



Special issue: What will be the new normal? Digital competence and 21st-century skills: critical and emergent issues in education

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1 Introduction

The practice of digital technology in education was redefined in many ways by the first lockdown due to the Covid-19 pandemic. While the pandemic, as in May 2023, is still changing and varies substantially across and within countries all over the world, educational institutional systems are constantly trying to find and adjust to what in this special issue is understood as ‘a new normal’. A new and different educational state-of-the-art emerged, characterised by its mode of leadership and teaching (online, blended, face-to-face) and content to be emphasised (e.g. subject knowledge and/or more generic competences such as (professional) digital competence, critical thinking, computational thinking, digital citizenship, in-depth learning, problem solving, and collaborative learning). Even though the focus and emphasis on digital competence and 21st-century skills were at large before the pandemic, it has certainly accelerated its acknowledgement and importance (Howard et al., 2021; Scherer et al., 2021). Moreover, the pandemic has brought the quality of both online and blended teaching, as well as the importance of digital technology and digital competence, to the forefront of educational transformation (Olofsson et al., 2021a). The pandemic forced K–12 and higher education teachers and students to perform online and/or blended teaching and learning, and the quality of this endeavour has been reported as inconsistent between and within educational institutions and contexts (Howard et al., 2021; Scherer et al., 2021). Moreover, it was much characterised by a crisis-

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prompted situation and not necessarily a situation for which neither educational institutions, teachers, nor students were prepared (Ewing & Cooper, 2021).

Given the somewhat challenging and complex educational situation described above – ‘a new normal’ – it is at the same time interesting to notice that research studies presenting experiences during the pandemic have revealed examples of novel and motivating teaching and learning practices suggesting that teacher educators, teachers, student teachers and students have adapted to more digital environments (see for example, Ferdig et al., 2020; Khlaif et al., 2021). In light of such findings, it is an equally interesting observation that educational institutions in different parts of the world have been adapting and renewing educational policy and curricula to include digital competence and 21st-century skills as a formal part of national compulsory education for nearly two decades (Erstad & Siddiq, 2023; Olofsson et al., 2021b; OECD, 2016). However, research has shown that the extent to which, and with which content and focus, these competence areas are taught, and teachers’ and students’ competencies and skills within these domains vary considerably (Howard et al., 2021; Siddiq et al., 2016). For example, Olofsson et al. (2021b) argue that such variations can be due to the fact that the concept of digital competence can be considered plastic, temporal, and n-dimensional, a concept “that carries an intended meaning, which can be translated and negotiated relative to national educational needs and beliefs and with a possibility to be enacted in different ways in a situated local practice” (p. 323). Concerning the concept of 21st -century skills, which is often-times considered broad, and including a number of competence areas such as critical thinking, creativity, problem solving, computational thinking, collaboration, and ICT literacy, and defined as “the skills, knowledge, and expertise students must master to succeed in work and life – a blend of content, knowledge, specific skills, expertise, and literacies” (Partnership for 21st Century Skills, 2010, p. 8). Similarly, as with digital competence, 21st -century skills keep evolving along with the changes and needs in society (Erstad & Siddiq, 2023; Siddiq et al., 2017), such as including new competence areas, e.g., AI (artificial intelligence) literacy, and algorithmic literacy.

To sum up, this special issue includes papers that address, analyse, and discuss the challenging, nevertheless important, opportunity for educational institutions and research to investigate and consider the emergent issues related to digital competence and 21st-century skills. Our goal with this special issue is to contribute knowledge on how K–12 and higher education – in a time for considering ‘the new normal’ – work with digital competence and 21st-century skills, the lessons learned and how they are transforming to cope with unforeseen situations. Moreover, in this issue, we aim to contribute relevant knowledge and new perspectives on how we can move the field of digital technology in education forward – learning from the close past.

For this special issue, we initially received 104 original abstract submissions, of which 48 proceeded through the journal’s rigorous review process. Furthermore, the number of submitted full papers was 34, of which 15 were rejected, one delayed and one withdrawn. Hence, our call attracted researchers from around the world, and this issue consists of 17 papers written by 45 scholars from four continents: Asia, Australia, Europe, and North America. Moreover, they are from 9 different countries: Australia, Denmark, Hong Kong, Lithuania, Norway, Spain, Sweden, Switzerland and the USA. In the papers briefly presented below, three of them focused on literature

reviews (Siddiq et al.; Ortiz-López et al.; and Bertel et al.), five on teacher education (Brianza et al.; Martín Bylund & Stenliden; Han et al.; Velander et al.; and Örtengen), four on digital integration, including voices from school leaders and teachers (Reis-Andersson; Löfving; Stumbrienė et al.; and Serrano Ausejo & Mårell-Olsson), and five on teaching, learning, and professional development with an online focus (Hathaway et al.; Prestridge et al.; Godhe; Kohnke et al.; and Svihus).

