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PROFESSIONAL EDUCATION & TRAINING | RESEARCH ARTICLE

Academic teachers' experiences of technology enhanced learning (TEL) in higher education – A Swedish case

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Abstract: This article presents a Swedish study on the potential of technology to transform teaching and learning practices in higher education. Sweden is at the forefront of technological innovation and digitalization and when it comes to technology in education this is not an exception. Technology Enhanced Learning (TEL) has emerged as an important pedagogical aspect within higher education in recent years. The term TEL is used to demonstrate teaching experiences that intend to improve such support. Previous research has recognized bottom-up initiatives from academic staff with specialists in technology often addressed by individual enthusiasts. Also, most internal processes regarding digitalization are identified as top-down initiatives driven by policy rather than influenced teachers. Hence, the main aim of this study is to analyse academic teachers´ experiences with digital technologies that support students' learning in higher education. To support this aim, following research questions are posed: 1) What factors facilitate TEL in teaching in higher education and why? 2) What factors limit TEL in higher education and why? Focus group interviews with 36 academic teachers from two Swedish universities were conducted. Results show that on the one hand teachers experience both benefits and limitations with TEL. On the other hand, important organisational aspects of using TEL are highlighted. The choices that academic teachers face and give expression to do not appear to be a matter of individual choice or stance in teaching situations. These results have relevance globally for all involved in teaching and learning in higher education.

Subjects: Teaching & Learning; Open & Distance Education and eLearning

Keywords: academic teacher; agency; higher education; teaching; technology; enhanced learning

1. Introduction

The digital development over the last decades has led to changed communication possibilities in higher education (e.g., Hillman & Säljö, 2016). Blended or hybrid learning and an increased use of open educational resources (OER) and Web 2.0 technologies have provided a variation in the teaching, learning and assessment processes. The term Technology Enhanced Learning (TEL), which describes the interface between digital technology and higher education teaching—like any form of e-learning with the purpose of enhancing learners' experiences—refers to the

application of information and communication technologies (e.g., Bayne, 2015; Kirkwood & Price, 2014). Scholars have studied TEL represents an improvement over historically established university teaching to provide solutions for innovation and development in higher education systems, and found that improvement may be slow to change (e.g., Bayne, 2015; Kerwald & McCallum, 2015). Aligned with this, there is an ongoing discussion in the research field about the pedagogical value of TEL (e.g., Beetham et al., 2013; Dunn & Mark, 2019; Holmberg, 2019; Holmberg & Fransson, 2022; Kirkwood & Price, 2014).

As Kirkwood and Price (2014) highlight, TEL is often used in unconsidered ways, which means that how academics conceptualise teaching and learning with technology affects students' experiences of learning. It´s also recognised by Leinonen and Durall (2014) who argues, teaching and learning with technology is a somewhat wicked problem that is related to the difficulties of solving problems of change and the various interests related to them. In practices many actors are involved (academic teachers, students, technologies) with various complex interdependencies. Dunn and Mark (2019) acknowledge the importance of highlighting what students and lecturers do in terms of using TEL in higher education, rather than focusing on the use of TEL as a predicted academic achievement. In addition, they problematise TEL and claim that while it is highly valued by students and institutions are eager to implement it, simply providing it as a resource is insufficient (Dunn & Mark, 2019).

Since the 1990s, higher education institutions have made substantial investments in network technology to adopt open and distance learning practices. Digital tools, flexibility and the redesign of physical learning spaces have emerged and are considered important for bringing universities closer to the goal of improving teaching quality and learning outcomes (Bøe, Gulbrandsen & Sørebø, 2015; Lindberg-Sand, 2016; SUHF, 2016). As Fransson and Holmberg (2012) argue, this could mean teachers and learners choosing to use digital tools in ways that have not been anticipated, such as seeing the affordances of digital tools as problems or possibilities. A challenge pointed to by Bøe et al. (2015) is what challenges information and communication technology (ICT) could mean for both teachers and students. Such challenges and processes are recognised by Urbina et al. (2021) in their review of studies on self-regulated learning that consider the use of technology-enriched environments in higher education. The authors discuss self-regulation in technology-enriched learning environments (TELE) as including many challenges, particularly in relation to students' commitment, motivation, social connection and feedback. Another finding highlight the importance of self-regulation in students as a form of individual and group growth. Other challenges according to teaching workload is pointed by Laurillard (2022) who emphasise the ambitious educational policy aims demanding improvement and the necessity to rethink the approach of teaching and learning. To frame such processes, Laurillard claims only lecturers should be responsible for the pedagogic innovation that is needed to adapt to changing environment.

