Relocating Online a Technology-Enhanced Microteaching Practice in Teacher Education: Challenges and Implications

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Abstract: The rich repertoire of online practices adopted by educators during the Covid-19 pandemic opened up new perspectives for educational research to consider e-learning post-pandemic. Focusing on teacher education, it is worth considering the practices adopted to inform the development of future curricula that cultivate teaching competencies for e-learning. This paper examines microteaching, a well-established practice realised in teacher education as a learning-to-teach experience. As was the case with other teacher education practices, the forced online transition heavily compromised the vividness of microteaching -a technique inherently connected to face-to-face interaction-. On the other hand, this online relocation can be an opportunity to capitalise on online microteaching as a fulfilling e-learning experience in teacher education. The paper has two parts. In the first part, we conceptualise the potential of microteaching while applying Technology-Enhanced Learning (TEL). The second part reports our experience relocating online a mature technology-enhanced microteaching practice (successfully implemented in face-to-face settings for seven years) due to the Covid-19 pandemic. Our research design utilises two implementations of microteaching practice. One was conducted in a typical face-to-face context pre-pandemic, and another was conducted in an online context during a lockdown imposed by the pandemic. On a first level, collecting qualitative data from both contexts allowed us to observe common TEL-related challenges. On a second level, we focused on identifying challenges distinct at the online context to infer and highlight the implications of the online relocation. These implications relate to (i) the organisational changes, as experienced from the instructor's perspective, (ii) the technologies adopted for applying TEL, and (iii) the challenges that pre-service teachers (PSTs) face in the online environment. Our findings extend the previous research scope on face-to-face microteaching practice. New challenges of relocating technology-enhanced microteaching online include technical difficulties in handling technologies and reduced participation in whole-class discussions. However, challenges that remain relatively unaffected concerning the typical face-to-face practice are (i) the PSTs immersion in the roleplaying character of microteaching, (ii) the misconceptions on the principles and methods of teaching techniques roleplayed, (iii) the adoption of digital tools for applying TEL, (iv) the selection of suitable digital tools, and (v) the burden of time limitation. In conclusion, we argue that these insights reveal an unexplored potential for technology-enhanced microteaching in an online context. We discuss how the implications of shifting microteaching practise online may model future microteaching implementations in teacher education post-pandemic. We support that online microteaching, apart from providing an alternative method when circumstances impose it, should be integrated within the typical teacher education curriculum to cultivate teaching competencies for e-learning.

Keywords: teacher education, technology-enhanced microteaching, online practices, covid-19

1. Introduction

In spring 2020, due to the Covid-19 pandemic, most countries in the world experienced an unprecedented total or partial lockdown, which subsequently caused universities and schools to suspend their face-to-face operation and relocate it online. With approximately 1.5 billion students away from classrooms and restricted at home (UNESCO, 2020), established practices changed quickly, with educators having to show "pedagogic agility" (Kidd and Murray, 2020).

Researchers acknowledge that handling online educational contexts requires a "new and extended skills set" (Gachago et al., 2017; Peachey, 2017). The challenge of any kind of online teaching is "transferring the skills of content delivery, student engagement, motivation, and assessment into the new delivery venue" (Clement, 2010: 97). Specifically for pre-service teachers (from this point on referred to as "PSTs"), skills are indeed a key factor for integrating e-learning in their practice rather than having the intention to do so (Olugbara and Letseka, 2020). Another critical factor is the obstacle of time: One of the greatest misconceptions about online teaching is that it is somehow a quick and dirty version of the much more complex classroom teaching reality. Nothing could be further from the truth. "Teachers who have taught online will usually say that their face-to-face classrooms are far less time-consuming" (Brookfield 2006, 91, in Clement 2010, 97). Another issue relates to the design constraints on pedagogical innovation posed by virtual conferencing tools (such as Zoom, Blackboard, Google classroom, or Microsoft Teams). In this respect, Mishra (2020) cautions on schools' uniform responses to the Covid-19 crisis regarding the adoption of these tools and on decisions taken under immense time pressure, which have the power to shift the balance and direction of the emerging educational ecosystem. An

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interesting example is that of virtual conferencing sessions: they have become more "bumpy" and teacher-centred than face-to-face sessions, with long silences, shorter student responses, and lack of paralinguistic communication as many students prefer to have their camera off (Peachey, 2017). However, researchers claim that during the Covid-19 pandemic, many teaching practices and values remained unchallenged despite the relocation to newly formed online spaces as "there was a sense of both sameness and difference in some of the innovative pedagogies developed on the (g)local level" (Kidd and Murray, 2020).

Due to the Covid-19 pandemic, the need to rapidly adapt to new teaching and learning online contexts affected teacher education profoundly (la Velle et al., 2020; Flores and Swennen, 2020). Institutions and teacher educators were confronted with an "unexpected and forced transition", creating the need for decisions, choices, and adaptations, meeting the expectations of student teachers, and the requirements of teacher education institutions (Carrillo and Flores, 2020). In this context, among other issues, it is interesting to notice the practices adopted in teacher education regarding PSTs learning-to-teach experiences.

PSTs missing practicum in schools and the challenges entailed for doing it "virtually" have been recently addressed in educational research (see, e.g., Assunção Flores and Gago, 2020; Coolican, Borras and Strong, 2020; Kidd and Murray, 2020; la Velle et al., 2020). However, no previous study addressed microteaching practice during the Covid-19 pandemic to the best of our knowledge. This paper explores microteaching, which has already been reported to effectively bridge the school placement gap (Griffiths, 2016), as an alternative method providing a compelling learning-to-teach experience in an online context. Indeed, as the opportunities for developing new pedagogies for online teacher education opened up dramatically during the Covid-19 pandemic (la Velle et al., 2020), we capitalise on practising online microteaching during this period. Acknowledging the significance of understanding the implications of e-learning among PSTs (Sadeck, Chigona and Cronjé, 2020) we intend to provide original insights into the challenges of relocating online a learning-to-teach experience that may guide the integration of e-learning in teacher education.

