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Teacher Agency in the Context of Evolving Educational Technology

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Abstract

As users of educational technology, teachers have been studied using different theoretical frameworks. However, the teacher agency perspective has not been explored extensively. Teacher agency as a concept has the potential to explain teachers' actions related to quickly evolving educational technology. Thus, this study aims to examine teacher agency and educational technology to understand teaching in digitalised schools and teachers' work in a situation where they are rapidly adapting their teaching technologically and pedagogically. The data consist of Finnish primary and secondary school teachers' (N = 198) written answers to an online questionnaire. The qualitative data are analysed using theory-guided content analysis. The findings frame teacher agency materially, socially and structurally regarding educational technology and distance teaching and show how teacher agency appears in these contexts. These results deepen the understanding of teacher agency from the standpoint of educational technology and can be utilised to develop in-service teacher training on the pedagogics of educational technology. This study paves the way for future research targeting teacher agency and educational technology.

Keywords: Teacher agency, in-service teachers, information and communication technology (ICT), professional learning, teacher education

Introduction

In many countries, teachers work and develop their work relatively independently. As teaching practitioners, they interpret curricula through their own professionalism and personal pedagogy (Mausethagen & Mølstad, 2015; Toom et al., 2021). This is the case in countries such as Finland, where teachers are – at least to some extent – autonomous professionals with master's-level university degrees (Salokangas et al., 2020). Regarding digitalisation and education, teachers are expected to prepare their students to study and work with different technologies now and in the future (Chalkiadaki, 2018; Passey et al., 2018; Voogt & Knezek, 2018; Voogt & Roblin, 2012). In Finland, these competencies are defined in the curriculum as transversal skills that should be developed in all subjects throughout primary and secondary school (National Core Curriculum for Basic Education 2014, 2016). This requirement indicates all teachers' responsibility for using digital technologies to meet the expected learning outcomes of the curricula and future demands (Salmela-Aro & Lavonen, 2023). However, recent Finnish studies argue that there is a wide range of practices regarding educational technology on how curricula are interpreted and implemented in current education in schools and that the state of digitalised education varies across schools (Halinen et al., 2024; Oinas et al., 2023).

The concept of teacher agency can shed light on teachers as practitioners and actors in digitalising education. Teacher agency has been used in several studies targeting teachers' work and profession. The concept has helped stakeholders understand teachers undergoing educational changes (Biesta et al., 2015). It has also been employed in investigating transforming education and school practices (Imants & Van der Wal, 2020; Reinius et al., 2022) and developing the teaching profession (Kauppinen et al., 2020; Toom et al., 2021). However, the perspective of digitalising education and teacher agency has played a minor role in research (Albion & Tondeur, 2018) even though educational technology and especially generative AI influence teaching and change the knowledge requirements for teachers (Mishra et al., 2024). Against this background, in the present study, we concentrate on teacher agency and teaching that adapts to evolving educational technology.

In this study, teacher agency refers to teachers' active role in influencing their work and its contexts, as well as their ability to do so as individuals and with the collegial community (Eteläpelto et al., 2013; Imants & Van der Wal, 2020). Teacher agency is understood here through actions taken by teachers in their working environment (Biesta et al., 2015). These goal-oriented and self-initiated actions are intended to influence the environment and create beneficial impacts on the teaching and learning (Goller & Harteis, 2017; Leijen et al., 2020). Following previous research (Eteläpelto et al., 2013; Leijen et al., 2020), we comprehend these actions as decisions and choices concerning educational technology and its pedagogical use.