In addition, previous research on academic teachers' continuing development of professional digital competence in education shows that they develop this when they are engaged in embedding ICT in subject teaching activities, for example in collaboration with other teachers and students' willingness to learn. Using educational technologies in teaching is reported to be a key characteristic by students in relation to what makes a good university lecturer (Su & Wood, 2012; Williams et al., 2016). In a study by Zwart et al. (2017), in which they investigate digital learning material in relation to online learning, they point out the importance of instructional approaches and the teachers role in digital teaching. This further shows the importance of teachers in higher education developing their digital competence. However, research show that the level of digital competencies of teachers are moderate (e.g., Eyo & Wang, 2016). The results also highlight the digital expertise of the academic staff as highly variable (Arnild et al., 2009; Barlow-Jones & van der Westhuizen, 2014; Instefjord & Munthe, 2017; Laurillard, 2022; Ottestad et al., 2014; Lindell & Danielsson, 2017). Academic managers' knowledge about institutional strategies and the use of educational technology is problematised by Habib and Johannesen (2020). Their findings point to

the gap between the academic managers' intentions with their support and implementation of TEL and the different understandings of TEL amongst the academic staff. Dunn and Mark (2019) acknowledge the importance of highlighting what students and lecturers do and how urgent it is to engage with TEL. However, the concept of teachers' professional digital competence still appears to be ambiguous and elusive and is often hard to define (Skantz-Åberg et al., 2022). In their article, Skantz-Åberg et al. identify seven aspects of teachers' professional digital competence that reoccur in research: 1) technological competence, 2) content knowledge, 3) attitudes to technology use, 4) pedagogical competence, 5) cultural awareness, 6) critical approach and 7) professional engagement, with the first being the most prominent (Skantz-Åberg et al., 2022).

One reason could be access to a wide variety of ICT resources the continuous introduction of new technology and ongoing rapid changes in higher education. In this study the focus is on questions related to academic teachers' experiences of digital teaching practices to support students' learning in higher education in relation to the concept of professional digital competence. During the COVID-19 pandemic, distance education and teaching in higher education had to be urgently revised. As argued by Williamson, Eynon and Potter educational technologies were "positioned as a frontline emergency service" (2020, 107). Nonetheless, as digitalisation moves forward, and as previous research shows academic teachers access to a wide variety of ICT resources and the continuous introduction of new technology and ongoing changes in higher education it spans quality issues in many ways. Therefore, drawing on a Swedish study conducted prior to the COVID-19 pandemic, this study thus aim to contribute to the research community by exploring TEL in higher education by looking at the potential of technology to transform teaching and learning practices that require teachers to reconsider what constitutes teaching and learning. In so doing the study includes two Swedish universities with similarities in their education programmes and national digitalisation processes. Here, digital teaching practice is defined as the different contexts in which academic teachers teach and the digital media (such as learning management systems, forums, etc.) that they and their students use. The aim of the study is thus to analyse academic teachers' experiences of teaching with digital technologies to support student learning in higher education. To support the aim, the research questions posed in the study are: 1) What factors facilitate TEL in teaching in higher education and why? 2) What factors limit TEL in higher education and why? As a starting point for the study, there is the hypothesis that teachers' work situation is problematic, according to access to an educational environment that is in constant digitalized change by the introduction of ongoing new technology in higher education.

2. Theoretical framework

A controversial issue in the context of Swedish universities is the discourse on students as customers. The perception of students as customers and "buyers" of pre-packaged content from teachers is problematic given the traditional starting points on which higher education is based, such as emphasising critical thinking, reflection, collaborative learning, collaboration, and individual learning. The concept of "agency" is therefore important in that it reflects "the ability of actors to critically shape their own response to problematic situations" (Emirbayer & Mische, 1998). Mostly qualitative research on agency has approached relational and transformational perspectives with focus om individual actions according to work communities (Goller et al., 2017). These studies contribution has led to understanding of learning practices in specific conditions according to the professional lives of individuals. Many studies have been dealing with the process of learning through the construction of professional identity or participation in work community practices. As Goller and Paloniemi (2022) highlight is agency is often related to organizational work practices and social relationships in close connection to professional identity construction.

One example of such holistic approach is highlighted in a study by Pappa et al. (2017) who emphasized agency on the professional relationships and socio-cultural environments of schools. The authors conclude teacher's identity agency in terms of a combination of pedagogical agency dealing with pedagogical choices and relational agency connected to shared collegiality. Teachers'

autonomy, openness to change, their versatility and collegial community showed as important factors to support teacher´s agency. A recent study with a transformational and relational perspectives with focus on leaders´ agency is made by Hökkä et al. (2019) in terms of relationship agency, organization agency and identity agency. The findings show that leaders' agency is a matter of multifaceted and emotional striving that not only deals with rational considerations. As Hökkö et al. argues it´s important to include emotional aspects in further discussions of agency in learning and at work. During the recent years a few quantitative studies has examined how agency relates to learning and development to work communities. One study made by Vähäsantanen et al. (2022) examine the relationship between professional agency and work development by collecting data via a data-based questionnaire in the domains of health-care. Findings contributes to a modification of earlier theoretical oriented dimensional structures which often appears to be one-dimensional. As Vähäsantanen et al. argues there are reason to consider the close relationship between professional agency and work engagement in more detail to capture individuals´ experiences at work encompassing behavioral and emotional aspects.

