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Elementary Teachers' Development in Using Technological Tools to Engage Students in Online Learning

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Abstract: Technological tools are means by which online teaching could encourage the engagement of students, especially elementary students. The present research studies how elementary teachers develop their use of technological tools in their asynchronous and synchronous online teaching, specifically when this online teaching occurs during emergency education. The research was conducted in the academic year 2019/2020. We interviewed two elementary teachers, where one of them taught asynchronous lessons more than synchronous, while the second taught synchronous lessons more than asynchronous. We analyzed the data using two frameworks: one for interaction type and one for engagement type. The research results indicated that different interaction types influenced teachers' decisions to use technological tools. In addition, what concerned the teachers' use of tools at the beginning was the cognitive engagement, but they advanced towards focusing on behavioral and the affective engagement.

Keywords: *Elementary teachers, online learning, students' engagement, technological tools, tools.*

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Introduction

Online education has attracted the attention of educators and educational researchers as it could impact positively educational outcomes and facilitate students' learning (Abuzant et al., 2021). This could be done through the technological tools used in online learning. Gunawardena et al. (1997) recommend five phases of knowledge construction: Sharing concepts and ideas; discovering and exploration of inconsistencies among the ideas, concepts, and statements advanced by different participants; negotiating meanings and co-constructing knowledge; testing and modification of co-construction to phrase an agreement; and applications of the newly constructed meaning. Garrison et al. (2000) prioritize the 'quality of learning' which is expressed by students' ability to construct 'deep understanding through sustained critical discourse' (p. 284). They subsequently proposed a framework consisting of four stages for knowledge building in online learning: triggering event, exploration of ideas, integration of ideas, resolution of a dilemma. The previous suggestions made by researchers could be performed with the help of technological tools.

Knowledge construction can be performed through engagement with technological tools (Anabousy & Tabach, 2016, 2017; Daher, 2010a, 2010b). One of the instructional goals of teachers in general, and for online learning in particular, is to create effective student engagement (Grandzol & Grandzol, 2006), which will support students' knowledge construction. This instructional goal could be encouraged through choosing and implementing various tools. Different issues are worth pursuing regarding the use of tools for encouraging students' engagement. One such issue is the choice and implementation of tools by teachers to encourage interaction in emergency online education. Another issue is the choice and use of tools in emergency online education for encouraging different functions of engagement: behavioral, emotional and cognitive. A third issue is the development of the use of tools by elementary school teachers during emergency online education. The present research attempts to address the previous issues when it targets primary school teachers.

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Literature Review

Researchers' interest in students' engagement follows from its influence on different aspects of students' learning. Martin and Bolliger (2018) argue that students' engagement influences positively their satisfaction of online learning, motivation to learn, sense of isolation, and performance. Researchers investigated the factors that influence positively students' engagement in online learning, pointing at online interaction as one such factor (Gunawardena et al., 1997), where this interaction could be learner-learner, learner–instructor, and learner–content interactions (Moore, 1993). Bolliger and Martin (2018) reviewed the literature to describe factors that influence the previous three types of interactions, pointing for example at the good communication as fostering student engagement in the online course. Saying this, they warned that not all communication tools are valued, whereas students in some studies (e.g., Walker, 2016) did not like chats or phone calls as communication tools. The present study focuses on how the issues of interaction and engagement impact teachers' choice and implementation of tools for emergency online education.

The Interaction Framework

Interaction in the online lesson/course could be a framework for studying students' engagement in the online course. Bolliger and Martin (2018) used a framework of three types of interaction to study university instructors' and students' perceptions of online student engagement strategies. These interactions were learner-learner, learner–instructor, and learner–content. In the study that we report, elementary school teachers used various technological tools to motivate students' engagement in online learning. Thus, we propose two additional types of interaction: teacher-tool and student-tool. The last two interactions are relevant in a context in which various technological tools are utilized by teachers who transit from one tool to another to make better correspondence between their instructional goals and the technological tools utilized in online lessons. Dixson (2010) investigated what activities or means could lead to more high engagement of university students in online courses. They reported that multiple communication channels were related to higher engagement, especially the communication of student-student and instructor-student.