The purpose of this study is to provide a more detailed understanding of the nature of teacher agency related to the use of evolving educational technology in teaching. The rapid advancement of technology creates new possibilities for teaching and learning but demands adapting to technology and making decisions that foster students' learning (Trevisan et al., 2021). Educational technology as a constantly developing entity requires teachers' deeper and critical perspective and knowledge (Mishra et al., 2024; Selwyn, 2024; Vartiainen et al., 2024). This means that teachers must enact their agency in developing their teaching with educational technology. In this study, we give voice to teachers as users of educational technology and utilise data from a qualitative

questionnaire, collected right after the COVID-19pandemic-induced remote learning, to shed light on teacher agency and educational technology (Jelinska & Paradowski, 2021). Our study focuses on teachers' actions – intentions, goals, decisions and choices – with the abrupt shift to a technological and pedagogical situation where all teachers had to digitalise their teaching practices and modify these to fit the distance mode. Using the period of distance education as an example of teacher agency in the context of educational technology, we aim to describe how such agency appears from the educational technology standpoint. Teachers had to enact their agency and take control of the situation by using digital tools. This provided an optimal condition for this study, offering an opportunity to frame teacher agency in an educational technology-dependent context and to explain the features of such agency in digitalising education.

Theoretical framework

There are various definitions of teacher agency, and it has been theorised from several viewpoints (see Biesta et al., 2015; Eteläpelto et al., 2013; Kauppinen et al., 2020). The concept has also been criticised for lacking a precise definition (Deschênes & Parent, 2022). In this study, we define teacher agency through teachers' self-initiated and goal-oriented actions, such as making choices and decisions concerning their working environment, both individually and with colleagues (Eteläpelto et al., 2013; Goller & Harteis, 2017; Leijen et al., 2020). We aim to elaborate on the concept of teacher agency in relation to educational technology. Teacher agency refers to teachers' professional actions, meaning that it becomes visible in what they do in their work (Biesta et al., 2015). Teacher agency describes teachers' capability to influence their work and its contexts, both individually and collectively (Eteläpelto et al., 2013; Kauppinen et al., 2020).

Agency appears when teachers make decisions, choose between alternatives or take stances in ways that affect or change their work (Eteläpelto et al., 2013; Leijen et al., 2020). These acts of agency are intentional and goal-oriented (Goller & Harteis, 2017; Leijen et al., 2020). Built on prior knowledge and experience, teacher agency also includes an orientation towards the future (Leijen et al., 2020; Priestley et al., 2015). In this sense, teacher agency is understood as not a personal trait but a dynamic and ongoing process (Biesta et al., 2015). Teacher agency is constantly evolving; goals are achieved and reflected on, new objectives are set, and accumulated experiences and knowledge influence future actions (Leijen et al., 2020). In this study, this understanding means that we concentrate on teachers' intentions, goals, decisions and choices during distance education and presume that teacher agency can be recognised through them.

Teacher agency is bound to particular situations and contexts. This means that teachers evaluate the present situation based on their knowledge and experiences, and they act accordingly by making decisions and choices (Leijen et al., 2020). The contexts in which agency occurs have been conceptualised in ways that emphasise its different aspects (Eteläpelto et al., 2013; Goller & Harteis, 2017; Leijen et al., 2020). These conceptualisations share the understanding that teacher agency has a material context with physical objects, as well as a social or cultural context with colleagues and students. The third context is structural meaning for example the organisation of a school (Leijen et al., 2020).

When teachers enact agency in these contexts, it entails ongoing perception and interpretation of the specific situation, which then lead to choices and decisions (Leijen et al., 2020). The contexts can provide teachers with resources for, enablers of or constraints to teacher agency (Leijen et al.,

2020). Teachers act based on their perceptions of these contexts; they also shape their work actively (Biesta et al., 2015). Teacher agency can be recognised via teachers' decisions and choices, along with their intentions and goals; it is enacted as well when they take stances (Eteläpelto et al., 2013; Goller & Harteis, 2017). In this study, we restrict this contextual environment to educational technology. The educational field has a long history of using different technologies to support learning (Koschmann, 2012; Valtonen et al., 2022). Nonetheless, educational technology seems to be constantly in a state of innovation, which challenges teachers' knowledge and teaching practices (Jing et al., 2024; Mishra et al., 2024). Digitalising education has also led to more critical interpretations (Magnone, 2024; Selwyn, 2024). As a contextual environment, educational technology requires teacher agency as it continuously evolves.

