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Stay Online

Student Teachers' Views on Online Experiential Learning in Emergency Remote Teaching (ERT)

Assi Piilikangas and Eila Lindfors

The COVID-19 pandemic provided us with a living laboratory to study emergency remote teaching (ERT) when its emergence forced teaching to migrate from face-to-face to online in Finland, as in many parts of the world. This paper examines student teachers' perceptions of the usability of online teaching from their experiential learning viewpoint. The student teachers (N=20) were enrolled in the Introduction to Craft, Design and Technology (CDT) in Primary Education course and were asked to participate in a survey with open-ended questions. CDT education aims to facilitate experiential learning using hands-on design, building and engineering. Kolb's cycle models experiential learning as a combination of experiences, perceptions and conceptualisations through active learning, and the elements of active learning, from a student's point of view, can be considered elements of usability, e.g., the elements of online teaching the students consider valuable and meaningful in their active learning. The analysis criteria for usability were drawn from a literature review, and theory-driven content analysis was applied. The results, consistent with prior research, indicate that flexibility and independence are seen as positive and that the change in teaching methods, increased workload and lack of social contact are seen as negative in online ERT.

Keywords: online teaching; experiential learning; ERT (emergency remote teaching); usability; craft, design and technology education; teacher education

The emergence of COVID-19 and emergency remote teaching in CDT education

In spring 2020, a cohort of first year student teachers had enrolled in the Introduction to Craft, Design and Technology (CDT) in Primary Education (LUOT3440) course at the University of Turku when COVID-19 emerged and changed all the plans for the course. Online teaching arrived quickly throughout Finland, as in many parts of the world, and big changes were made in many schools and learning institutions. Schools went online without time to properly prepare, which is why such teaching should be considered emergency remote teaching (ERT) instead of conventional online teaching. Hodges et al. (2020) compared online teaching and ERT in the following way:

> In contrast to experiences that are planned from the beginning and designed to be online, emergency remote teaching (ERT) is a temporary shift of instructional delivery to an alternate delivery mode due to crisis circumstances. (Hodges et al., 2020, p.6)

The LUOT3440 course is the first–and for many student teachers, only–experience of CDT education during their primary teaching programme's mandatory studies. During the course, student teachers acquire didactical and pedagogical understanding and knowledge of the content of CDT education together with the skills to design and solve problems safely using techniques, tools and materials for primary schools. Since theoretical knowledge in CDT education is always implemented in practice through experiential learning, hands-on learning in authentic learning environments in various technology workshops is seen as a precondition for acquiring the necessary knowledge to teach CDT in primary schools, where pupils are aged from 7 to 12 years old (University of Turku, 2021).

CDT education is experiential learning by doing and making. In CDT education, it is not enough to learn theory–theoretical knowledge is always implemented and experienced in a practical designing and making process. Kolb's (2015) cycle models learning as a combination of experiences, perceptions and conceptualisations through active learning and raises important issues and perspectives. Kolb (1984) sees learning as a process whereby knowledge is created through the transformation of experience (p. 38), and this is the usual way to learn in CDT.

Faced with the emergence of COVID-19, face-to-face teaching was forced to end and all teaching was moved online. All workshops normally held at the university were replaced with at-home tasks. All materials, instructions and forms of teaching needed to be reorganised in only a few days, and the learning assignments that had always been conducted in CDT workshops had to be completed at home with the help of ERT. University teachers still had to supply teaching that would help student teachers in their experiential learning. In fact, COVID-19 created a living laboratory to study ERT in CDT education. The current paper reports a study on the usability of ERT from the student teachers' viewpoint (N=20) and seeks to answer the following question: What elements of online teaching do student teachers consider to be opportunities and challenges as they evaluate the usability of ERT from their experiential learning viewpoint?