1.1 Theme 1 – literature reviews

While empirical research during post-Covid has increased in pace, there is also a need to develop theory in the field of digitalisation of education. This is utterly important in the view of ‘a new normal’ —to be able to understand and align with novel research and practice. The use of literature reviews as a methodology has gained increased ground in educational research over the last two decades. Systematic literature reviews are considered an adequate methodology for identifying what is considered state-of-the-art in a given field, and in particular for investigating research gaps and proposing further research needs (Petticrew & Roberts, 2006).

In this special issue, three different review types are included, focusing on digital agency, e-assessment, and emerging digital practices for supporting student-centred learning. The first paper is written by Siddiq, Mørk Røkenes, Lund, and Scherer. This study applies a conceptual systematic review methodology, and focuses on the concept of digital agency. Given the appearance of the digital agency concept in recent literature, it is being used interchangeably with the more established concept of (professional) digital competence. The researchers investigate conceptualisations of digital agency, its underlying theoretical frameworks, and how they relate to digital competence and similar concepts. The findings show that few studies explicitly define digital agency. Moreover, during the last three years, digital agency has been more frequently used in the literature, highlighting the need to include transformative perspectives when designing teaching and learning with technology. The second paper is conducted by Ortiz-López, Olmos-Migueláñez, and Sánchez-Prieto, and applies a mapping review methodology focusing on e-assessments in digital environments. This study investigates the state-of-the-art in this field, including the evolution of publications, the authors, the tools used, the contexts, the objectives of studies using e-assessment, and future avenues of research. The third paper is written by Bertel, Otto, Markman, Andersen, Lyngdorf, and Ryberg. It uses a systematic review methodology focusing on emerging digital practices that support student-centred learning environments in higher education. This study maps the general landscape of the online, hybrid, and blended digital practices applied in existing student-centred learning environments in higher education since the onset of the pandemic. The findings highlight critical factors and barriers related to emerging practices that support students’ interactions with teachers, content, and each other, as well as the emerging competencies that these practices will require.

1.2 Theme 2 – teacher education

As mentioned previously, the question of digital competence and PDC in teacher education (TE) and in K–12 schools has intensified in educational policy, research, and practice during the last few years. The answer to ‘why’, thus, is probably multi-faceted but jointly related to what in this special issue is termed ‘the new normal’. As mentioned previously, the first possible answer to why there is an extensively increased global interest in digital competence and PDC could be due to the pandemic. Teacher education institutions all over the world were forced overnight to make a transition into an emergency remote teaching (ERT) practice facilitated by digital technology (Ryberg, 2021). However, the pandemic in that sense cared little about the current level of neither teacher educators’ level of PDC nor their former experience of using digital technology in teaching and learning (see Bonk, 2020). The first paper, written by Brianza, Schmid, Tondeur, and Petko, is framed by this crisis-prompted condition for educational activities. Using TPACK as a theoretical lens, the authors investigated whether the experience of emergency remote teaching during the lockdown forced by the pandemic impacted teacher educators’ knowledge and beliefs about their future teaching with digital technology. One main finding in their work is that teacher educators maintained positive beliefs towards digital technology during the pandemic and were even able to draw benefits from the experience of lockdown. In line with this paper, the second paper, written by Martín Bylund and Stenliden, addresses the online lives of teacher educators and student teachers during the pandemic. Using a post-humanist problematization of communication, the authors investigated the body-sensory dimensions of presence in ERT. A central take-home message is the importance of being aware of how the material setting of online encounters affects the body and thus the didactic conditions for building meaningful relationships in an ERT environment.