In line with this theoretical understanding, we conceptualise teacher agency as a phenomenon that is enacted through teachers' intentional and goal-oriented actions bound to their teaching and working environment (Biesta et al., 2015; Leijen et al., 2020). To elaborate on the concept with an emphasis on educational technology, we frame teacher agency with material, social and structural contexts (Leijen et al., 2020). In the material context, we include educational technology, especially digital devices and applications that teachers use for teaching. The social context involves colleagues and students. The structural context consists of the school as an organisation, management and leadership, and the curriculum. These contexts, comprising the teaching environment, are understood as providers of resources for, enablers of or constraints to teacher agency (Leijen et al., 2020). During the remote learning, all contexts were adjusted to the distance mode and dependent on digital technology (Salmela-Aro & Lavonen, 2023).

Building on this theoretical understanding, we approach the topic with this research question: *How does teacher agency appear in a situation that requires rapid technological and pedagogical adaptation for organising education?*

Methodology

Research Context and Questionnaire

The context of this study is the Finnish system of university training schools. These schools are affiliated with universities, and all student-teachers practise teaching in these "lab schools" during their studies (Chung, 2023; Malinen et al., 2012). The training schools form part of the local communal school network and follow the same curricula as those of all schools in Finland. Training schools are in close contact with universities, have access to the latter's research and research-based development (Vähä et al., 2025) and are provided with educational technologies similar to those of teacher training units. Implementing research and trying out technological novelties are part of the teachers' work in these schools (Väätäjä, 2025). The teachers at the university training schools comprise the target group for this study, given their extensive experience in using technology to support teaching and learning. Moreover, the data collection after the distance teaching period makes their experience of educational technology robust and highly relevant for this study because remote learning could not occur without technology.

The data were collected via an online questionnaire that was sent to teachers at training schools in nine universities. The questionnaire consisted of seven items: 1. What technologies did you use – how and why? 2. What kind of experience has the period of remote teaching been for you? 3. What type of collaboration did you engage in during the period? 4. What kind of support did you

provide to colleagues when transitioning to remote education and during the period itself? 5. What kind of support did you receive from colleagues when transitioning to remote education and during the period itself? 6. What do you think you learned that you might not have encountered under normal circumstances? 7. What do you think you learned that you intend to use as a practice in face-to-face teaching? The purpose of the questions was to reveal teacher agency-related aspects (Kauppinen et al., 2020; Leijen et al., 2020). The rationale for the seven open-ended questions was that when each participant's answers were combined, these would provide deeper insights into their agency, as well as their intentions, goals, decisions and choices from their individual and collegial perspectives and in the context of educational technology.

Participants

This study's participants (N = 198) were experienced professionals; 124 had over 15 years of teaching experience, and 40 had taught for more than 30 years. A total of 138 females and 60 males answered the questionnaire. Among them were subject teachers (126) in lower and upper secondary schools, class teachers (56), and special education teachers and student councillors (16). In Finland, all these teachers, including student councillors, have daily teaching responsibilities for students.

Data and Analysis

The data were collected in May 2020 after the remote learning period caused by the COVID-19 pandemic. Schools in Finland were closed from mid-March to mid-May. The data consisted of the teachers' (N = 198) written answers to the open-ended questions listed in the Research Context and Questionnaire subsection. The data were highly reflective since the participants were just returning to the ordinary classroom setting after teaching remotely for two months. The answers to the seven questions were compiled as one text unit for each teacher, resulting in 198 blocks of answers. The data, which comprised approximately 18,300 words in total, underwent a theory-guided content analysis (Elo & Kyngäs, 2008).

Building on the theoretical framework represented in the previous section, the concept of teacher agency was operationalised for the data analysis by focusing on teachers' intentional and goal-oriented choices and decisions influencing their work (Eteläpelto et al., 2013; Goller & Harteis, 2017; Leijen et al., 2020). These make their teacher agency and its contexts observable (Leijen et al., 2020). In the first phase of the analysis, the data were first read through several times for an overview, and meaningful parts were extracted and encoded according to the operationalisation of teacher agency. The coding covered teachers' intentions and goals (Goller & Harteis, 2017; Leijen et al., 2020), decisions and choices (Eteläpelto et al., 2013; Leijen et al., 2020) and stances (Eteläpelto et al., 2013). The unit of analysis was a sentence covering teachers' choices and decisions concerning, for example, educational technology use, cooperation with colleagues, pedagogical practices and coping with emotions. The first author executed the coding. In the second phase of the analysis, the codes were organised and reduced into categories in discussion with other researchers (see Table 1).