In short, digitisation affects the entire structure of an organisation in higher education in that it impacts how employees perform their work and enables and opens for changes in the structure. But such developments follow certain rules—the organisation develops evolutionarily while technology develops revolutionarily. It takes time for employees in an organisation to follow the development. It is not clear what kind of impact the use of technology has had on the education system or how it supports students' learning. These are still open questions (Barlow-Jones & van der Westhuisen, 2014; Bøe et al., 2015; Price & Kirkwood, 2014). Inspired by Vähäsantanen et al. we adopt the relationship between professional agency and work engagement in the present study. We take into account individuals´ experiences of a digitised work context on a group-level, encompassing behavioral and emotional aspects as well as academic teachers' autonomy. We examine a work-related collective agency in which the changing contexts of academic work, learning demands, processes and academic practices are becoming increasingly complex.

3. The context
In 2017, the Swedish government published the document entitled `For sustainable digital transformation in Sweden—a Digital Strategy´. The strategy outlines the vision of the government's digital policy for sustainable digital transformation in Sweden. The overall objective is for Sweden to become a world leader in harnessing the opportunities of digital transformation (The Government of Sweden, 2017). The two universities included in this study embarked on an extensive process of development projects to address the several demands and perceived needs to develop and offer flexible technology-enhanced programmes. Project leaders were appointed at both universities to lead the development work. These projects entailed the development of Digital Learning Labs as places for development, education, learning, innovation, and research in relation to the digitisation of society and the new opportunities and challenges that such processes entail. The Labs function as a physical place and the concepts intend to create the conditions for exploratory collaborations between different social actors. Collaborations like this are needed to understand the impact of digitisation on various social functions and contexts, as well as to discover and utilise the potential of various digital technologies in an ecologically, socially, and economically sustainable way. The projects also involve initiatives for the development of digital competence for academic teachers, both during the projects and later. Both universities are equipped with special departments with staff to support the technical equipment and support and educate the academic staff.

4. Method and material
The study is interdisciplinary with a research group represented by four researchers from two disciplines (teacher education and nurse education). The two universities who participate in the study (described above) were invited to participate by a request to the dean of academy at relevant faculties for the training of nurses and teachers. After an agreement from the dean of academy and head of department an information about the study and requests for participation

were sent to the relevant departments via email. The information contained a description of the study and the aim with the interviews in the focus groups, to address possibilities and limits of the technological issues that had been experienced by the participants and enable them to exchange views (Kvale & Brinkmann, 2014). Further, the information contained ethical considerations and that participation was voluntary. The empirical data consists of focus group interviews conducted with 36 academic teachers from the two universities in Sweden. The academic teachers had worked at the universities between 4 and 22 years. They had all teaching experience and had undergone further training in digitization. All teachers had adopted technology in their teaching and use of digital tools in other tasks related to their practice. According to Hylander (1998/2001 who points out that what is common to most definitions of focus groups is that the participants discuss questions of common interest. In the present study all participants had digitization as a common interest which was evident in the statements of the initial interview question that dealt with the ways in which the participants defined the use of digital technology in their daily work.

4.1. The interviews

The interviews followed an interview guide developed by the researchers responsible for the study. The interview questions were designed to increase understanding and generate knowledge about factors that facilitated or limited the academic teachers' teaching. The guide consisted of open questions relating to the academic teachers' definitions and use of digital resources. Other questions focused on the whether and how digital resources supported students' learning, the limitations related to the use of digital resources in their teaching practices, attitudes in the academic context and the kind of support that the participants regarded as important for the development of teaching with digital technology to enhance students' learning. The participants were divided into four focus groups, with six to eight academic teachers in each group. The interviews took approximately one hour and were conducted at a neutral location at the respective universities. The researchers worked in pairs during the interviews: one researcher observed and the other acted as moderator. A moderator was chosen who was not well known to the participants to avoid them being associated with a specific opinion or approach that could have affected both the participation and the conversation (Kreuger 1994).
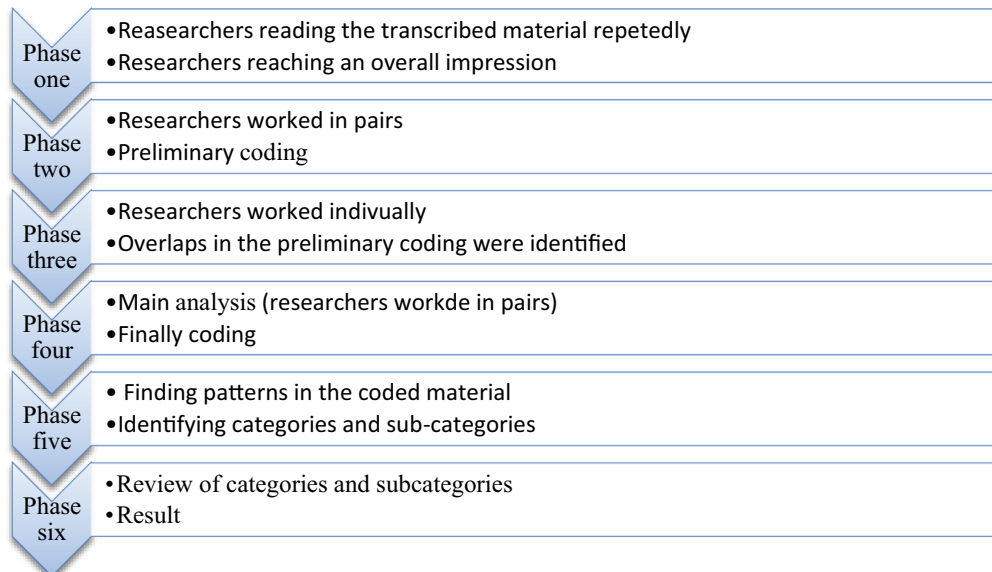
4.2. Data analysis procedures