The third paper is written by Han, Mørk Røkenes, and Krumsvik. It is also framed by the pandemic but more specifically focuses on TE in post-pandemic times. However, this paper also offers a second possible answer to the question of ‘why’ raised previously: a rapid digital integration in TE that can enhance pedagogical designs and methods probably not used in TE before the pandemic. In this case, this rapidly developed enhancement refers to the flipped classroom (FC). In that respect, this paper aims to provide evidence of student teachers’ perceptions of the FC to help teacher educators be knowledgeable about implementing a FC in a way that supports student teachers to reflect on the value of a FC in their teaching practice, a focus that also puts the spotlight on the dual didactical task to be performed by teacher educators (see Lindfors et al., 2021). One main finding reported is that even if student teachers prefer more courses flipped in their studies, they still seem hesitant about flipping their own courses in their teaching practice. The fourth paper, written by Velander, Taiye, Otero, and Milrad, provides an example of highly advanced digital technology making its way into TE, namely artificial intelligence (AI). Taking a theoretical stance in TPACK, the researchers explored both teacher educators’ and in-service teachers’ understanding and preconceptions of AI to inform TE and professional development. In the paper, Velander et al. report findings about teachers’ AI-

related content knowledge, which is generally said to be gained through incidental learning and often results in pre- and misconceptions of AI.

A third, and final, possible answer of ‘why’ is to be found in the paper by Örtegen. According to Örtegen, given the highly digitalised society of today, including the increased presence of online deep fakes or disinformation, young people’s digital citizenship is a crucial aspect of democratic education in K–12 schools. This calls for student teachers to develop relevant PDC and teacher educators able to perform the dual didactical task of teaching student teachers how to teach digital citizenship in school. This paper offers a close reading of three conceptualisations of digital citizenship that could inform teacher educators’ dual didactical tasks in this matter. One main message of the paper is that conceptions of digital citizenship in TE need to be unpacked as they may impact future teachers’ preparation to teach for digital citizenship and, in turn, pupils’ digital citizenship formation.

1.3 Theme 3 – digital integration, including voices from school leaders and teachers

The pandemic has brought an increased awareness of how digital technologies are entering and redefining education, and school leaders, as well as teachers, have been made aware of how this leads to an expectancy for developing new competencies. In this theme, we have gathered papers that make this awareness apparent in different ways, and together, they give voice to school leaders and teachers on digital integration in different areas—from leadership to the classroom.

The first paper is written by Reis-Andersson, and accentuates the importance of school leaders in the digitalisation of education. Digitalisation in education creates opportunities that could lead to positive effects if digital technologies are applied correctly. However, insufficient integration of digital technologies can trigger a negative development – for example, increasing workload due to nonfriendly user interfaces in software and reducing the motivation to apply digital technologies in education due to a lack of digital competence. In this paper, Reis-Andersson utilises group interviews and a survey to show that school leaders describe the digitalisation process in the form of digital competence for teachers, access to hardware and software, and a shared culture. School leaders explain that clear guidelines, collaboration between teachers, and enough time enable digitalisation in education. Conversely, the lack of support and resources constrain digitalisation in education.

The second paper by Löfving, explores the complexity of teachers’ work in an increasingly digital society. Teachers are stipulated to carry out policy directives on both core knowledge and on more vaguely described cross-curricular competencies. In her study of 41 teachers in three lower secondary schools, she tried to make sense of and negotiate their students’ digital competence and cater to and develop this competence further. She shows that three main themes were discovered concerning how teachers make sense of students’ digital competence: digital content, creativity, and avoidance of digital usage. The findings showed there were discrepancies between what the teachers reported regarding their students’ digital competence and how the teachers handled the different aspects in their teaching practices, which raises questions on what adequate digital competence teachers need to address, and how it can

be acted upon as a cross-curricular concept. However, it seems to be left to the teachers to make sense of this by themselves. One main conclusion is the importance of letting teachers regularly discuss students' digital competence so that it is catered to and developed in a reflected, holistic, and thorough way.

The third paper by Stumbrienė, Jevsikova, and Kontvainė concerns the adoption of digital technology in educational practice. This study aims to identify the key factors that influence teachers' motivations to transfer technology-enabled educational innovation in primary education. The findings show that motivation to transfer is significantly influenced by five domains: perceived value factors, personal characteristics, social practices, organisational factors, and technology-enabled innovation factors. Motivation to transfer innovation varies according to teachers' perceived digital technology integration skills, which underpin the importance of applying different roles and strategies based on the teachers' skills. The authors suggest that the findings could be a basis for designing effective professional development of in-service teachers and creating a suitable environment in schools for the adoption of innovation in post-pandemic education.