Usability criteria for online teaching in an ERT situation

One approach to usability in education is to describe how students experience the teaching methods, tools, learning materials, platforms and learning assignments. This usually refers to how effective, efficient or satisfying the experience is to the users. According to Nokelainen (2006), pedagogical usability means a well-working system that makes it possible to continue one's studies and independently achieve one's goals. In the present study, the usability of online teaching in CDT education is understood primarily as the usability attributes that the student teachers experienced while studying online in an ERT situation. The theoretical criteria for usability in ERT situations were developed using the literature review results (Table 1) taken from research by Mäkelä et al. (2020), who listed nine opportunities and challenges in online teaching. Since the current study is in the context of teacher education, irrelevant items were removed (e.g., parental roles do not apply to adult students), and the list of nine opportunities and challenges was reduced to six.

Mäkelä et al. (2020) saw flexibility; individualisation or personalisation; high-quality instruction; improvements in learning outcomes and skills; benefits of using ICT; online collaboration and social networking with peers; support for learners' emotional, mental and physical health; a wider range of courses; and ensuring education in exceptional circumstances as the opportunities in online teaching. In this study, opportunities for individualisation or personalisation and opportunities for online collaboration and social networking with peers are placed in the same category.

The nine challenging elements listed in the research were changes in teaching methods; changing roles of teachers and parents; additional difficulties in learning; teachers' negative attitudes towards technology and educators opposing the use of technology; the lack of ICT competency and support; a lack of up-to-date ICT infrastructure; a lack of social contact and the isolation that may decrease children's social skills; negative effects on learners' physical and mental health; and the increased workload for both teachers and learners (Mäkelä et al., 2020; Stenman & Pettersson, 2020). Some of the categories were merged so they could be fit under the same topic; for example, teachers' negative attitudes and teachers' changing roles were placed in the same category with the need to change teaching methods. Other elements added to this column dealt with the same idea from a different point of view. The lack of social contact and the negative effects on learners' physical and mental health were also merged into one category.

Table 1. The opportunities and the challenges of online teaching developed from Mäkelä et al. (2020, pp. 5–7).

Opportunities of ERT		**Challenges of ERT**	
O1	Flexibility in learning	C1	The changing roles of teachers
O2	Improvements in students' learning outcomes	C2	Students' difficulties in learning
O3	Enabling adaptations in learning	C3	Lack of ICT competency and support for teachers and students
O4	High-quality instruction	C4	Increased workload of students and teachers
O5	Ensuring education in exceptional circumstances	C5	Lack of up-to-date ICT infrastructure
O6	Support for learners' emotional, mental and physical health	C6	Lack of social contact and negative effects on students' physical and mental health

Flexibility – not only of time and place, but also of deadlines and attitudes – is one of the opportunities in online teaching. Flexibility is also seen as a challenge, as it requires teachers to change their teaching styles, which may be difficult for some because they fear losing control over their teaching. According to Mäkelä et al. (2020), online teaching improves learning outcomes for motivated students with good learning, literacy, technology and time management skills, but it also creates difficulties, especially for younger learners and those who struggle with self-direction and self-discipline.

Online teaching offers many possibilities for personalisation and individualisation. Learners' skills, pace, specific needs, preferences and personalities can be better considered in online teaching. In addition, online collaboration and networking can be fostered in many ways and there are possibilities for online interaction and participation. This is where ICT competency and support plays a big role, as a lot of knowledge and training is required to produce quality online education.

With online teaching, high-quality instruction is an opportunity for teachers to motivate, advise, instruct and orient learners. However, producing such instruction–and making it high quality–increases teachers' workloads; indeed, online teaching has been found to increase workloads for both teachers and students (Stenman & Pettersson, 2020). Ensuring education continues in exceptional times is clearly a good thing, and it can actually be more economical than traditional education. Nevertheless, online education creates new demands, such as for up-to-date infrastructure, to which not everyone has access.

Despite physical separation, it is possible to provide support for learners' emotional, mental and physical health with online teaching, such as by including breaks and study activities related to physical exercise. However, online teaching can result in a lack of social contact and thus affect physical and mental health, and it can make maintaining a healthy lifestyle and daily rhythm more difficult (Mäkelä et al., 2020).