The Engagement Framework

Fredricks et al. (2004) reviewed the literature for types of engagement and reported three such types: Behavioural engagement, emotional engagement and cognitive engagement. Behavioral engagement is related to the idea of participation in academic, social, or extracurricular activities. Emotional engagement is related to the idea of appeal and includes positive and negative reactions to and of the participants in the educational context. Cognitive engagement is related to thoughtfulness and willingness to exert the necessary effort to comprehend complex ideas and master difficult skills. In the present research, we consider the type of engagement in which the teacher was involved through choosing and implementing technological tools during the emergency education imposed by COVID-19 Pandemic.

Use of Tools in Online Learning

Online learning is attracting the attention of researchers (Daher & Awawdeh Shahbari, 2020), especially during emergency education due to COVID-19 (Abukhalil et al., 2021; Khan et al., 2022). One issue of online learning is tools' use. Tool use is an important aspect of the educational scene in the digital era (Daher, 2009), and as such, it is considered as one component of teachers' development in implementing technological lessons in the classroom. The he United Nations Educational, Scientific and Cultural Organization (UNESCO) has developed the ICT Competency Framework for Teachers to support teachers in their implementation of technology. This framework is organized over three successive stages of a teacher's development in teaching using ICT, where each stage refers to tool use by the teacher (pp. 8-9). The first stage is Knowledge Acquisition in which teachers need to "make appropriate ICT choices to support specific teaching and learning methodologies." The second stage is Knowledge Deepening in which the teachers "blend varied digital tools and resources to create an integrated digital learning environment to support students' higher-order thinking and problem-solving skills" and in which they "use digital tools flexibly to facilitate collaborative learning, manage students and other learning partners, and administer the learning process". The third level is Knowledge Creation in which teachers "determine how best to incorporate student-centered and collaborative learning to ensure mastery of multidisciplinary curriculum standards."

Technological tools as manipulatives could be utilized in online teaching and learning. Schmidt (2004) says that a broad range of online teaching and learning tools are available, where classroom teaching can be enhanced with online technological tools that fit the context. Gregory and Bannister-Tyrrell (2017) explored the digital learner presence of university students through their feedback on their perceptions of the affordances of a variety of online tools used in teaching, namely blogs, discussion boards, wikis and 3D virtual worlds. They found that the participants were unaware of blogs or that they did not find a use for them in their online presence. A small part of the students (15%) was using wikis daily. On the other hand, most students indicated that a discussion board was either highly significant, 47%, or significant, 36%, to enhance their learning. Researchers described the contribution of different types of games to students' learning. Jonsson (2015) argued that games can help students in learning new scientific concepts. Watson et al. (2011) mentioned that the appropriate game activities can enhance a student's sense of self-confidence and increase socializing and management abilities, which could contribute to team development. In the present research, we intend

to study a specific issue of tools' use, which is the elementary teachers' development in tools' use during emergency education due to COVID-19.

Research Rationale and Goals

Students' engagement indicates the quality of their learning experiences in general and in their online learning in particular. Past studies were mostly interested in students' engagement in the online learning of university students (e.g., Bolliger & Martin, 2018; Dixson, 2010), but part of the studies targeted the secondary school setting (e.g., Bergdahl et al., 2020). Fewer studies investigated students' engagement in online learning in the elementary school or teachers' choice, implementation, evaluating, and revising of technological tools to encourage elementary school students' engagement. The present study intends to investigate how the use of tools by teachers served the instructional goals of encouraging students' engagement expressed in the type of engagement and the type of interaction, and how this use developed throughout an educational emergency; specifically, COVID-19.

In addition, researchers claim that "teachers' competencies are challenged in pandemic conditions as they have to conduct the learning processes outside of their comfort zone" (Hindun et al., 2021, p. 547). The present research intends to verify how teachers' use of tools developed during COVID-19 emergency education. This would enable to plan professional development programs for teachers to qualify them for such emergency education.

Research Questions

First question: What are the intended interaction types utilized by elementary school teachers for online instruction during an educational emergency?

Second question: What are the intended types of engagement in choosing and implementing tools in online instruction during an educational emergency?