Narrowing down on the contextual background of this research, at a macro-level, microteaching as a practice in teacher education has a long tradition in Greece. However, it is not generalised, i.e. globally adopted by all official teacher education providers. Microteaching was first introduced in 1973 at the School of Pedagogical and Technological Education (ASPETE), where it is still practised as an integral part of technological education's PST practicum. It is also a tradition of the Aristotle University of Thessaloniki (Schools of Primary and Secondary Education), since 1987, also followed by other Schools and Departments in Northern Greece, such as that of Primary Education of the Democritus University of Thrace (Chatzidimou, 2011). Overall, from the total of 21 Pedagogical Departments in Greece, about half (11) include microteaching in their study guides, either as an autonomous module, a laboratory exercise, or as part of students' teaching practicum (Fykaris and Papaspyrou, 2014). However, neither incorporating digital technologies in microteaching to apply Technology-Enhanced Learning (TEL) nor online implementation has been previously studied in a Greek educational context.

At a micro-level, microteaching applying TEL (from this point on referred as technology-enhanced microteaching) has been an integral part of the post graduate module undertaken by the researchers for the past seven years, first at the University of Athens, in face-to-face settings and then completely online, at the University of West Attica, where the online relocation took place (see section 3. Methodology).

In what follows, we provide a theoretical background of microteaching in terms of its TEL perspective and then attempt to illustrate this perspective in practice. In the methodology section, we describe our qualitative research design (Willig, 2013) and our approach to the challenges of relocating online a technology-enhanced microteaching practice. We report findings regarding (i) the challenges of teacher educators for organising microteaching practise, (ii) the challenges regarding the application of TEL and (iii) the extra challenges that PSTs face when practising online microteaching. At the end of the paper, we argue about the potential of technology-enhanced microteaching in an online context. Also, we discuss how the implications of this shift of microteaching practice may model future practices in teacher education post-pandemic.

2. Microteaching meets TEL: towards integration

2.1 Microteaching and online microteaching

Microteaching is a condensed lesson unit delivered within a roleplaying context (Ledger and Fischetti, 2020), where peers act as "students". Karlström and Hamza (2019) note that the typical structure of microteaching

involves three phases: (i) the planning phase in which PSTs plan a short lesson unit, (ii) the teaching phase in which they teach the unit to peers, and (iii) the reflection phase for reflecting on what happened during the microteaching session. Researchers report that, despite its inherent nature of artificiality, the microteaching experience allows PSTs to apply theoretical knowledge and develop practical teaching competence (Yan and He, 2017). PSTs can transform their subject matter knowledge and pedagogical content knowledge (Baştürk, 2016) by scaling down the classroom's complexity into a controlled and monitored training environment (de Lange and Nerland, 2018). Practising microteaching empowers PSTs to (i) evolve their pedagogical knowledge and competence (Fernández, 2010), (ii) connect theory with teaching practice (Mergler and Tangen, 2010), and (iii) develop basic teaching skills (Yan and He, 2017). Furthermore, microteaching supports PST's reflective practice in the planning phase (Karlström and Hamza, 2019; Zalavra et al., 2020), in the teaching phase (Diana, 2013) and, of course, in the reflection phase (Griffiths, 2016; Straková and Cimermanová, 2018).

Research in online microteaching is relatively limited, accounting for two different approaches. Kusmawan's (2017) online approach refers only to the reflection phase by incorporating video recordings into the traditional microteaching technique and making them available online. As Kusmawan (2017) reports, the open online distribution of microteachings' video recordings allowed PSTs to view and reflect on their practice. Participants had positive perceptions of this experience with regards to (i) improving their professional teaching, (ii) boosting their confidence in their teaching and (iii) developing critical and reflective thinking. In line with our approach to online microteaching that focuses on practising the teaching phase in an online context is the research by Mergler and Tangen (2010). These researchers report a comparative study with one group of PSTs practising microteaching in a face-to-face context and the other in an online context. The findings of Mergler and Tangen (2010) reveal that the PSTs who practised online microteaching had higher efficacy levels than those who practised the traditional face-to-face microteaching.

2.2 Microteaching and TEL

Recent years have witnessed the internationally recognised importance of teachers designing learning tasks (Goodyear and Dimitriadis, 2013) and appropriately integrating technology into teaching (Zalavra and Papanikolaou, 2019). Technology integration should be interweaved with learning design as it offers many opportunities to engage learners and strengthen the learning process (Papanikolaou et al., 2016). In this line, researchers endorse that the pedagogical use of digital technology should be embedded in teacher education programs to improve current teaching and develop new approaches (Kirschner, Wubbels and Brekelmans, 2008). They also envision the modern-day teacher being able to apply effective, efficient, and enjoyable pedagogic/educational techniques while using the different tools and technologies afforded at this moment (Kirschner, 2015). Practising technology-enhanced microteaching may expedite the time it takes PSTs to progress to more innovative and meaningful uses of technology in subsequent field experiences and efforts as in-service teachers (Dawson, Pringle and Lott Adams 2003). Therefore, we argue for the necessity of promoting TEL as an integral teaching component of contemporary teacher education and subsequently stimulating PSTs to operationalise TEL while practising microteaching. To operationalise this argument, we present a representative instance (PST cohort) of our 7-year experience on TEL-enhanced microteaching in a face-to-face academic context. We then focus on the online relocation of this practice due to the covid-19 pandemic and its effects, both concerning previous TEL practice and its potential for future technology-enhanced online microteaching.