Methods

The research context

The student teachers (N=20) were enrolled in the Introduction to Craft, Design and Technology (CDT) in Primary Education (LUOT3440) course at the University of Turku (6 ECTs, first year students, primary teacher programme), and they were asked to complete a survey with the following open-ended questions:

- What factors promoted your learning?
- What issues were challenging during ERT?
- What factors did you consider important in online teaching?

By answering, the student teachers indicated their consent to participate in the research. The survey also requested some background information. The data was anonymised such that it would not be possible to identify individuals.

The student teachers had different backgrounds in both education and CDT. Most (17) had graduated from secondary school, but one had a master's degree in early childhood education. Four had worked as classroom assistants before their studies. Some already had a lot of experience in CDT, but others were beginners. Four did crafts as a hobby, but 11 had their most recent experience of CDT in seventh grade. Their ages varied between 20 and 40 years. Half of the students stated that they had good motivation, but the remainder simply sought to pass the course.

The LUOT3440 course comprised four 90-minute lectures and seven two-part workshops. All the lectures were face-to-face before the ERT; less than half of the workshops were face-to-face, and the remainder were online. Each workshop had different content, and the teachers used multiple methods to provide that content to the students. Some of the CDT content was introduced by a video assignment– the students had to identify the best videos that used a certain technique or material and provide their views on the usability of the videos in teaching. There were also assignments that were not time-bound, so they could be completed at the students' convenience. Two of the workshops took place over Zoom; the teacher demonstrated the content of the workshop, and the student teachers could see the implementation in real time. Zoom was also used for weekly meetings at which anyone could ask questions concerning the LUOT3440 course and online teaching. Teachers were also available for one-on-one online meetings if students needed help with specific content. Some assignments were given weekly, and student teachers needed to buy their own materials for these workshops to be able to follow and engage with the content.

The analysis

Content analysis was used in two ways. First, the student teachers' responses were read and the original phrases thematised as opportunities and challenges of ERT. The difficulties the student teachers described in the survey were identified as challenges (Table 2), and phrases that included the potential and benefits of ERT were identified as opportunities for experiential CDT learning (Table 3). The original phrases of the student teachers were anonymised and identified by codes from ST1 to ST20. Second, a theory-driven content analysis was conducted. The original phrases were summarised (Table 2 and 3), and those phrases were categorised into C1–C6 (for challenges) and O1–O6 (for opportunities; see Table 1). The results were fitted to the theory and are presented as opportunities and challenges of ERT, using the 27 subcategories that arose directly from the data (Table 4).

Table 2. An example of the categorisation of original phrases for challenges.

Original phrase thematised to challenges	Summarised phrase	Subcategory	Theory-based category
In some topics, I would have needed more prepared instruction from teachers. (ST12)	Lack of instructions	Shortage of instrumental support	C2 Difficulties in learning
Even though the instructions were informative, I found it hard to start working. It would've been much easier if I could've asked for help from someone. (ST9)	Lack of direct contact		C6 Lack of social contact

Table 3. An example of the categorisation of original phrases for opportunities.

Original phrase thematised to opportunities	Summarised phrase	Subcategory	Theory-based category
Showing workshop-like working via Zoom, so students can ask questions about the difficult issues. (ST7)	Students can ask questions via Zoom	Real-time support	O4 High-quality instruction
High-quality instruction and well-managed Moodle platform. (ST3)	High-quality instruction and networking platform	Well organised and informative platform	O4 High-quality instruction

Results

During the analysis, the 27 subcategories were mapped onto the 12 ERT challenge and opportunity categories (see Tables 1, 2 and 3; Mäkelä et al., 2020) except for **C5 Lack of up-to-date ICT infrastructure,** for which no subcategories were found.

The category **C1 The changing roles of teachers** in ERT was explicated by the student teachers with two subcategories: *Students' lack of direct instructions in teaching* and *Teachers' real-time support*. These were mentioned several times in the data.