Table 1

Categories and Main Categories

Coding	Categories		Main categories
Intentions Goals Decisions Choices Stances	*Learning to use educational technology* *Learning distance pedagogies* *Innovating for teaching purposes* *Struggling with educational technology*	Material context	Educational technology as a resource for, enabler of or constraint to teacher agency
	Exchanging tips and sharing materials with colleagues *Emotional support for colleagues* *Existing collegial groups becoming stronger* *Forming collegial groups or seeking one for cooperation* *Working alone* *Student interaction pros and cons* *Self-directed students* *Problems in supervising students and conducting assessment*	Social context	Collegial community and students as resources for and enablers of teacher agency, and the lack of community as a constraint to teacher agency
	Lack of leadership *Work overload and challenges of working home* *Challenged profession* *Challenged curriculum*	Structural context	Distance education as an enabler of or constraint to teacher agency

The main categories were then formed from the categories according to the material, social and structural contexts of teacher agency (see Leijen et al., 2020). The material context comprised educational technology, while the social context included colleagues and students. In the structural context, we decided to include the remote school's leadership and working from home, as well as the teaching profession and the curriculum as two other recognised elements. The three contexts overlapped. It was not easy to separate technological collegial support from educational technology or working from home from the material context, but for more consistent reporting, we made these separations. The categories revealed how teachers perceived and interpreted their working environment, which was heavily and suddenly changed, especially in relation to educational technology and its pedagogics. Through these context categories, we formed the main categories that featured the kinds of resources, enablers of or constraints to teacher agency that the teachers had in the technology-enhanced and dependent remote school.

Findings

Material Context: Educational Technology as a Resource for, Enabler of or Constraint to Teacher Agency

From the material context standpoint, teacher agency appeared in the teachers' decisions and choices concerning educational technology. Enacting agency included gaining knowledge on and learning to use educational technology in pedagogically adequate ways for teaching and adjusting pedagogical practices to the distance mode. Applying educational technology was a critical part of the teachers' work. The distance education period could not be realised without digital tools; it required the teachers' choices and decisions. Educational technology was the main resource for enacting teacher agency. Regarding educational technology and how the teachers described their actions, the perspectives of resourcing and enabling teacher agency were entangled. The teachers wrote that they studied and learned more about digital platforms and various kinds of applications and used them in teaching, as they tried to find the educational technology most suitable for their teaching practices. Educational technology or digital tools did not directly constrain teacher agency, but it was challenged because of the distance mode, which required new practices. Despite variations among the respondents, as most of the teachers already had knowledge of technology or obtained necessary skills fluently, some teachers reported having no experience with the suitable educational technology needed when distance teaching began. "[I obtained] technical know-how for using systems. I didn't even know their names when I started. [I took control over] the whole distance learning technology in a broad sense. There was nothing I had known before (107)." (The number in parentheses at the end of each excerpt is the code assigned to each respondent to maintain participant anonymity.)

The teachers chose to use versatile tools for lessons and communication, especially the platforms, such as MS Teams or Google Classroom, provided by their schools. Although the situation was emergent and quick decisions had to be made, the teachers wanted to assess and try out the tools before their actual use with students. Along with studying technologies, the pedagogical aspects were also mentioned. The teachers who mastered educational technology did not necessarily have much experience with distance teaching, and they had to develop new pedagogical practices. Almost all teachers discovered more pedagogically adequate ways of using different platforms and applications, which they claimed to have positive impacts on their teaching practices and agency. "I encountered new digital environments and learned how to use Teams better – so well, in fact, that I'm going to make it a permanent feature of my classroom teaching (88)."