3. Methodology

3.1 Setting and Participants

During the spring semester of the academic year 2019–2020, the research team undertook the postgraduate course "Digital Technologies and Collaborative Learning" offered by the University of West Attica in Athens, Greece. The participants were 30 PSTs from several disciplines, such as Computer Science, Mathematics, Greek language, Primary Education, etc. The course was organised into two parts. In the first part, collaborative learning, its challenges and implications as illustrated in the relevant literature were approached. In the second part, PSTs were introduced to four collaborative learning techniques: Brainstorming, Debate, Jigsaw, and Roleplay. By the end of the course's first part, the Covid-19 pandemic discontinued face-to-face lectures. Thus, the second part of the course was relocated online, using the institutional platform MS Teams (https://teams.microsoft.com/) as the primary virtual conferencing tool. The 30 participants formed nine groups (we call them cohort B groups from now on). The teams were assigned to collaboratively develop a learning design in the learning design tool WebCollage (Villasclaras-Fernández et al., 2013) integrated into the

collaborative learning design environment of ILDE (Hernández-Leo et al., 2018). The main requirement that the learning design had to meet was to include a collaborative learning technique and integrate digital technologies in its implementation. The PSTs' teams could choose from a range of online Web 2.0 applications suggested by the instructors or make their own choices. The learning designs were initially authored, developed, and then implemented as technology-enhanced microteaching sessions. Specifically, each group had to "teach" the learning design in a simulated online context as a microteaching session, with their peers playing the students' role. To reflect on their practice, after each session, they participated in a peer-review activity to provide feedback to their peers and leverage from cultivating a community of inquiry (Makri et al., 2014).

The above course syllabus was similar to the one undertaken by the research team in the context of another postgraduate program at the National and Kapodistrian University of Athens, from 2011 until 2017. For the purposes of this study, we chose a representative cohort of 10 PSTs (from several disciplines) attending the course at the spring semester of the academic year 2017–2018. The 10 participants formed four groups (we call them cohort A groups from now on). This methodological choice was not made to support a comparative study. Instead, it aimed at (i) shedding light on the challenges PSTs face with the TEL aspect of microteaching and (ii) highlighting those aspects that remain the same or change across the two contexts, face-to-face and online.

3.2 Research Design - Data Collection and Analysis

Following a qualitative research design (Willig, 2013) our study addresses the following research questions:

- **RQ1:** What challenges do teacher educators address in relocating online an established face-to-face technology-enhanced microteaching practice?
- **RQ2:** How does relocation from face-to-face to online affect PSTs' technology adoption for applying technology-enhanced microteaching?
- **RQ3:** Do PSTs face extra challenges when practising online than face-to-face technology-enhanced microteaching?

For RQ1, we used data from our research diary and observations from both implementations (see Figure 1), as we identified similar or slightly different challenges in the online implementation in relation to the typical face-to-face implementation.

For RQ2, our data sources were both cohorts' deliverables (learning designs developed) and all participants' individual reflective text accounts, delivered at the end of both courses. In the case of cohort B, we also used the video recordings of microteaching sessions from the MS Teams platform. As in the previous RQ, we used data from both courses to highlight the effect of online relocation on TEL adoption.

For RQ3, we used participants' peer review comments regarding their experience as "students" and their individual reflective text accounts regarding their experience as "teachers" practising online microteaching.

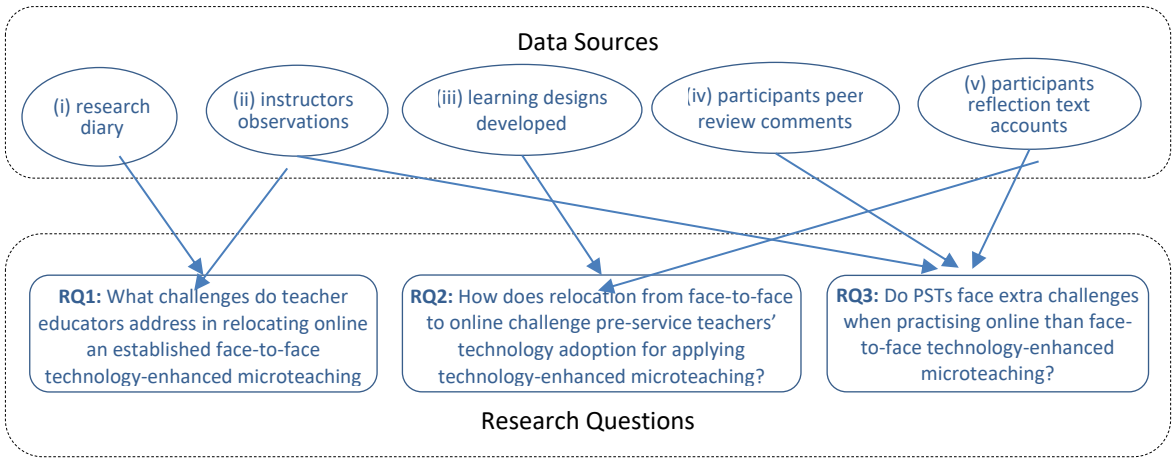

Figure 1*:* Correspondence of data sources to research questions

Participants from both cohorts gave us consent to use their texts and course deliverables for research purposes. We applied thematic analysis (Braun and Clarke, 2006), analysing data sources per research question as seen in

Figure 1. Both researchers were involved in the process, exhaustively negotiating themes to conduct a rigorous and relevant thematic analysis.

4. Findings and Discussion

4.1 The challenges that teacher educators address in relocating online an established face-to-face technology-enhanced microteaching practice

As the researchers were also the course instructors in both contexts (face-to-face and online), our research diary is a valuable source of thoughts, feelings and activities throughout the research process, from design through data collection and analysis to writing and presenting this study. During the spring semester of the academic year 2019–2020, we intended to follow the typical implementation for the course syllabus regarding PSTs practising face-to-face microteaching as we had practised it in the previous seven years. When the Covid-19 pandemic disrupted face-to-face classes, we were concerned if shifting online to a microteaching practice was feasible. The possibility of changing the syllabus by removing the microteaching session -and replacing it with presentations of each collaborative learning technique- was initially considered. Besides, we worried that lacking face-to-face communication with all its paralinguistic elements would make the practice of microteaching -in its essence, a roleplay- awkward at best and impossible at worst. Despite these concerns, we reached the final joint decision to assign PSTs to implement their microteaching sessions online. Oddly, supporting this decision did not drastically change the initial course design. After the instructors presented the four collaborative learning techniques: Brainstorming, Debate, Jigsaw, and Roleplay, the PSTs were split into groups, each group assigned to practice one technique. The groups used ILDE and WebCollage for authoring and peer-reviewing their microteaching sessions. They were free to choose which tools to integrate into their technology-enhanced microteaching sessions. Overall, the course design, goals, and objectives remained to a great degree unchanged. What was different in practical terms was the class size and the obligatory use of the institutional platform, MS Teams, for synchronous video conferencing, and in effect, for implementing the microteaching sessions.