The collected empirical data was transcribed and analysed based on thematic analysis. Thematic analysis offers a flexible way of analysing qualitative data and provide a rich and detailed base (Braun & Clarke, 2006; Braun et al., 2019). Prior to undertaking the thematic analysis, we needed to consider what counted as a theme. In the study we argue, in line with Braun et al. (2019), that a theme captures something important in relation to the research question and represents some kind of pattern based on what is expressed in the conversations. Starting points for the analysis had the basis in theoretical concepts such as relationship agency, organization agency and identity agency (Hökkä et al., 2019). The focus was the individual experiences of a digitised work context on a group-level where behavioral and emotional aspects were considered. The analysis process was carried out in six major phases. The transcript was coded with a letter for each group and the groups letter plus a figure for each participant. Group one was coded A and participants A1 - A8; group 2 was coded B and participants B1 - B6; group 3 was coded C and participants C1 – C6; group 4 was coded D and participants D1 – D8; group 5 was coded E and participants E1 – E8.

In the initial part, all four researchers read the transcribed material repeatedly to gain an overall impression. The second phase consisted of dividing the researchers into pairs to read the material again and to work with the preliminary coding of what could be identified as generic experiences and what was common to all the participants by color marking statements in the material. In the third phase, the researchers worked individually to identify any overlaps in the preliminary codes. The main analysis was conducted in phase four. In each question, the academic teachers' experiences of digital technology to support students´ learning according to professional agency

Figure 1. The six phases of data analysis.

Phase one	•Reasearchers reading the transcribed material repetedly •Researchers reaching an overall impression
Phase two	•Researchers worked in pairs •Preliminary coding
Phase three	•Researchers worked indivually •Overlaps in the preliminary coding were identified
Phase four	•Main analysis (researchers workde in pairs) •Finally coding
Phase five	• Finding patterns in the coded material •Identifying categories and sub-categories
Phase six	•Review of categories and subcategories •Result

Table 1. Showing categories, subcategories and frequency

Category	Subcategory	Frequency
TEL and change of academic teaching practice	The infinite number of possibilities	34
	Beneficial changes for the students	27
	Administrative gain	24
Professionality in academic teaching	The affordances of digital technology	31
	Interaction	42
	Professional autonomy according to TEL	39
Quality assurance in relation to TEL	Economic conditions for the development of teaching	18
	Secure examination	36
TEL and impact on the work environment	Framework factors that teachers cannot control	44
	Stress in relation to the digital equipment	34
	The lack of support	38

were compared. Phase five included finding patterns in the coded material and identifying categories and sub-categories by. In phase six, the research team worked together and here each category was reviewed and reworked. The data analysis is described in the figure 1 that follows:

Subsequently, four overall categories were defined according to the factors facilitating and limiting the use of TEL: *change of academic teaching practice, professionality in academic teaching, quality assurance* and *impact on the work environment*. Within each main category, associated subcategories were identified, reported in the following table 1:

4.3. Ethical considerations

Ethical considerations were considered in accordance with the Swedish Research Council's guidelines (Vetenskapsrådet, 2017). The study was reviewed and approved trustworthy by the Swedish Ethics Review Authority. No personal information was collected for the selected group. In the

study the researchers were aware that conversations in focus groups could lead to one of the participants experiencing a sense of inferiority if the others in the group clearly had a deeper knowledge of digital technology for supporting students' learning. How such questions should be handled was discussed by the researchers before each focus group interview. The researchers paid particular attention to whether such situations should arise. Each interview began with a clarification by the moderator to raising awareness that each participant's voice was equally important and that the starting point for the interview was that everyone who participated had different experiences of working with digital technology. The researcher who acted as an observer during the interview paid specific attention if such a situations occured. Each interview ended with the participants having to comment on how they perceived the conversation. One conclusion the researchers could make after the interviews was that no such situation had arisen.

5. Results

The result points to a complexity that academic teachers face in terms of the factors that facilitate and limit TEL in connection with teaching in higher education. The categories generated by the analysis show that within the categories there are factors within TEL that limit and contribute to opportunities for developing teaching in higher education. The result is reported in the following order: *TEL and change of academic teaching practice; professionality in academic teaching; quality assurance in relation to TEL; TEL and impact on the work environment.*

5.1. TEL and change of academic teaching practice

This category presents possibilities and challenges according to Tel and rapid change in the everyday academic work for academic teachers. The result highlights the academic teachers consideration of factors in TEL that constitutes basic aspects in teaching and learning. The participants indicated that the transition to technology to support students' learning made it possible to approach teaching in new ways. Essentially, the academic teachers experienced the possibilities of using digital technology in their teaching, its advantages and variation. An advantage that was highlighted by the participants was the possibility for the teaching to be location independent. At the same time, the participants pointed to limitations of not being able to communicate in real time with their students, capture their questions or contribute to a better understanding of the content under discussion

5.1.1. The infinite number of possibilities

In this sub-category the responses reflected the possibilities and the infinite number of variants that digital technology offered, closely linked to academic experiences and practices. The academic teachers' professional knowledge of digital technology were pronounced in accordance with the why, what and when questions. This was illustrated by a quotation from an academic teacher:

> A5: We really have an infinite number of possibilities, we have both streaming/.../we can both stream and film/.../that you can record on your own computer has an infinite number of variants/.../and what I think is that we have these variations that we can also adapt individually/ ... /it depends on the nature of the subject/ ... /I don't think that just saying that we should have recorded is not applicable for every subject, it depends a bit on the kind of subject and what one talks about.

