T&L—can then be harnessed to achieve policy goals in ways that a negotiated route through complex time-consuming processes of internal consensus might not be so effective in achieving. The question of *change efficacy* then is also a question of what makes a certain path to change socially legitimate within a HEI and the HE sector as a whole. Consensus culture in Norway and the Nordics is less about setting a priori the content of change, and more about legitimizing change (or resistance to change) through processes of employee involvement and democracy that are seen by all actors as foundational to the very existence of the organization as a legitimate social unit. This also explains why, just as leaders cannot be too assertive in their style and proposals, so rank and file academic staff are expected to adopt a consensual outlook that does not put them in stark opposition with the leadership. This emerges quite clearly from the interviewees, in that critiques from teaching staff are couched in a language of consensus where there is an acknowledgment of the positives of certain policies around DTs, soon followed by concerns about potential negative effects of such policies. This is indeed distinctive of Norwegian and Nordic consensus culture, and complicates the often oppositional picture of *us vs them* that emerges from critical literature on tensions and conflicts between management and employees in HE in the Anglo-American world (Alvesson & Spicer, 2016).

What will be important to follow up with future studies is this tension between a certain optimistic vision of the “inevitability” of wide-ranging DTs (often conceived by HE policy-makers and HEI leaders as a singular linear evolutionary process of DT) and the concerns of many academic teaching staff who find themselves on the frontline of such changes and increasingly see the dangers to academic autonomy that these changes might bring. How will these tensions and contradictions play out in Norwegian HE in the future? How far-reaching will the accelerated digitalization brought about by COVID-19 turn out to be a few years from now? And will the organizational consensus culture of Norwegian HE survive such changes, but also provide different trajectories than in countries such as UK and US where this consensual approach is not the norm in HEIs? We hope our chapter has illuminated some important aspects related to these questions, and will spur more debate and research on these crucial topics for the future of HE in Norway, the Nordics, and beyond.

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PART IV

What Next?



Possible Scenarios for the Future of Digital Transformations in Higher Education

Cathrine Edelhard Tømte, *Rómulo Pinheiro*,
Linda Barman, *Lise Degn*, and *Lars Geschwind*

In this edited volume, our aim has been to expand the scholarly and policy debates surrounding digital transformation (DT) in higher education. We applied a broader systemic framework pertaining to multiple manifestations at various scales and involving an increasing number of internal and external stakeholders. In so doing, we followed, and further developed the work initiated by Laterza et al. (2020), pursuing DT in its plurality. Moving from DT to DTs, the conceptual framework exposed three analytical elements—contexts, mediations, and type of effects—for unpacking the manifold empirical DTs’ manifestations.

C. E. Tømte (✉)

Faculty of Social Sciences, Department of Information Systems and Center for Digital Transformation (CeDit), University of Agder, Kristiansand, Norway
e-mail: cathrine.tomte@uia.no

R. Pinheiro

Faculty of Social Sciences, Department of Political Science and Management and Center for Digital Transformation (CeDit), University of Agder, Kristiansand, Norway

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By looking to the Nordic countries and their higher education (HE) systems, we have provided solid empirical insights on how DTs gained ground before and continued to gain ground during the years of the COVID-19 pandemic. Moreover, this volume has demonstrated how international digitalization trends, such as global EdTech platform providers, may impact the activities of HE institutions (HEIs), particularly where HE is public and funded by the governments, as in the Nordic countries.

These developments are observed at all levels and impact on technical, pedagogical, and human resource systems within and across organisational boundaries. For example, the contributions by Øvrelid and colleagues (Chapter 2) and Singh and Haugsbakken (Chapter 6) have demonstrated how the contexts of teaching and learning are exposed to DTs by offering online solutions in addition to or substitution of campus-based offerings. Both chapters highlighted the ways in which these processes existed prior to the pandemic but became more wide reaching due to the implementation of emergency remote teaching; thus, they have been subject to far more debate during the COVID-19 pandemic than before. A key message from the research is that the DTs that impact the contexts for teaching and learning call for several types of change, intersecting with infrastructure, culture, and competencies. Moreover, DTs of context have been observed in traditional campus-based teaching—for example, in the ways faculty staff are expected to adopt digital technologies.

L. Barman

Department of Learning in Engineering Sciences, KTH Royal Institute of Technology, Stockholm, Sweden
e-mail: lbarman@kth.se

L. Degn

Department of Political Science, The Danish Centre for Studies in Research and Research Policy, Aarhus University, Aarhus, Denmark
e-mail: ld@ps.au.dk

L. Geschwind

Department of Learning in Engineering Sciences, KTH Royal Institute of Technology, Stockholm, Sweden
e-mail: larsges@kth.se

Tømte and Lazareva (Chapter 4) showed how a specific technology-rich learning space may foster the development of digital competence for future teachers. A key message here, however, is that faculty staff would also need professional digital competence to foster this type of learning for their students. The learning space itself can only provide an appropriate context for this development. The digital competence of the people involved in the DTs processes is thus seen as crucial (a necessary condition) for HEIs if they are to succeed in taking advantage of the investment in new contexts for teaching and learning.