> ... the clarity of the instructions becomes relevant when teachers are not explaining them in person. (ST16)

The challenge category **C2 Students' difficulties in learning** was the largest category in the analysis. It has three subcategories: *Equal support for students, Difficulties in implementing material technology* and *Time scheduling by a student.* The category includes original phrases that describe the students' considerations when making and using material technology with different techniques and tools. The student teachers had difficulties in 'making' most things only theoretically, and this was seen as problematic.

> The lack of tools or equipment should not affect students' ability to do the assignments. (ST4)
>
> The most challenging part was not being able to implement all the hands-on work in practice. (ST19)

The subcategory *Use of new software* in the category **C3 Lack of ICT competency and support of teachers and students** included phrases that described difficulties in using the software required by the ERT scenario. The students also made statements that were categorised as **C4 Increased workload**, especially in the subcategory *Number of studies and hands-on working.*

> The struggle with the amount of work and scheduling all the work, both in this course and in other studies, took a lot of time and energy. (ST18)

There were numerous phrases in the category **C6 Lack of social contact**, and two subcategories were formed: *Students' isolated hands-on making* and *Social support, feedback and peer support.* Peer support has been found to be significant when learning online, but during ERT, there were fewer contacts between teachers and students. Many student teachers felt that they were left alone with their studies. They had previously learned a lot during face-to-face teaching, both from the teachers and from other students. In ERT, some of this peer support was enabled by Zoom meetings and the student teachers' own WhatsApp groups. According to the students, the lack of other social contact made peer support and other interaction meaningful. The students emphasised that it was very important to have Zoom meetings during which they could see each other and ask questions about the course.

Table 4. Research results categorised and subcategorised as opportunities and challenges of ERT.

	Subcategories of the opportunities of ERT		**Subcategories of the challenges of ERT**
O1	Students' self-directed time and task scheduling	C1	Students' lack of direct instruction in teaching
			Teacher's real-time support
O2	Deeper learning experience	C2	Equal support for students
	Use of new software		
	Positive attitudes and challenging oneself		
	Positive learning experience		Difficulties in implementing material technology
	Possibilities in the use of material technology		Time scheduling by students
O3	Personalisation	C3	Use of new software
	Individualisation		
	Self-directed behaviour		
O4	Allocation and delivery of learning assignments	C4	Number of studies and hands-on working
	Clear and supportive instruction		
	Teacher's real-time support		
O5	Implementation of teaching in different circumstances	C5	*No original phrases or subcategories*
	Smooth progress of studies		
O6	Teacher's empathy and support towards students	C6	Students' isolated hands-on making
			Social support
			Feedback
			Peer support

Category **O1 Flexibility in learning** includes the subcategory *Students' self-directed time and task scheduling*. This is seen as an opportunity in the ERT situation because learning assignments can be completed according to the students' schedules.

> The work can be done at the time of inspiration, not in a rush during the workshop. (ST17)

Autonomy was seen as requiring more work, but as bringing a positive and deeper learning experience. This is seen in category **O2 Improvements in learning outcomes**, which included several subcategories*: Deeper learning experience, Use of new software, Positive attitudes and challenging oneself, Positive learning experience* and *Possibilities in the use of material technology*.

> In online teaching, I had time to explore the techniques/machines etc. that had been studied. It is very different to independently find out about issues than to be taught by teachers at the beginning of the workshop. (ST12)

The category **O3 Enabling adaptations in learning** had three subcategories: *Personalisation, Individualisation* and *Self-directed behaviour*. The ERT situation required a lot of individualisation, such as replacing a particular material with one found at home (ST7). The opportunity category **O4 High-quality instruction** had three subcategories: *Allocation and delivery of learning assignments, Clear and supportive instruction* and *Teacher's real-time support*. The learning assignments were provided one by one, which helped students with the workload. The use of the learning platform (Moodle) became important, and many students thought it positive that they learned new software and ICT skills, despite the time needed and the additional workload. The category **O5 Ensuring education in exceptional circumstances** comprised *Implementation of teaching in different circumstances* and *Smooth progress of studies*.