The results show that academic teachers consider themselves capable to work with several variants of digital technology in accordance with the content and circumstances that occur. Also, findings point at the important issue of pedagogical agency and shared collegiality connected to the academic teacher's openness to change and their versatility in relation to pedagogical choices according to TEL.

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5.1.2. Beneficial changes for the students

The participants talked about the benefit of digital technology as a support for student´s learning. They included digital technology as a resource that enabled students to prepare for seminars and in that way contribute to a more equal teaching:

> D1: It is a great benefit for the students, unlike when I was studying when it was a matter of copying what the teacher wrote on the board. It's a huge resource actually and that you can publish it in advance for them/.../there are students with dyslexia for example, so they can look at it in advance and whenever they want and even go back to it, so it's a great resource.

The academic teachers experienced a more equal teaching as the potential of digital technology, especially for students in need of specific support. Teaching can be individualized to a greater degree by adapting the flow of information to the needs that occur within the student groups. Also, digital technology brings several administrative advantages to the teachers that have an impact on their teaching to support student learning. The result also shows limitations that have to do with the importance for teachers of having the opportunity to have a dialogue with the students in real time.

> B2: When it comes to presentations then, it becomes a way of structuring a lecture in advance which means that you lock in structure and that can then affect the dialogue you have with students. One can imagine that teaching and acquiring knowledge is more of an organic situation that is influenced very much by those in the room and not only by the individual teacher who structured the content in advance. There is a risk that the dialogue with the students is lost in several respects which can affect the students´ motivation and understanding of the content.

That students can take part in recorded lectures and materials via learning platforms are an important factor for the participants according to TEL. At the same time, the results show the teachers' professional awareness of quality aspects related to considerations of how teaching is carried out to benefit students' learning.

5.1.3. Administrative gain

The result show pedagogical and administrative gains when academic teachers are dealing with large volumes of students, texts and collegial relationship. As one academic teacher said:

> E3: There is also a/.../partly it is this kind of pedagogical gain, then there is, I think, a great administrative gain in terms of whether is possible to handle larger student groups or larger texts/ ... /there is a kind of administrative gain with the digital when it comes to teaching, the courses, and classes and so on.

Looking at the changes digital technology has brought to academic teachers' teaching practices, several factors have contributed to gains and challenges of their teaching. The results show different factors such as the teaching became location-independent and could be carried out regardless of time or place. Other advantages were that the students could prepare for seminars by listening to recorded lectures, accessing material and participate in discussion forums that the teacher had made available on the learning platform. For the academic teachers themselves, the digital technology offered a large range of resources for development and incorporate in their teaching. The complexity that emerges in the results shows a duality that the teachers are faced with in connection with TEL. The digital tools become governing for professional practice in several respects, which in turn affects students' motivation and learning.

5.2. Professionality in academic teaching

The responses in the category *professionality in academic teaching* according to TEL indicated the participants' knowledge of the relationship between the different technologies, their affordances, limitations and how they impacted learning. How digital technology influenced the students, and

the academic teachers teaching was central when it came to seminars and other teaching situations. One of the most common results shows the importance of face-to-face interaction with the students in connection with the teaching. In addition, the participants' attention to how technology affected learning was regarded as a matter of form and content according to students learning.

5.2.1. The affordances of digital technology

The result shows the academic teachers' awareness of whether and how the affordances of a specific technology could be used to have an impact on the actions of the students.

The result shows that knowledge about the affordances of technology was not sufficient when teaching with digital resources. The participants experience of dealing with the integration of technological knowledge, content knowledge and pedagogical knowledge was a matter of pedagogical value.

> **C4**:But then, I think there is a lot to know, apart from relationships and that sort of thing that are talked a lot about, but also knowing just what is on offer. How I can design my teaching technically/.../I mean how, what kind of possibilities do I have? Knowing what kind of technology is available and how I can develop distance learning, for example/.../Now I'll just take an example in music when you have to create your own music. Yes, but there are programmes where you can have a work function/ . . . /or something where they create together.

The question of *how* digital technology could contribute to design the teaching technically and developing distance learning and offer an added pedagogical value was in focus in the results. Another aspect of importance was the question of the added value when digital technology were used to complement other pedagogical choices in teaching. The added value of digital technology concerned questions of Why? What? and When? connected to the teachers pedagogical choices highlighted students collaborative learning. These results point out that teacher's professional agency includes a multifaceted striving including emotional considerations.