From our perspective, that of the instructors, in our observations of the online implementation of the microteaching practice, we identified three interesting issues:

4.1.1 Immersion in the roleplaying character of microteaching

The first issue relates to our initial concern about the actual online transferability of the roleplaying character of microteaching. To our surprise, in all cohort B group sessions, both the PSTs playing the role of “students” and those playing the role of “teachers” indicated a behaviour of total immersion in their role. This was evident in “teachers” discourse styles when addressing younger age groups (primary school), as was the case with many sessions. On the other hand, “students” behaved as one would expect: asking many questions -sometimes even disruptive for the microlesson flow- and addressing their teachers as “sir” and “madam”. Though they participated in all assigned activities with diligence and zeal, probably motivated by collegial feelings towards their peers, they attempted to mimic children’s in-class behaviours and discourse at any instance possible. This impression was further validated by PSTs peer review comments, in which the “liveliness” and “positive climate” of the lesson are recurring themes. Although immersion in microteaching roleplay was a common phenomenon in face-to-face courses, it was unexpected in this first effort of online relocation.

4.1.2 Reduced participation in whole-class discussions

In contrast to their absolute engagement in their roleplay during practising microteaching, PSTs did not show the same enthusiasm in the case of whole-class discussions. This type of activity was a core element of the course rationale in its face-to-face version. The typical lecture, presenting each collaborative technique, was, in fact, an instructor-led discussion on the principles and application methods of the techniques. The participants actively participated by asking questions, requesting explanations and sharing their views. In addition, after each microteaching session, there was always time for discussing the first impressions of both “teachers” and “students” before proceeding with the more in-depth process of written peer review.

In the online relocation of the course, this rationale was challenged. Although practices towards building a sense of community (Makri et al., 2014) were adopted, this was not the case. From the first online lesson, it was evident that most participants were unwilling to appear on camera unless necessary. They were reluctant to interrupt the instructors and address questions verbally or use the “raise hand” symbol in MS Teams. Also, they hesitated to answer when asked, leading to awkward silence periods. When prompted to comment on their

colleagues' microteaching sessions, they preserved a politeness norm, keeping critical comments and suggestions for their written reviews.

To address these challenges, the instructors activated the "chat" feature of the platform. This feature is not enabled by default in MS Teams, unless the class is registered into a "team" with its own general chat area. Social presence was further pursued through the use of an application, Sli.do (https://www.sli.do) -also supported in mobile devices-, allowing participants to participate in brief polls activated during the course and post their questions on a "Question and Answer" area (for example, see Figure 2).

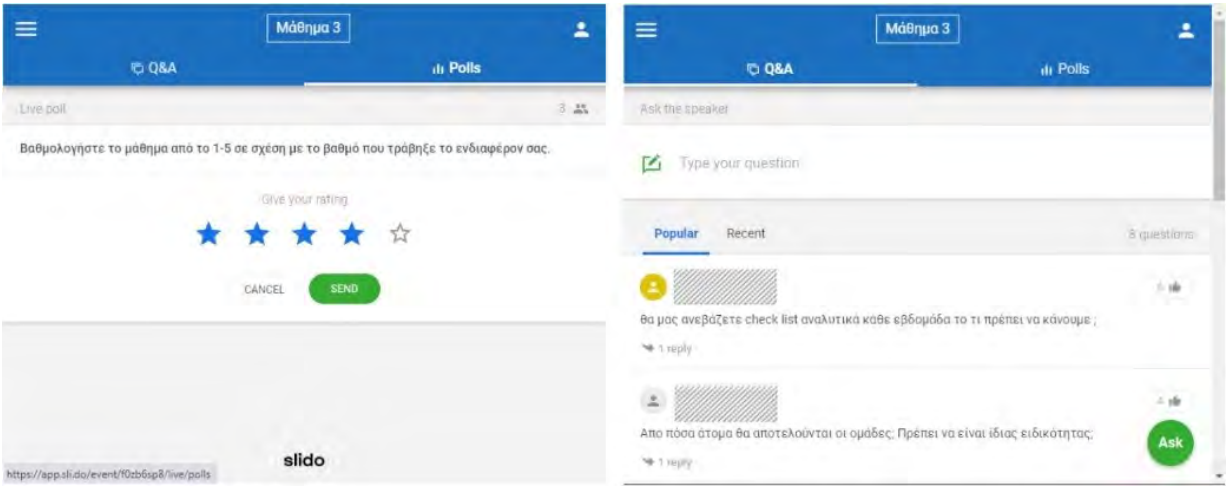

Figure 2: The "Question and Answer" and the "Poll" features utilised in Sli.do

4.1.3 Misconceptions on the principles and methods of collaborative learning techniques

A striking similarity between the two contexts (face-to-face and online) is that PSTs had the same typical misconceptions regarding the principles of collaborative learning techniques and application methods in their microteaching sessions. During our seven-year experience teaching the face-to-face course, the misconceptions we identified were also repeated in the course's online version.

While practising the Brainstorming technique in their microteaching sessions, the PSTs encountered difficulties in (i) keeping the session brief and not extending it into a discussion, as this is a method that usually comes after the "storming" phase, and (ii) categorising quickly and efficiently the words and ideas expressed by students. In both contexts, the "teachers" struggled to categorise the ideas using a digital tool in a straightforward and visible-to-all way.

Another common misconception is practising a Roleplay as a Debate. There were microteaching sessions of both cohort A and cohort B teams that assigned roles to "take sides" on a topic, which is actually the Debate technique's essence.