The second critical feature, as suggested in the framework on DTs, is connected to how sub-systems may play a mediating role at the system level. As suggested by Laterza et al. (2020), the technological platforms being used within HEIs are central in this respect. De Andrade and colleagues empirically demonstrated how dominant EdTech providers are gaining ground on a global scale and have become even more dominant during COVID-19 due to remote online teaching and closed campuses. In the Nordic countries, HEIs had a solid pre-existing digital infrastructure, including learning management platforms, and were thus well prepared to transfer their teaching to online remote settings, as sketched out in Chapters 2, 5, 6, and 7. However, as suggested by Barman and Weurlander (Chapter 7), these sub-systems may also hinder innovation in teaching and learning, as they allow for other types of narrower knowledge domains to be assessed which often differ from those preferred or initiated by the faculty staff themselves. The mediating role of these sub-systems of digital platforms may thus allow for new ways of teaching and learning, but these developments should be closely followed, as they may cause unintended effects that have not yet been foreseen—for example, they may change the subjects themselves, as demonstrated by Øvrelid and colleagues (Chapter 3) and Tømte and Lazareva (Chapter 4), or they may limit proper assessments, as in the case outlined by Barman and Weurlander (Chapter 7).

The various impacts of or effects caused by digital transformation are referred to as the third critical feature of our proposed DT framework. One could argue that all chapters in the present volume address different types of DT effects at multiple levels within HEIs. For example, the impact at the organisational or meso level was observed by Hermansen and Lund (Chapter 6), wherein the authors empirically demonstrated how various systems are becoming coupled in new ways due to digitalisation,

which thus may cause sustainable changes across entire organisations. Furthermore, at the micro level, digital technology has caused epistemic changes in disciplines and/or subjects (see Øvrelid and colleagues, Chapter 3; Tømte and Lazareva, Chapter 4; and Wollscheid et al., Chapter 10), as well as in assessment practices (Barman and Weurlander, Chapter 7). A more overarching epistemic change within HEIs resulting from digital transformations has been recognised as a change from education to ‘learnification,’ as suggested by de Andrade and colleagues (Chapter 2). Within this framework, it is argued that one key trend, which is also closely linked to the increasing use of digital platforms, can provide a narrower understanding of ‘learning’ in terms of just tracing, and analysing distinct learning activities. This approach may or may not accurately reflect with the common understanding of ‘education,’ which also includes elements of the social perspectives of learning, elements of *Bildung*, and what are often framed as twenty-first-century skills (including collaboration, creativity, communication, and critical thinking) (Pearlman, 2010). Singh and Haugsbakken (Chapter 6) further discussed this dilemma in their case study of an institutional MOOC offering.

Another critical empirical insight emerging from the contributions in this volume is the salience given to the complexity of DTs in HE. To unpack some of this complexity, we adopted a framework outlined by Laterza et al. (2020), who suggested the use of three analytical lenses—contexts, mediations, and effects. The empirical contributions comprising this volume have clearly demonstrated that the three lenses may be useful for illustrating the multitude of transformations that is at play within HEIs at multiple (nested) levels. For example, governments and universities might hold various perceptions of digitalisation. Degn (Chapter 9) demonstrated that even if digitalisation is acknowledged within the Danish HE system and domestic providers at a general level, little effort is put into implementing digitalisation as a policy idea as part of the steering mechanisms between the government and HEIs. De Andrade and colleagues (Chapter 2) pointed at the same observation when they identified various dominant or hegemonic narratives on HE digitalisation. Moreover, Hermansen and Lund (Chapter 5) showed how actors who relate to diverse systems may be coupled with a joint understanding of digitalisation within a faculty. Furthermore, Laterza and colleagues (Chapter 11), in their study of one HEI in Norway, demonstrated how faculty staff hold various perceptions of the DTs of teaching, as well as how these perceptions substantially vary from those held by

internal leaders at different levels, suggesting a misalignment between experienced realities and future expectations, including the teaching and learning performance of students and staff.

This multitude of perceptions as to what constitutes DTs was found to vary across levels and amongst individuals within HEIs, including according to the three analytical lenses composing the proposed framework for DTs. These findings, albeit cautionary and tentative, nonetheless validate the importance associated with systemic and pluralistic assessments that take into account not only multiple sub-systems within HEIs but, equally importantly, the complex inter-relationships, both existing and emerging, amongst them. When applying the analytical framework of DTs in HE in various empirical contexts, as in the present volume, a great multitude of practices and perceptions have emerged. These include valuable insights that all call for further study within and beyond the Nordic context. Undoubtedly, to obtain a more coherent understanding of these developments and their multiple impacts within HEIs and HE systems alike, various disciplines (both working alone and integrated within one another in an inter-/multi-disciplinary fashion), theoretical lenses, and scientific methods are required. The present volume makes a first attempt in this direction, acting as a stepping stone towards integrated, multi-level, and multi-proposed DTs in the HE research agenda.

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