5.2.2. Interaction

The possibility of interaction with students was the most important factor in the teachers' experiences with TEL. A dialectical relationship became apparent from the participants' comments about digital technology and the question of interaction with students. The result shows the benefits of physically meeting in a room and the teachers' possibilities of interacting with students using digital technology. While some of the participants experienced the importance of interacting face-to-face with students in the physical room, others experienced that they were more likely to employ digital technology for interacting with students. The possibility of face-to-face interaction for noticing and interpreting students' body-language in the teaching situation was one factor of importance:

> E5:/.../but I want the interaction, I think it's nice and one thing you miss with streaming is that sometimes you can actually see and feel if you have something that is a bit complicated that you need to explain and then you ask "Was I clear now?", then no one says `no we didn't understand´.

The academic teachers experienced that digital communication contributes to relationship building between the teachers and the students in many ways such as the ability to give space to talk and to see every student in the group. On the other hand, the result points out limitations according to the difficulties that arose when students appeared to be uncomfortable in the digital room. Interaction in digital environment with the students were experienced as challenging by the teachers. Preferences that include face-to-face interaction and the benefits of such situations were a predominant position held by the teachers.

5.2.3. Professional autonomy according to TEL

Findings in the sub-category *professional autonomy* underpinned that the participants' experiences mainly concerned issues of self-motivation, uncertainty, fulfilment of requirements and the image of the good teacher. The importance of pedagogical judgements and the teacher´s own decisions about when and how digital technologies should be used in teaching were seen as basic to professional practice. At the same time, the academic teachers experienced problems in the professional practice due to teachers not being aware of the potential of teaching in digital environments. In addition, the academic teachers' experienced uncertainty related to their ability to manage the student group when some students followed the teaching in the room and others participated via streaming. Furthermore, the students' demands for the implementation of the teaching and whether the technology worked or not was experienced as a limitation by the teachers. The academic teachers´ ambitions to meet the students' requirements of a professional practice regarding digital technology also indicated the consequences of a rapid change to a digital way of working:

> **A5**: I think that's what's difficult, that you risk trust in yourself as a teacher and that's what I feel/…/so you kind of have to figure out what it is that's bothering you, then it's not that I don't know how to make it work or something. That's the price we pay when the technology doesn't work and that could be because I know too little about it, or I'm doing it wrong, or there's something wrong with the system/ … /us as a teaching staff, we don't want to be disqualified or illegitimate in the eyes of the students, and we risk that every time it happens.

The result shows the academic teachers image of the good teacher with demands and expectations to be lived up to in professional practice. A risk factor emphasised by the participants was losing legitimacy as a teacher in front of the student group when the technology did not work. Such legitimacy includes teachers' identity agency in terms of their professional identity and pedagogical choices in situations framed by circumstances they cannot control.

5.3. Quality assurance in relation to TEL

The findings in the *quality insurance* category highlight the need to develop the teachers´ capacities for a continuous learning and relearning of digital technology to support students' learning. According to the results, a key theme was the importance of the whole university organisation being included in the development of digital technology to support students' learning. Regarding the use of computers and other digital tools in examinations, the academic teachers were challenged to of making sure the examinations were legally securing.

5.3.1. Secure examination

The result reports participants experienced the challenge to secure examinations according to TEL. Online examinations were regarded as insecure since it was not possible to check who actually carried out the examination tasks:

> A4: The disadvantage with having to do tests, so to speak, is that you cannot really check whether it is the student who is doing it or whether it is the spouse or a friend or whatever/ …/but at the same time you have to assume that most people want to learn.

The results show the importance of software quality control for the resources offered for teaching and examination. A main issue was how the universities allocated resources for the development of teaching and secure examinations with digital technology. According to the results it´s obvious that there is a need of improved structural conditions such as further education for teachers in relation to digital examinations. Previous research (e.g., Dunn & Mark, 2019; Eyo & Wang, 2016; Laurillard, 2022) agrees with those findings, claiming the development of the level of digital competence and the institutions profiles on the topic.

5.3.2. Economic conditions for the development of teaching with digital technology
The importance of implementing digital technology to support student learning affected all levels of the university's organisation according to the result. As indicated above, some participants highlighted financial issues in terms of the universities' allocation of resources for the development of teaching with digital technology as a limiting factor. According to the result, the decisive factor for the limitation depended on the academic system tended to maintain traditional resourcing. This meant that subjects were allocated funds based on different price tags that did not correspond with the demands placed on the teaching staff to work with digital technology to support student learning:

> C2: But it strikes me now that the whole system is still based on the allocation of different price tags for the activities and the equipment. This means that in your subject you have much more teaching time than we have for the same 7.5 credits. For us, you give lectures and then the students take care of the rest, there is nothing more. And that means less money for our subjects. But if it was taken seriously, the potential of IT would change the entire university, the whole of university Sweden.

Regardless of whether the claims made by the teachers were directed at organisational factors and economic values, or whether they related to a more specific desire for increased opportunities to develop teaching with digital technology, the teachers seemed to proceed from a given direction of willingness. The academic teachers desire to develop teaching and influence organisational factors appeared in connection with ideas about such changes being justified in terms of the knowledge that was needed in contemporary and future society.