Third question: How does the use of tools by elementary school teachers develop during online instruction educational emergency?

Methodology

Research Design

In the present research, we used the case study design, here two-cases design, where the difference between the two cases was their extent of use of the asynchronous and synchronous design. In the description of each study, we computed the number of synchronous and asynchronous lessons taught by each teacher. We analyzed the sequence of tools used by each teacher synchronously and asynchronously. Then, we compared the sequences of the two teachers. In this design, we covered both the quantitative aspect of the two participants' online teaching (though only one feature of this aspect), and the qualitative aspect of two participants' online teaching (here we investigated both the asynchronous and synchronous aspect of the participants' online teaching.

Research Context and Participants

The research context is that of emergency online learning, where teachers did not choose to participate in online teaching and learning but were obliged to do so as a result of a health emergency. In the present research, we consider the use of online tools by primary school teachers to engage their students in online learning.

The research was conducted in the academic year 2019/2020. We interviewed two teachers from the same elementary school, where one of them taught asynchronous lessons more than synchronous ones (Nadia, a mathematics teacher), while the second taught more synchronous lessons than asynchronous (Samira, an English teacher). All the names of the teachers are fictive. Our choice of two participants resulted primarily the difference between them in using asynchronous and synchronous online learning. We are aware that the discipline could have influenced their use of tools, but, in the present study, we mainly studied the development of this use. In addition, we took into consideration the goal of tools' use, which is related to the taught discipline.

Data Collecting Tools

In the present research, we used interviews with teachers. Interviews with the participating teachers are semi-structured, including initial questions that develop into further questions according to the answers of the interviewee. Examples of such questions: Which tool did you use in teaching online lessons? Did your use of tools develop throughout the whole period of emergency online learning? How did it develop if indeed it did? What is the cause of the development in your use of tools?

Data Analysis

To analyze the texts resulting from the interviews, we used inductive and deductive qualitative content analysis. Content analysis is a process of condensing raw data into categories/themes based on inference and interpretation by using inductive reasoning. Deductive reasoning is used to generate concepts as in a theoretical framework (Patton, 2002). Using deductive reasoning, we looked for themes related to engagement frameworks as that in Bolliger and Martin (2018) and that of Fredricks et al. (2004). Using inductive reasoning, we tried to find out if additional engagement themes not given in the literature were described by the participating elementary teachers.

Table 1 shows terms that could indicate each type of interaction. The resulting categorization will help answer the first research question.

Table 1. Terms Indicating Each Type of Interaction

Type of interaction	Examples on indicating terms
Learner–learner	Students-collaborate, students-discuss
Learner–instructor	Ask-reply, request-respond
Learner–content	Discover-content, investigate-concept/relation
Learner-tool	Tool-attract-student, student-enjoy-tool
Instructor-content	Instructor-is content with-content
Instructor-tool	Tool-fit-instructional goal

Table 2shows terms that could indicate each type of engagement. The resulting categorization will help answer the second research question.

Table 2. Terms Indicating Each Type of Engagement

Type of engagement	Examples on indicating terms
Behavioral engagement	Students' conduct, students' on-task behavior
emotional engagement	Student attitude, students' interest
cognitive engagement	Students' thinking, students' self-regulated learning

We were concerned with the reliability between coders. To ensure this reliability, we followed Syed and Nelson (2015). We began by developing a manual of codes, which contained codes, descriptions, and possible examples. Then, we read the transcription of the observation carefully to become familiar with it. The third step was to develop the categories and themes derived from observations and then from the problems. Coding the observations and the text of the problem was completed by the three authors, and their agreement was calculated through Cohen's Kappa. The calculation gave 0.93 in the case of the interaction aspect and 0.92 in the case of the engagement types aspect. The results of the analysis are suitable for concluding the analysis was reliable.

Findings

In the present research, we considered the use of tools, in teaching online courses asynchronously and synchronously, by elementary-school teachers. To do so, we examined the number of different tools utilized by each teacher as well as the total number of tools/variations utilized by the teacher. In addition, we examined the goals of tool use by the teachers, where this goal was further examined in terms of roles of tools as expressed in the interaction types and in the function of engagement.