In the fourth and final paper of this theme, written by Serrano Ausejo and Mårell-Olsson, the use of immersive technologies, such as virtual reality (VR) and augmented reality (AR), in teaching organic chemistry is explored. The study aims to understand how these technologies might foster students' spatial ability and 21st-century skills in K–12 education. Using design-based research methods, this exploratory study utilised immersive technologies as an instrument within three different groups in grade 8. The results show that in implementing teaching activities, it is necessary for a teacher to possess technological know-how regarding immersive technologies to achieve the intended motives and goals for the teaching activity. Moreover, there is a need to develop knowledge about the added value these immersive technologies offer to increase students' learning processes and foster their spatial and 21st-century skills.

1.4 Theme 4 – teaching, learning, and professional development with an online focus

The pandemic was a milestone in the digitalisation of education around the globe. The transition to ERT represented, on the one hand, an organisational and technological challenge and, on the other hand, a revelation of the real level of digital competence among stakeholders around and within educational institutions (Abdel-Hameed et al., 2021). On the basis of the cumulative experience of ERT (Walter & Pyżalski, 2022), new areas of research have emerged, together with new postulates among teachers and directors of formal and non-formal educational institutions. Given the need to transform the educational system while taking into account the rich palette of experiences from the pandemic period, this theme focuses on several key areas related to learning, teaching, and professional development.

The first paper, by Hathaway, Gudmundsdottir, and Korona, reports from a comparative study between Norway and the US – two societies considered to be leaders in the digitalisation of education. Despite the relatively high level of digitalisation in both countries, the authors highlighted critical areas of digital competence that need

improvement in both Norway and the US. This paper also highlights the universality of the global challenges relating to the ability to integrate ICT into teaching, and organisational processes, as faced by teaching staff during the period of the pandemic.

The second paper, written by Prestridge, Main, and Schmid, focuses on issues related to the different forms of online and blended presence. Based on qualitative research, the findings highlight the important issue of understanding and adapting forms of distance learning in the context of students' and teachers' needs for co-presence and engagement. The paper offers a ground for reflection for media educators and teachers who have struggled during ERT with the lack of physically mediated interactions typical of classroom teaching.

The third paper, written by Godhe, investigates the challenges faced by teachers in Sweden during the first months of the pandemic. The findings suggest that technological aspects do not represent the biggest barriers to the transition to ERT. Rather, other dimensions, such as pedagogical (methodological) and social issues, are key. Further, the paper shows that the 'soft' areas (not directly related to the technological dimension) of distance teaching and learning were a challenge that teachers faced during the pandemic and that the same challenges may still need to be faced in the future. This is an area to which special attention should be paid when shaping PDC among future and current teachers.

Kohnke, Founq, and Zou highlight several key issues related to the digitalisation of education. This team explored teachers' professional development in online and blended learning through microlearning. Drawing on both qualitative and quantitative data, their findings show that microlearning was perceived as flexible and allowed the teachers to focus on small, relevant, and immediate tasks that nurtured the development of their digital competence. Moreover, the results show that previous PDC development programmes were perceived as too general, requiring further development to better prepare teachers for online and blended teaching.

In the final paper of this special issue, written by Larsen Svihus, the implications of ERT in the working lives of teachers in the higher education sector were considered. Svihus used qualitative interviews to capture challenges faced by academics in new media-mediated university classes (e.g., the inability to meet student activation needs, and dealing with modes of interaction on different platforms). A key finding of this study is that the challenges that emerged during the pandemic were typical among both experienced teaching staff and newcomers to higher education teaching.

1.5 Some concluding remarks

This special issue aimed to contribute relevant knowledge and new perspectives on how researchers and practitioners can move the field of digitalisation of education forward – learning from the close past in a time for considering 'the new normal'. Our goal was to contribute knowledge on how K–12 education, including schools, leadership, teachers, and students, work with digital competence and 21st-century skills, and how they are transforming to cope with unforeseen situations. We have succeeded in providing examples of how the role of teachers and students has changed in an uncertain situation, a role requiring stepping in and out of face-to-face, online, hybrid, and/or blended teaching and learning. Moreover, we seek to better

understand how local or national educational policy is concerned with issues related to digital competence and 21st-century skills, as well as how theoretical and conceptual changes are taking place within these domains.

The 17 papers included in this special issue encompass a wide range of research addressing the areas above through original research on the four different themes of the issue. Together, they provide literature reviews, research on teacher education and digital integration, as well as on teaching, learning, and professional development. In the continuing shift into a ‘new normal’, this special issue at several aggregation levels considers critical and emergent issues regarding digital competence and 21st-century skills in K–12 and in higher education.

We welcome you to engage with the included papers and enjoy the perspectives on ‘the new normal’ presented.

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