The teachers also enacted their agency by developing their technological environment. Educational technology enabled them to be innovative. The technologies provided by the schools were extended with informal tools, such as social media applications, for pedagogical purposes. The teachers combined existing accessories, educational tools and applications for teaching purposes in novel and practical ways. Altogether, their innovations showed creative hacks to combine the existing elements of the digital world and thus perform the activities needed for supporting learning. At best, these components of creativity contain many different approaches to integrating digital technology and pedagogy for the achievement of pedagogical goals. The teachers successfully changed the material context of educational technology and influenced it to benefit students' learning. "I put up a stand made from the lamp holder of a projector and used

the camera for screen sharing when I was drawing something, doing demos or using a fraction pie on the table to illustrate (154)."

Another teacher wrote about all the applications that were used to accomplish in teaching:

> I uploaded the video to the YouTube channel I created. I posted a link to the students' WhatsApp. After the video, I always took three students on a WhatsApp video call to discuss the video – I showed them pictures on the iPad. – The students moved on to work – I took the following ones to discuss. Pupils sent in pictures – I immediately commented back by drawing directly on the picture. (195)

The same educational technology that provided resources to some teachers and enabled them in various ways constrained others. Many teachers wrote how they could finally do activities that they had always wanted to incorporate in their teaching and how their connection with students improved. These teachers usually mastered technology use or quickly acquired the necessary skills at the beginning of remote school. They noticed positive details about their own professional competence, with and without educational technology. Positivity signified proficient technology use and teaching skills, and it enhanced their motivation. These teachers were able to modify their teaching and student interaction to fit the distance mode without a struggle. Those teachers whose agency was constrained based their criticism on the distance mode and they emphasised its challenges to pedagogy. They could not flexibly adapt their teaching practices to the new mode, and they intended to replicate their classroom practices in the distance mode. They indicated that teaching via web tools was unnatural and that they could not observe their students properly. They also felt that they had to abandon some familiar aspects of being teachers. "I had to 'forgo' my profession and jump into teaching via computers. It was very hard to accept the feeling of inadequacy. One cannot be educated remotely (3)."

The sense of inadequacy seemed to be a marker of constrained teacher agency. When the teachers faced challenges with the pedagogy or educational technology, it influenced everything related to the distance education period. They did not share these feelings with colleagues and attempted to manage everything by themselves.

Social Context: Collegial Community and Students as Resources for and Enablers of Teacher Agency

From the social context perspective, teacher agency was enacted with colleagues and students, which meant resorting to collaboration and sharing. Almost all of the teachers wrote about collegial support as a resource for and enabler of teacher agency during the exceptional time. Collegial support was both given and received, and this occurred in peer relations and teacher groups. The least support involved giving tips about suitable applications and answering questions regarding educational technology when asked. Sharing and exchanging materials was a common way of providing support. This entailed sharing lessons in certain applications (such as Seesaw) or previously created teaching materials (slides, videos and lesson plans) with colleagues. Again, teachers who had already mastered educational technology offered greater support for technology use and pedagogy. They also assessed that it was good that all teachers were required to use educational technology.

> The need created collegial motivation. Everyone suddenly wanted to learn and use new technologies. Before the crisis, they had no intention of learning or even believing in the

> opportunities offered by technology. Teachers are tough, resilient and study diligently when the need is clear. (95)

Additionally, emotional support was shared among colleagues. Such need was natural in an ongoing first-of-its-kind pandemic. Mostly, however, the teachers were worried about the quality of teaching and students' learning online. Emotional support was as important as pedagogical or technological tips and equally shared, helping teachers endure these difficulties.