Lastly, we observed the same difficulty in implementing the Jigsaw technique in both contexts. The PSTs as "teachers" failed to organise the groups involved in the technique efficiently. Thus, the interplay of "home groups" and "expert groups" was often mixed up, with "students" ending up not acknowledging each group's function. This was especially evident in the online version of microteaching, as, in practical terms, there was the need for separate breakout rooms for "home" and "expert" groups. Online synchronous work in these different spaces had to be orchestrated and coordinated as seamlessly as possible so that "students" did not have to switch among other platforms and tools, thus shifting the pedagogical concerns of collaboration into technical frustrations.

4.2 The effects of face-to-face to online relocation on PSTs' technology adoption for applying technology-enhanced microteaching

We consider two dimensions of technology adoption while practising technology-enhanced microteaching. The first one involves preparing microteaching, whereas PSTs adopt technologies to design their lesson, and

communication means to collaborate on their design. The second one involves designing for TEL, and specifically designing for the collaborative learning technique to be practised.

4.2.1 The effects on a microteaching's preparation phase

The content analysis of the participants' reflection text accounts provides us insights into preparing their technology-advanced microteaching. As expected from their assignment, both cohorts in this study used the learning design tool WebCollage and collaborated in the ILDE platform for developing their learning design. Since communication means were up to team members, it is interesting to consider their methods. Although they all met face-to-face during lectures, one out of four cohort A groups reported working exclusively online synchronously and asynchronously. The rest of cohort A groups reported using several online tools apart from making use of their face-to-face encounters. Among the nine cohort B groups, two groups reported meeting face-to-face, which is an immensely exciting finding since this study took place in the period that either a coronavirus lockdown or restrictions on people's movement were imposed. The digital tools utilised by both cohorts for communicating online were similar: Skype (https://www.skype.com), MS Teams, Google Hangouts (https://hangouts.google.com), Messenger (https://messenger.com), and Viber (https://www.viber.com).

4.2.2 The effects on a microteaching's main phase

The content analysis of the developed learning designs provides insights into the means adopted. Despite cohort B using MS Teams as the synchronous tool for relocating the typical classroom's space to an online space, Table 1 summarises the means -digital tools and materials- used to apply TEL for each microteaching's collaborative learning technique. As seen in Table 1, both cohort A and cohort B groups used various digital tools. It seems that PSTs use equivalent methods for introducing their microteaching's topic and realising the collaborative learning technique and the subsequent assessment.

1. Introduction

We can see similarities in all the groups' introductory phases irrespective of the collaborative learning technique to be practised or the microteaching context. PSTs mainly used oral, video, and PowerPoint presentations to introduce their microteaching topic.

2. Roleplay technique

Animation, carried out with GoAnimate (www.goanimate.com) or Animaker (https://www.animaker.com), was used to practise TEL in either face-to-face or online Roleplay (for example, see Figure 3).