5.4. Impact on the work environment
The *impact on the work environment* category, focus on factors that participants could not control and that contributed to stress in various situations. According to TEL, demands were placed on education from a societal perspective and the participants were worried about not having control in situations that were experienced as urgent in the digital teaching context. Other experiences emphasised by the participants were not knowing enough about digital technology to be able to use its full potential in their teaching.

5.4.1. Framework factors that teachers cannot control
I relation to TEL, the respondents experienced framework factors that they could not control. Seen from a societal perspective with demands that education be digitised, the participants pointed to the importance of collegial collaboration and adopting a supportive attitude towards each other. The result indicates that collegial cooperation was characterised by the collegium itself having to take responsibility for the teaching practices and the directives to be achieved:

> D6: We are governed by what society thinks and what our management thinks. Actually, it is society's perspective, we should be digitised. So, then we want to do that and that's why it's like/ . . . /and then there's the collegial to collaborate on with and try to make the best of it as possible, so if someone is negative about it you try to lift it up in a positive way, turn it around instead. I'm like that anyway. Whether that's right or wrong, I don't know.

The findings also shows that knowledge about how to use digital technology in connection with teaching practice varied within the collegiate. Digital equipment was offered, but the question of pedagogical added value was not clear to all the teachers at the department:

> C4: We have all kinds of backgrounds, from knowing a lot from/ . . . /, to not having a foundation to stand on and that is a problem we have/. . ./and then there is this didactical, theoretical background. What do we have to stand on? that is missing. We are given an iPad or whatever. Here "now you are digitised, use it" and then you have no idea/. . ./Because I know how to use it privately/ . . . /But I have absolutely no idea how to do things didactically/ . . . /to use it in a good way.

These results show the gap between organizational and structural institutional strategies as well as the lack of required knowledge amongst the academic teachers. The demands and expected technological and procedural knowledge that the teachers are faced with, they have not been given the opportunity to conquer which brings a complexity in their professional identity construction. This complexity is closely connected to the academic teachers versatility, professional autonomy and shared collegiality.

5.4.2. Stress in relation to the digital equipment

A result that emerged in relation to TEL was the question of stress according to the digital equipment offered for teaching. It became a question of a teacher's own ability to solve any technical problems that arose in the class. That the teachers needed such skills contributed to limiting the use of digital tools in their teaching and was experienced as stress:

> D4: It has to do with trust, and it is certainly something that limits me in…, or prevents me from using digital, certain digital tools at times. It's actually the case that I don't trust the technology, or that it will work in a new lecture hall, or if I'm going to give an important lecture/ … /Because I don't always know, I know approximately how to solve it, but it is not always possible to do it on site.

Having access to support was an important factor in teaching contexts to avoid stress. Questions dealt with relearning and learning new software products in connection with the number of digital tools on offer were challenging issues for the teachers and the collegial community.

5.4.3. The lack of support

The results show a lack of direct support which were related to structural circumstances. The support is centralized at both universities. As the academic teachers experience it takes time to get the support that is necessary in the direct teaching situation.

> A2: For that to be possible at all we as teachers need to have a direct contact, we must have a hotline for support, for example if we are standing there with our stream and it suddenly dies, then we cannot end up in the support with 50 other students. It's something we've talked about a lot. It's essential.

The lack of support limits the academic teachers work according to TEL. They were infrequent users of the technical equipment in different lecture halls. The result point to the lack of instructions and the need of regularly check of the technical equipment to function properly. Further, the preparation work and requirements for keeping up to date with digital technology were time-consuming for the teachers. These findings are derived to organizational factors in relation to TEL such as opportunities for training to strengthen the teachers' own learning process to incorporate available digital technology.

6. Discussion

At an overall level, the purpose of this article has been to deepen our understanding of academic teachers' experiences of teaching with digital technologies to support student learning in higher education (TEL). The overall research questions to support the aim of the study are: What factors facilitate TEL in teaching in higher education and why? What factors limit TEL in higher education and why? The results reported above show how the teachers relate to the conflicting demands that impact their teaching practices in the academy and how they relate to the use of digital technology in those practices to support students' learning. The statements are like those found in previous research (Arnild et al., 2009; Instefjord & Munthe, 2017; Kirkwood & Price, 2014; Leinonen & Durall, 2014). The results show academic teachers—acceptance of the challenge of change according to TEL, the academic teacher's awareness of the possibilities of digital technologies and the impact on teaching and students' learning, ensuring quality in relation to TEL, impact on the work environment—seem to be based on several conscious considerations of the effects of

digitisation on teaching and the organisational structures found in higher education. The result highlights tensions that exist in the pedagogical work that teachers are faced with in connection with TEL. One of the tensions relates to the facilities of TEL as contributing to a more equitable teaching, such as giving students opportunities to prepare themselves, providing them with opportunities for repetition and independent studies regardless of time or place. While some of the statements underline a pedagogical added value to the teaching, others reveal opposite experiences aligned with limits of TEL. There is a risk that the digital tools used in teaching do not contribute to deep learning. Rather, students tend to consume the course content and look for shortcuts. Further, statements according to interaction between the academic teachers and students tells it´s a factor that limits TEL. The digital environment gives access to verbal and written communication, while other means of expression are restricted. Such limitations in the interaction are a challenge for the teachers to deal with in matters related to students' motivation and knowledge acquisition of the content.