> A lot of encouragement was needed. I gave positive feedback and helped others notice good things. I actively asked for help and tried to understand how my colleagues were acting. I experienced a lot of compassion, and I was encouraged. (111)

The teachers enacted their agency via collegial groups and as new groups. It seemed that already existing collegial groups became stronger, and the teachers also formed new groups for implementing teaching with peers. These included groups of teachers who taught the same subject and teachers of the same class level. Co-teaching practices were also bolstered. It was easy to turn to familiar colleagues to obtain information and materials for lessons. The task of modifying everything to fit the distance mode was so enormous that the teachers instantly gathered and paired using different communication tools and channels. Those who had no suitable peer group established one. Usually, the teachers also had an application or two for their group's collaboration because it was impossible to meet face-to-face. In the groups, the teachers shared materials, ideas and practices. They also planned and executed lessons and assessments. Most groupings took place in the teachers' work communities, but some teachers found their peers through social media or from more informal collegial groups. These were important resources for teachers and strengthened their agency.

Only a couple of teachers in this study noted that they had no collegial peers or groups for support during the distance education period. Some teachers reported being worried about colleagues who were left alone with everything. The absence of collegial support seemed to be a constraint to teacher agency since these teachers struggled through the remote school. "I did not collaborate with my colleagues nor with the parents. It was lonely work. We were not in contact with one another (7)."

The teachers' understandings of students during remote education were complex from the teacher agency standpoint. Some teachers wrote that teaching was easier because they did not have to deal with distractions and could thus concentrate on teaching. Some teachers thought that activating students was easier than in face-to-face lessons. Other teachers mentioned how distance teaching was not a suitable way to do their work. This was usually explained by the lack of proper interaction with the students. Still, many teachers acknowledged that they were able to interact more personally with every student; sometimes, they connected with shy or quiet students in a way they never had in classroom teaching. "At its best, contacting students is more equal via the web. When you participate in every small group during a lesson, you communicate with everyone (22)."

The teachers learned how important written communication was for some students. Technological applications such as Zoom or Meet enabled more equal and inclusive communication, and each student received equal attention from the teacher. The teachers also recognised how independent and self-directed students were when they let them be. Several teachers wrote about how they would add more self-directed tasks to their lessons in the future. "[In the future,] I [will] allow a

more individual working pace, focus more on personal learning objectives and provide some kind of chat during the lessons (99)."

> Making the voice of the quieter students heard [was important]. This is something I will try to develop further in the future. I asked the students to record their thoughts regularly in their OneNote notebooks. The recordings were absolutely wonderful to listen to. – I asked students to record an audio file with the solutions to a couple of problems, verbally going through the steps of their solutions and justifying their choices. What a great idea! (199)

Some teachers noted that observing and supervising students was not possible in a remote setting. For them, it was essential to witness how students worked and as this was not possible to the same extent as in the classroom, it negatively affected their agency and constrained their actions as teachers. Assessment also became more difficult as the teachers could not be certain who did the exercises or took the tests. Their inability to supervise learning was a constraint to their teacher agency.

Structural Context: Distance Education as Enabler of or Constraint to Teacher Agency

From the structural context perspective, teacher agency was challenged in many ways during the distance education period. The remote school affected the structures of teaching because schools were closed and teachers had to work from home. Most teachers did not have a home office, and they also had their spouses working remotely and their children trying to study in the remote school. Using classrooms for teaching was not allowed. The usual organisational support for schoolwork-related issues such as special education and teaching assistants also had to be modified to fit the distance teaching mode. One of the issues was the management of teachers. In this study, the teachers relied more on their colleagues and peers than on their headteachers. Just a few teachers mentioned headteachers at all. A couple of them stated that they found the headteacher's guidance inadequate and that they needed clearer instructions and advice. "The headteachers probably thought they were supporting us by encouraging us to lower the bar. However, I found it very distressing that the headteachers repeatedly told us to keep the bar low (178)."

The structure of the teachers' workday dissolved as they had to plan and execute new kinds of teaching practices. All participating teachers raised the issue of hard work and long hours spent on distance teaching. However, they dealt with additional work in diverse ways. Some teachers perceived new tasks more as ways to develop and try new practices supporting their profession. Again, other teachers expressed greater frustration with long hours without seeing much positivity in the experience. This was the case even with the teachers who had already mastered the web tools or took control over them during the period. They worked hard to enact their teacher agency and to accomplish their objectives in a context that did not suit them as teachers.