> The teacher's ability to adjust the course to online teaching, even though rapid change was hard for everyone–it is great that a course so concrete could be held online. (ST3)

The category **O6 Support for learners' emotional, mental and physical health** was formed with only one subcategory: *Teacher's empathy and support towards students*. The teacher's positive attitudes and support and the knowledge that a helping teacher was available were seen as valuable.

Conclusions and discussion

This case study investigated the elements of online teaching that student teachers in a primary education programme (N=20) considered to be opportunities and challenges. They evaluated the usability of ERT (Hodges et al., 2020) in CDT from their experiential learning viewpoint (Kolb, 2011) following the emergence of COVID-19 in spring 2020. The data offers rich material for identifying themes from their experiences. From a study ethics point of view, the role of the researchers was considered carefully. Since the data needed to be translated into English, there was careful attention paid to not altering the original meaning, and the researchers held discussions to reach consensus during the analysis, which supports the reliability of the results.

This study reveals that, in online teaching of CDT education, student teachers lacked materials, tools (Table 4, C2) and teachers' real-time support (Table 4, C1) while completing their experiential learning assignments (Code et al., 2020; Kolb, 2017). The teaching content needs to be communicated and learned through doing and creating experientially in well-equipped workshops, which indicates that, in future, it would not be effective to have only online teaching, even in an ERT situation. That was especially the case for machines that could not be borrowed or used at home; for example, one cannot learn to use a laser cutter without practising with a laser cutter.

In contrast to Mäkelä et al. (2020), in this Finnish teacher education context, **Lack of up-to-date ICT infrastructure** (**C5**) was not mentioned at all, and the students seemed to handle online learning well

from an ICT infrastructure viewpoint. Otherwise, the results are consistent with previous studies (Hass & Joseph, 2018; Mäkelä et al., 2020) and support existing knowledge about online teaching (Mäkelä et al., 2020), improvements in learning outcomes, difficulties in learning and increased workload.

The results do highlight some elements of CDT education, such as *Deeper learning experience, Use of new software, Positive attitudes and challenging oneself (***O2**) and *Smooth progress of studies* (**O5**) (Table 4). As Kolb and Kolb (2015, 2017) stated, in experiential learning, the subject is placed at the centre, and the teacher and all the students are experiencing it. The teacher's role is to help students to experience the phenomena and to provide alternative concepts while the students are assimilating their observations into their own conceptions of the topic. Everyone receives information through concrete experience and transforms it through their own reflections and conceptualisations (Kolb & Kolb, 2015, 2017).

In ERT situations, the changing roles of teachers (**C1**) and high-quality instruction (**O4**) were found to be important to the students as ways of ensuring their education (Mäkelä et al., 2020; Stenman & Pettersson, 2020). To provide a well-planned course and high-quality instruction for all assignments takes a lot of a teacher's time, which in ERT situations is usually very limited. Thus, the instruction and the teacher's role seem highly relevant, and these should be enhanced in online teaching in order to support students in their learning assignments. In addition, a well-functioning platform for instructing the students was seen as valuable. It was interesting that some of the student teachers experienced online teaching more as an opportunity than a challenge: *Positive attitudes and challenging oneself* and *Positive learning experience* (**O2**; Table 4). At the same time, some of the student teachers considered online teaching and the learning assignments to be time-consuming and very difficult, and they felt frustrated: *Teacher´s real-time support* (**C1**), *Time scheduling by a student* (**C2**) and *Social support and peer support* (**C6**; Table 4).

This pilot study provides information related to online teaching when it is necessary to implement applied, practical knowledge using physical materials and techniques to complete learning assignments, such as in design, engineering, technology and arts education. Although the analysis was theory-driven (Hodges et al., 2020; Mäkelä et al., 2020) and the analysis was conducted by consensus, the results may not be generalisable, but a case study with 20 informants does offer a rich example of how student teachers view online teaching in ERT situations in CDT education. Future studies could seek to evaluate online teaching in relation to students' motivations and goal orientations with a larger amount of data.

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