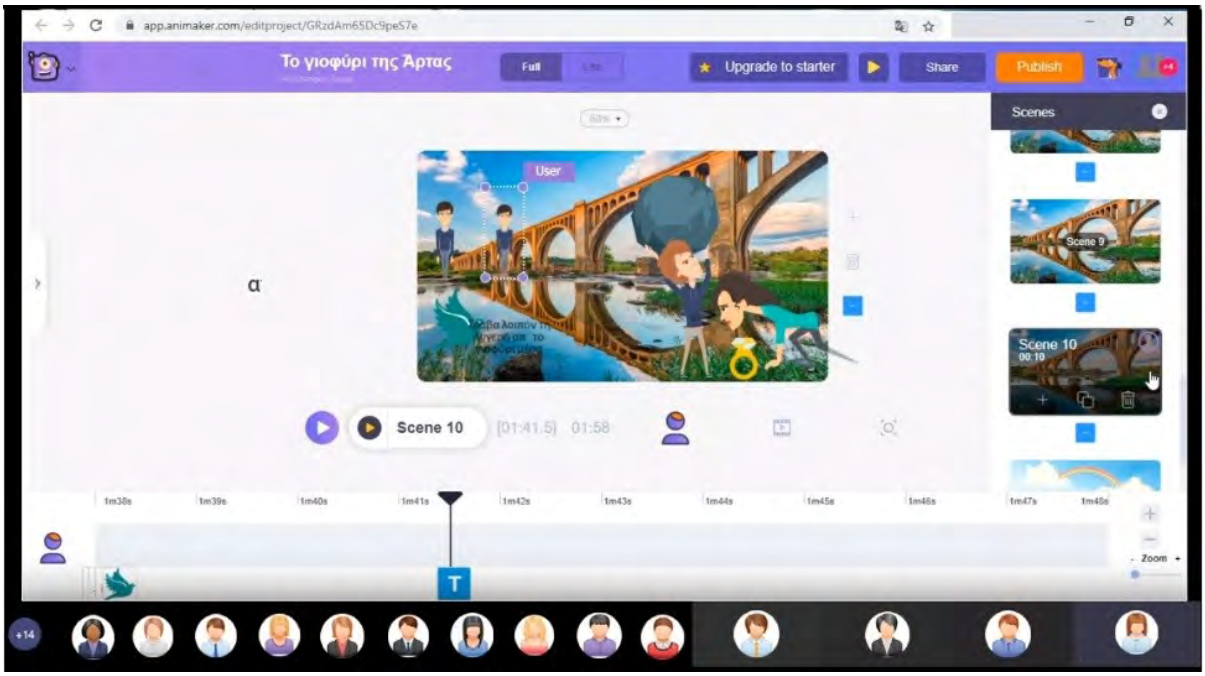

Figure 3: Collaborative animation creation in Animaker

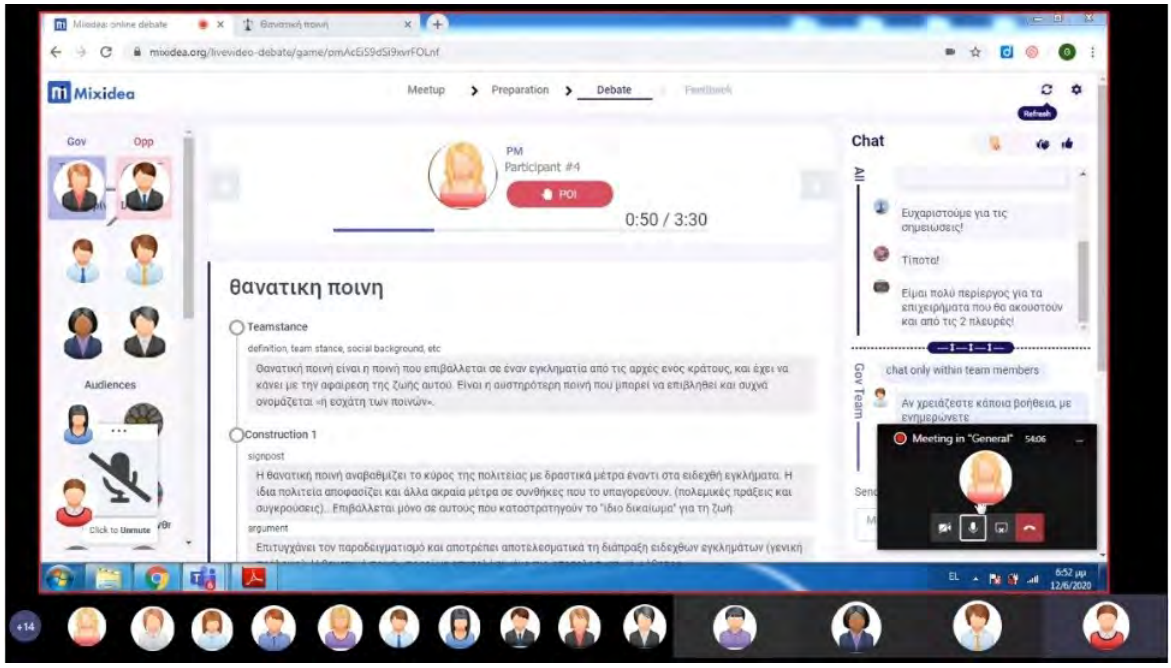

Figure 4: Online debating with Mixidea

One cohort B group enriched the Roleplay by ending the story with a presentation pre-created by teachers-PSTs in Second Life (https://secondlife.com). While cohort A groups used simple paper cards for assigning the roles of the Roleplay, cohort B groups used Google Docs (https://docs.google.com/document), Linoit (https://linoit.com) and AvatarMaker (https://avatarmaker.com).

3. Brainstorming technique

All the groups used collaborative online notice boards such as Padlet (https://padlet.com) and Stomboard (https://stormboard.com) for Brainstorming.

4. Debate technique

The Debate was organised in digital tools like CreateDebate (https://www.createDebate.com), Kialo-Edu (https://www.kialo-edu.com), and Mixidea (https://mixidea.org) by all the groups, regardless of their microteaching context (for example, see Figure 4).

5. Jigsaw technique

Likewise, all the groups opted to provide online resources to their students for elaborating the topic in the Jigsaw groups. One cohort B team also used Phet simulations (https://phet.colorado.edu) to approach a physics subject. Jigsaw intragroup communication was realised by texting in Ted-Ed (https://ed.ted.com), Google Hangouts, and MS Teams by the cohort B groups, while face-to-face was evident for the cohort A groups.

6. Assessment

Lastly, most groups chose digital options for the assessment phase of the topic explored in their microteaching session. They mostly used online polling in Google Forms (https://docs.google.com/forms) and opinion notes in Padlet for assessing Roleplay and Debate. At the same time, they preferred online quizzes realised in Kahoot (https://kahoot.com) and ClassMaker (https://www.classmarker.com) or presentations in Google Slides (https://docs.google.com/presentation/) and H5P (https://h5p.org) for the Jigsaw technique. The discussion was the only technique practised after Brainstorming. As expected, the cohort A team practised oral face-to-face discussion. In contrast, cohort B teams synchronously practised online discussion with MS Teams in oral form and with MeetingWorlds (https://meetingworlds.com) and Google Hangouts in written form.

Table 1: Means used in microteaching for applying TEL while implementing collaborative learning techniques

Cohort	Group	Technique	Introductory Phase	Technique's Phase	Assessment
A	1	RolePlay	Video presentation	Paper Cards for roles' assignment. Animation in GoAnimate	Discussion in a Forum in the class' Edmondo.
B	1		Oral Presentation and GoogleDoc.	GoogleDoc for roles' assignment. Animation in Animaker. Presentation in Second Life.	Opinion Notes in Padlet.
B	2		Powerpoint presentation.	Linoit for roles' assignment. PowerPoint presentation and synchronous voice animation.	Opinion Poll in Google Forms.
B	3		Video presentation and ThingLink interactive text.	Linoit Sticky Notes and Avatar Maker for roles' assignment. Synchronous voice animation.	Opinion Notes in Padlet.
A	1	Brainstorming	Oral presentation.	Padlet	Oral Discussion.
B	1		Video Presentation.	Padlet	Written discussion in MeetingWorlds.
B	2		Online resources in the class' Edmodo.	StormBoard and Wordle.	Oral discussion.
A	1	Debate	Powerpoint presentation.	CreateDebate, Rubric shared online, paper notes.	Oral discussion.
B	1		Online resources.	Kialo-Edu	Opinion Poll in Google Forms.
B	2		Video presentation	MixIdea, Rubric shared online.	Opinion notes in Padlet.
A	1	Jigsaw	Oral and on paper instructions.	Videos and Phet simulation given as resources. Student teams communicate face-to-face.	Presentation in Google Slide.
B	1		Oral instructions and introductory video.	Resources organised in Padlet. Student teams communicate by texting in GoogleSlides.	Presentation in Google Slide.
B	2		Oral instructions.	Resources organised in Ted Ed. Student teams communicate by texting in Ted Ed.	Presentation in H5P. Online Quiz in Kahoot.
B	3		Oral instructions.	Resources given in Google Docs. Student teams communicate by texting in Google Hangouts.	Online Quiz in ClassMaker

4.3 The extra challenges that PSTs face when practising online than face-to-face technology-enhanced microteaching

The content analysis of the instructors' observations, the participants' peer review comments and reflection text accounts allowed us to identify challenges they encountered when practising in terms of preparing and implementing their microteaching sessions.