The remote school enabled the teachers to reflect on the teaching profession as a structural backbone of teacher agency. They wrote about their profession and how they learned new things about its core. Some respondents indicated that tolerating incompetence related to the remote school did not trigger strong emotions. For other teachers, the situation was far more challenging, feeling that their competence as teachers was invalidated. The experience both enabled and constrained their teacher agency. "I was listened to and supported. [I learned to] control my mind

and trust my professional skills as a teacher. I easily tolerate the feeling of inadequacy, and students are amazingly responsible when you let them (97)."

Contemplating the distance period highlighted the possibilities of normal face-to-face teaching, helping teachers better appreciate and understand the features of classroom teaching that could not be achieved via technology.

> [The experience was] difficult, rewarding and enriching. It increased my appreciation for my own work. I realised how much we do for the students every single day. I missed my students and colleagues daily. The pedagogy of distance learning began to become part of my own professional skills. I was supported by colleagues in adopting new environments. The best part of school is meeting and working together. I do important and meaningful work for myself. This all became even clearer. Of course, my pedagogical skills developed in remote-learning (digital) pedagogy, but that's just a bonus. You can't do that alone. (119)

Only a few teachers mentioned the curriculum, although it is an essential structure of teaching, and teacher agency is enacted in line with it. The curriculum may be such an unquestionable part of teaching and school that it does not need any mention. Those teachers who wrote about the curriculum perceived the difficulty in following its aims in arts education. They also emphasised teaching as more than its content and argued that teaching transversal skills – meaning cooperation or interaction – was challenging via web tools.

Discussion

In this study, we elaborated on the concept of teacher agency from the educational technology standpoint. Our aim was to examine how teacher agency appears in a situation that requires rapid technological and pedagogical adaptation for organising education. The concept of teacher agency was operationalised for analysis via self-initiated and goal-oriented choices and decision-making (Eteläpelto et al., 2013; Goller & Harteis, 2017; Leijen et al., 2020). According to our analysis, teacher agency with educational technology varies among teachers regarding their perceptions of the material, social and structural contexts of their professional environment with educational technology. This means that teachers hold different views of the resources for, enablers of and constraints to their work environment; for example, educational technology could both enable and constrain teacher agency. The teachers interacted with the contexts, both individually and with their colleagues. They approached teaching with educational technology through the pedagogical lens, and their shared goal was to promote learning also via distance education.

On an individual level, teacher differentiation covers pedagogical aims, choices and decisions. In this study, the teachers enacted their agency when assessing and comparing the tools of educational technology and adjusting their personal pedagogy accordingly. This was a matter of gaining professional knowledge and learning to use digital tools in pedagogically adequate ways. Our findings align with previous studies' argument that teacher agency can enhance professional learning (Kauppinen et al., 2020; Toom et al., 2021). The individual teacher level is embedded in that of the collegial community, and based on our study's results, teacher agency with educational technology is highly social. The collegial community is the primary source of knowledge and support for teaching and teacher agency. In the absence of a collegial companion, teacher agency is severely constrained. This finding confirms those of previous research on teachers and

educational technology, which emphasise peer support and the role of colleagues (Ertmer et al., 2012; Venkatesh et al., 2003). The structural context of teacher agency in this study centred on the teaching profession and professionalism. Teachers could rely on their professional knowledge and experience, as well as on their capability to learn new skills. The school organisation as a structural context of agency was mainly mentioned by teachers only when it hindered action for distance education. Significantly, organisational structures did not constrain teacher agency.

The differentiation among autonomous teaching practitioners' agencies means that teachers perceive and interpret their contexts in numerous and changing ways. Their perceptions are built on their previous knowledge and experience (Leijen et al., 2020). From the perspective of educational technology, enacting teacher agency requires both technological and pedagogical knowledge (Mishra & Koehler, 2006). If this multitude of perceptions is considered when teaching with educational technology, and if digitalising education is discussed in collegial communities and on an organisational level, these might enhance meaningful change and learning of educational technology and its pedagogics. These remarks about individual and collegial teacher agency align with Mausethagen and Mølstad's (2015) contention that teacher autonomy is evolving from pedagogical freedom to the will and capacity for self-governance. They do not discuss the concept of teacher agency, but the ideas of agency and autonomy are connected via self-initiated decisions and goal-oriented choices. A more elaborated concept of teacher agency and specifying its contexts support autonomous teachers in understanding their profession from the educational technology standpoint.