The other recurring tension is more organisational in nature and has an impact on academic teachers' professional autonomy. The participants' statements give expression to the fact that the digital tools will control how the teaching is to be planned and carried out. This means that the creative and content enhancing elements of teaching could decrease. The teaching is instead adapted to a pre-determined form that the teachers are expected to use but are unable to influence. Academic teachers' digital experience and skills are therefore questioned by students, which has an impact on their professional autonomy. Other statements are characterised by a clear description of the teachers' opportunities for competence development. For the teachers, such competence development is about in-depth knowledge of why and how the content of the teaching can be implemented with the support of digital technology. Instead, the statements show that competence development basically means learning how the digital tools work. Amongst the teachers interviewed, such experiences come to the fore when referring to situations in which students question their knowledge of the functions of digital technology.

Briefly summarised, these two dividing lines can be said to form a field of tension for teachers' professional agency, where teachers' use of digital technology to support students' learning can be understood as a balance between two questions: To what extent does digital technology support students' learning in relation to the content? When and why? In the light of the statements that emerged in the results, it is reasonable to highlight the need to understand the complex activities the teachers are expected to manage.

Previous research has highlighted that TEL is often used in an unconsidered way (e.g., Kirkwood & Price, 2014; Laurillard, 2022). This is also confirmed in the statements from the teachers taking part in the study. Hence, it is important to focus on the ways in which academic teachers conceptualise teaching and learning with technology to determine the impact on students' experiences of learning. Several of the teachers point out that using technical aids is challenging and that it takes time to develop knowledge about and competence in using the digital tools—time that is usually not compensated for. Although the teachers can see the long-term benefits, the investment of time and energy can be difficult and overwhelming in the immediate present.

Another issue is that technology often takes over the teaching, for example if it does not work and causes an interruption in the teaching process. So, while technology can offer exciting new opportunities for developing teaching (e.g., Bayne, 2015; Kerwald & McCallum, 2015), it can also mean obstacles and difficulties for the teachers, and as such becomes a wicked problem (e.g., Laurillard, 2022; Leinonen & Durall, 2014). In relation to the different aspects of teachers' professional identity agency (Pappa et al., 2017) including digital competence listed by Skantz-Åberg et al. (2022), the most recurring one is "technological competence", which is also reflected in the present study when the teachers report that they focus on making the technology work and their own understanding of it.

Aligned with this is an organisational challenge related to the lack of adequate support from management in the use of TEL (Habib & Johannesen, 2020). As shown by Habib and Johannesen (2020), there is a gap between the academic managers' intentions with their support and implementation of TEL and the different understandings of TEL held by the academic staff. This is also reflected in the present study. Dunn and Mark (2019) point to the fact that simply providing resources for the implementation of TEL in higher education is not enough, and that a more substantial commitment is needed at different levels in the organisation, by focusing on what students and teachers actually do with TEL.

7. Conclusion

In this study we have identified various factors that facilitate and limit the use of TEL in teaching in higher education. The key findings from the present study, even though they are drawn from a relatively small sample in a Swedish context, are relevant to those involved in teaching and learning in higher education. To conclude, the results in this study indicate that teachers who have experience of using digital technologies in their teaching have a heightened awareness of the potential benefits and challenges that come with these tools, and they are conscious of the impact that digitization can have on their teaching. These teachers prioritize ensuring quality in their teaching and their students' learning experiences, and they consider the impact of digital technologies on the work environment. The choices that the academic teachers are faced with and give expression to do not appear to be a matter of individual choices or stances in teaching situations. Instead, it is significant factors that become important for teachers' professional agency in TEL, such as frame factors relating to organizational and structural conditions; incorporation of digital technology; expectations from students, colleagues and managers; propensity to change and quality in teaching.

The novelty in this study is connected to the findings in relation to the challenges and barriers to effective integration of digital technologies in higher education and strategies for addressing them. Overall, these findings suggest that teachers who are open to change and have a strategic approach to incorporating digital technologies into their teaching can have a positive impact on the quality of higher education. As Williamson et al. (2020) highlight, there is a call for research on issues around education, media, and technology. More investigation may be made into the best ways to assist academic teachers who are utilizing TEL, particularly those who are new to integrating digital technologies into their teaching. This could entail creating specialized training programs and support systems that address the unique requirements and difficulties of various groups of teachers, such as academics just starting their careers or those with little technological proficiency. Future studies might also investigate how TEL can improve interaction, students' engagement and learning outcomes, particularly in subjects where integrating technology may be difficult. Further research could look at new trends and best practices in TEL deployment and study how institutions can adapt to these changes given the rapidly shifting nature of technology and its impact on higher education. In the long run (e.g., Skantz-Åberg et al., 2022; Spante et al., 2018), this and future studies will have important implications for the field of agency, digitalisation and teaching in higher education in terms of the generation of knowledge that will contribute to a changed approach to the application of TEL and academic teachers' digital competence.

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