4.3.1 The challenges in preparing microteaching

Regarding the challenges participants encountered while preparing their microteaching, three themes were extracted from data sources. There is a sense of sameness in the face-to-face and the online context as these themes occur in both cohorts. We report them along with quotes that support them.

1. Selecting suitable digital tools

The PSTs report a persistent design preoccupation over choosing and integrating pedagogically suitable technology while preparing their microteaching. Participants in both contexts - face-to-face and online- report that they spent a great deal of time, both individually and collaboratively, experimenting with various tools before finally choosing which ones to include in their designs. These final choices were later the object of peer-review scrutiny regarding their pedagogical added value. Exemplar quotes are the following:

> *We struggled to decide which digital tool best fits practising the Roleplay technique. We considered and tested several Web 2.0 tools used for creating comics or animations and even some suitable for video editing. The majority of them did not cover all our needs. We spent a lot of time and effort to conclude using GoAnimate.* (Member of Group 1 practising the RolePlay technique as teacher / Cohort A)

> *We considered several tools suitable for online argumentation. We concluded using Kialo-Edu. We liked that students can choose their side "pro" or "con" and add their own opinions via "claims".* (Member of Group 1 practising the Debate technique as teacher / Cohort B)

> *Kialo-Edu was easy to use, and its features facilitated an appropriate Debate structure. However, in my opinion, supporting only a text chat argumentation is a burden. I suggest practising Debate orally.* (Reviewer of Group 1 practising the Debate technique as student/ Cohort B)

2. The burden of time limitations

The burden of time limitations during a microteaching's preparation relates to the amount of time needed or finding the same time to collaborate. As the following quotations show, time burden is a recurring theme in all PSTs reflective accounts in both contexts.

> *We spent much time discussing and negotiating. Although this was beneficial because we got stimuli from each others reasoning, it was also sometimes tedious. I recall us having a rather long negotiation when I argued about incorporating a specific learning activity. My peers spent a lot of time to "convince" me over some structuring issues of our microteaching. However, I feel that all this time was worthwhile as most of the negotiations led to adequately preparing our microteaching.* (Member of Group 1 practising the RolePlay technique as teacher / Cohort A)

> *We all had different agendas, and we were preoccupied with several tasks. Therefore, it wasn't easy finding the same time available to collaborate. It was hard to sync our schedule, so we decided to work in a shared Google doc. Although this smoothed our collaboration, we still struggled to find the necessary time to organise our assignment.* (Member of Group 3 practising the Jigsaw technique as teacher / Cohort B)

3. Technical difficulties

Technical difficulties belong to a broad recurring category within our dataset.

Both cohorts of PSTs report a long learning curve in getting familiar with specific tools (especially animation tools, 3D virtual worlds, or technique-specific applications, for example, Mixidea for Debate). Disagreements among team members are also common, caused mostly by their different disciplinary areas and digital literacy skills. An impeding factor for specific tools' use is the limited time or features licences many Web 2.0 applications impose. Sample quotes are the following:

> *I diligently worked on getting acquainted with GoAnimate. Luckily, we supported each other as a team, and we managed to overcome technical difficulties. Although we split the task of creating scenes, we devoted a great deal of time and effort preparing the "half-baked" animation given to students.* (Member of Group 1 practising the RolePlay technique as teacher / Cohort A)

> *At first, we excluded Mixidea due to its requirement to log in only via a Facebook or Twitter account. After testing other tools, we decided to overlook this limitation and opt for it as we appreciated its*

straightforward approach to setting up a Debate event. (Member of Group 2 practising the Debate technique as teacher / Cohort B)

4.3.2 The challenges in implementing microteaching

In implementing microteaching, the time burden is observed in both cohorts. Furthermore, two more difficulties were detected only in cohort B teams and can be directly attributed to the online environment.

1. The burden of time limitations

Time management was critical in implementing microteaching in both cohorts. Regardless of the collaborative learning technique practised, many groups did not punctually implement their microteaching. In the case of online implementation, though, time became more critical, in the sense that technical difficulties due to the online nature of the task made time management even more complicated. For example:

We didn't manage to achieve our time allocation. One of the activities exceeded the time we had planned, so we had to hurry the rest of the activities and omit the last one. My impression is that when practising a Roleplay technique, many issues may occur, the students' engagement is critical, so no one can accurately allocate time and be sure that everything will run smoothly. (Member of Group 1 practising the RolePlay technique as teacher / Cohort A)

I felt pressure as a student in your microteaching session. I think that you used a long introductory video and spend a long time categorising the ideas. You didn't leave us enough time for the last task of creating the poster. You should have managed your time better. (Reviewer of Group 1 practising the Brainstorming technique as student / Cohort B)

I couldn't login in Mixidea. I kept getting an error code when connecting with my Twitter account. I had to create a new Facebook account. Consequently, I spent on this issue the time scheduled to study the Debate's topic and prepare my claims. Having missed this task, I couldn't adequately proceed with the rest of the tasks. (Reviewer of Group 2 practising the Debate technique as student / Cohort B)

2. The last-minute technical turmoil

As expected in online environments, cohort B participants experienced several technical issues during the implementation of online sessions. Slow/lousy connections and microphones echoing were typical issues experienced and confronted individually. Apart from individual problems, we observed two last-minute unexpected technical turmoils related to the microteachings' overall digital requirements. They both concerned sound-related issues. Specifically, the 3rd group practising the Jigsaw technique attempted to use two platforms simultaneously: MS Teams for virtual conferencing - whole class, and Google Hangouts for small group collaboration. This combination created noise (sound coming from two sources) that made the implementation of microteaching impossible. The group had to abandon their initial plan and, on the fly, create breakout rooms in MS Teams. Likewise, the 2nd group practising the Debate technique planned to combine using MS Teams for the introductory phase and then move to Mixidea to realise the Debate's phases. Unexpectedly, participants encountered sound problems when switching from one environment to another. The turmoil created could not be handled impromptu and omitted some participants from properly following the activities' sequence.