When considering teacher agencies from the educational technology angle, one easily starts to wonder about different types of content for teacher agency. In this study, we concentrated on educational technology, but what if it is replaced with multiliteracy or inclusion, which both constitute the same kind of entity as digitalisation and should be taken into account by teachers (Kauppinen et al., 2020; National Core Curriculum for Basic Education 2014, 2016)? Do these teacher agencies include the same types of elements and contextual aspects?

Teachers in digitalising education are agentic actors who build practices, develop teaching, and innovate and influence the contexts of educational technology. Teachers and their agencies vary in prior knowledge and experience on educational technology, which influence their perceptions and interpretations of a particular situation (Leijen et al., 2020), as well as their actions and stances (Eteläpelto et al., 2013; Goller & Harteis, 2017). Based on our findings and aligned with the definition by Eteläpelto et al. (2013), we emphasise the meaning of collegial teacher agency with educational technology. Rapidly evolving technology poses a challenge to all teachers; addressing this issue requires collaboration and community-based practices.

Limitations and Directions for Future Research

This study has its limitations. First, the data were collected several years ago. Since then, educational technology and teaching practices have evolved further. Hence, the remote school period gave us a unique opportunity to gather data from teachers who had to modify their teaching in the distance mode and adapt the use of educational technology tools to accomplish their goals accordingly. Our analysis can still provide knowledge about educational technology use and teachers as practitioners in digitalising education. Second, the remote school induced by the pandemic was an emergency period of teaching (Jelinska & Paradowski, 2021; Salmela-Aro &

Lavonen, 2023). Actions were rapid and not necessarily well planned (Lavonen & Salmela-Aro, 2022). All these factors affect the data, analysis and findings. Moreover, digital teaching practices that were developed during the pandemic have disappeared after the return to face-to-face teaching in classrooms (Dertinger et al., 2025). Third, in our study, we had to rely on the teachers' self-written reports about their remote school experience. Nonetheless, we have no reason to believe that the teachers embellished their actions when writing their answers in the questionnaire. On the contrary, it seems that the teachers used it as a channel to criticise any aspect of remote education, especially their heavy workload and the non-functional educational technology tools.

In the future, it is important to investigate teacher agency from the educational technology perspective in more detail and in "normal" situations of teaching and learning. Obviously, teachers and their agencies differ although their goals for teaching do not vary much, and they all align their teaching with the curriculum. In this study, we have not covered the teachers' prior knowledge on educational technology in detail. Future research could further explore the connection between teacher agency and knowledge of educational technology. Teacher agency could be examined along with the model of technological-pedagogical content knowledge, TPACK (Mishra & Koehler, 2006) or other established models for teacher knowledge of educational technology (Valtonen et al., 2022). We need in-depth information about teacher agency and digitalising education to train both in-service and pre-service teachers to meet the challenges of digitalising education and future advanced technology demands (Mishra et al., 2024; Rahimi & Oh, 2024).

Conclusion

The aim of this study is to provide insights into teacher agency in the context of educational technology. Overall, our study's findings indicate that using the concept of teacher agency in studying digitalising education can provide useful knowledge for further research on both in-service and pre-service teacher education and on teacher profession, and for developing teaching practices in schools. These results suggest that the concept should be used in developing educational technology for pedagogical use and especially in collegial communities of teachers. This research reveals that fostering teacher agency means acknowledging diverse kinds of agencies and discussing them in detail.

NOTES

During the preparation of this work, the authors used different generative AI tools to help with the translation of the data excerpts and to improve language and readability. The authors have reviewed and edited the content and take full responsibility for it. The manuscript has been edited by an expert before its submission.

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