3. The inadequate resources provision

The second emerging difficulty exclusive to cohort B was the inadequate provision of resources and information to "students" and the unclear task communication by "teachers". Though the digital resources offered were rich enough and the "teachers" guidelines detailed enough, the "student" audience expressed the need for a more robust scaffolding mechanism on how to process them. Sample quotes are the following:

I was confused as a student during the individual phase of the Jigsaw technique over what my assignment was. The guidelines provided in your presentation slides were not clear. The clarification provided orally about searching the web for information on renewable energy sources was not enough as I was not sure what my inquiry exactly was. I would have appreciated more guidelines in your presentation slides. The Jigsaw technique is quite complex and practising it online makes it even harder. We, as students, cannot constantly ask for guidelines as we might have done in a face-to-face environment. (Reviewer of Group 1 practising the Jigsaw technique as student / Cohort B)

I found somewhat limited the instructions provided in the Edmodo virtual classroom. Maybe the fact that I participated using my tablet worsened my ability to follow the sequence of learning activities. I

> *had to switch screens between the instructions in Edmodo and the tasks related to Brainstorming that were carried out in Stormboard. The several questions addressed orally and in the chat reveal that I was not the only one who found the instructions limited.* (Reviewer of Group 2 practising the Brainstorming technique as student / Cohort B)

5. Conclusions

This paper reflects on our experience of relocating online a mature microteaching practice (as we successfully implemented in face-to-face settings for seven years) to respond to the Covid-19 pandemic.

We report the challenges of organising a technology-enhanced microteaching from the instructor's perspective. We can argue that relocating the course context –from face-to-face to online- did not influence the "essence" of the course and its main goal, which was to immerse in microteaching, under the strong effect of roleplay. This finding highlights the potential of online microteaching towards the new pedagogy emerging at the height of the Covid-19 pandemic. A pedagogy triggered by the sudden immersion of many into online learning and the subsequent exploration of e-learning beyond the pandemic.

Nevertheless, in the online context, we struggled to maintain the ambience of whole-class discussions. We had the "camera-off" effect, and we experienced reduced or reluctant participation with awkward silences, echoing the cautions of Mishra (2020) and Peachey (2017). Another interesting finding concerns applying collaborative learning techniques using a digital tool as a prerequisite for technology-enhanced microteaching. We observed PSTs in both contexts having the same typical misconceptions regarding collaborative learning techniques' principles and application methods.

Our findings indicate similar TEL application regardless of the context. As far as designing the microteaching session is concerned, PSTs seem to exploit contemporary communication means in both contexts. Still, at the same time, they value face-to-face collaboration. Regarding practising, we noticed minor effects of online relocation on PSTs repertoire of digital tools. PSTs adopt similar technologies for the introductory phase, the main phase applying collaborative learning techniques, and their microteaching session's final assessment phase. The inevitable change observed was using a discussion technique set in either a face-to-face or asynchronous online setting.

Finally, two challenges addressed by PSTs appear common regardless of the context. While designing their microteaching, PSTs were bewildered by the plethora of digital tools to choose the most suitable. In addition, during the preparation and the implementation of the microteaching sessions, they struggled to overcome time limitations. The online microteaching implementation has strikingly escalated the technical difficulties that PSTs encountered. However, though expected and manageable, the emerging technical difficulties should not be considered as isolated from the learning process as a whole since sometimes, these difficulties point towards pedagogical considerations. This was the case with the need to provide more systematic and careful support with instructions, guidelines, and digital resources in the online context.

Overall, relocating a technology-enhanced microteaching practice online was a rich experience for us and our students. It challenged our pedagogic agility as researchers and instructors, having to consider all aspects that needed to be transferred online: content delivery, student engagement, motivation and assessment (Clement, 2010). On the other hand, the PSTs did not miss the opportunity to have a compelling learning-to-teach experience in an online context. We consider that PSTs practising technology-enhanced microteaching online was a very effective "rehearsal" and dive into online teaching challenges within a safe and controlled environment.

Although the limitations of this study refer to the small sample of participants, our focus is grounding findings on a qualitative approach built from a robust dataset towards a more profound consideration rather than generalising based on quantitative results.

We deem that the implications of this shift of practice stimulate momentum for further attention to teacher education post-pandemic. Microteaching is by nature inherently connected to face-to-face human interaction related to teachers' body language, tone of voice, posture and reflects on their overall learning-to-teach experience. Moreover, collaborative learning techniques such as Brainstorming, Debate, Jigsaw, and Roleplay

are also activities that heavily rely on face-to-face interaction dynamics. Our study provides evidence that practising online microteaching achieved, if not a similar, at least a fulfilling learning experience despite its challenges. This fact opens up an unexplored potential to e-learning solutions beyond the scope of more common practices (e.g. lectures, quizzes, polls and the use of breakout rooms of platforms). These practices include coordination, cooperation and collaboration (in different levels) and demand augmented interaction to be successful, even for experienced teachers working in face-to-face settings. Transferring them online demands an extended repertoire in online teaching and tutoring, contributing to surpassing reported constraints in pedagogical innovation observed in online practices during the pandemic. Therefore, teacher education should consider online microteaching apart from an alternative method when circumstances impose it and integrate it within the typical teacher education curriculum to cultivate teaching competencies for e-learning. In our case, we intend to adjust our course's syllabus in the forthcoming academic years so that PSTs attending the particular postgraduate program practise both face-to-face and online technology-enhanced microteaching.

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