Table 3 describes the number of lessons that each one of the two participating teachers implemented in distance teaching as a result of COVID-19 in the period March 2020 to June 2020. In addition, it describes the tools that each participant utilized in this teaching.

Table 3. Number of Lessons and Tools Utilized by the Participants in Their Distance Teaching

Participant		Asynchronous teaching	Synchronous teaching
Samira	No. of lessons	15	13
	Tools	Electronic book from the digital provider, Google Forms	Links-rich PowerPoint presentations, PowerPoint presentation with voice, electronic book with voice, the printed notebook, Whiteboard, Games (Memory games, wheel cards, names), Google translator, YouTube videos, live worksheets, Google Forms.

Table 3. Continued

Participant		Asynchronous teaching	Synchronous teaching
Nadia	No. of lessons	41	8
	Tools	Electronic book from the digital provider, Google Docs, Google Forms, games.	Verbally, PowerPoint presentations, PowerPoint presentations & Whiteboard

Teachers' Tool Use in The Asynchronous Teaching:

Figures 1-2 show the two teachers' development in use of tools in their asynchronous teaching.

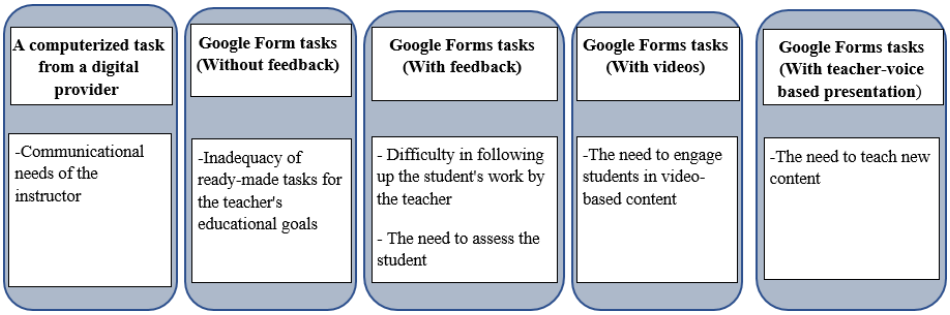

Figure 1. Samira's Use of Tools in Her Asynchronous Teaching

Figure 1 shows that Samira used a couple of tools in her asynchronous teaching. Advancing to Google Form, she varied her use of this tool according to her didactic goals.

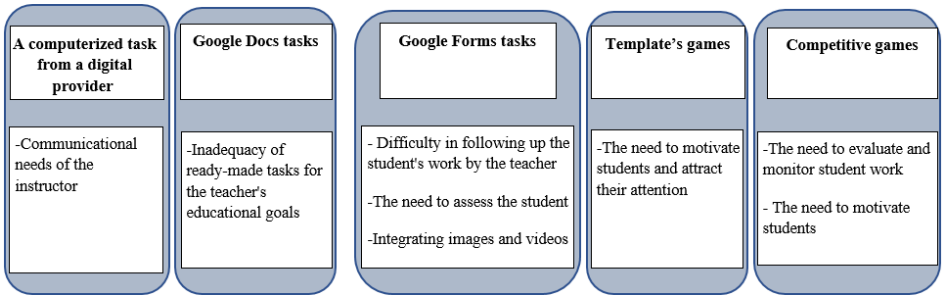

Figure 2. Nadia's Use of Tools in Her Asynchronous Teaching

Figure 2 shows that Nadia utilized different tools in her asynchronous teaching, which differentiates her from Samira regarding tools' use in asynchronous teaching.

We continue the reporting of the results and discuss them by focusing on the types of engagement and interactions supported by the use of tools. Figures 1 and 2 show that in the asynchronous teaching, Nadia used more tools than Samira. This finding could be explained by the number of lessons that each taught using this asynchronous teaching, where Nadia taught more lessons using this teaching than Samira. Murphy et al. (2011) found that synchronous online teaching relied on teacher-centered approaches, while asynchronous online teaching provided support for self-paced and highly independent learning. Thus, the teaching of more asynchronous lessons by Nadia could indicate that her teaching approach is student-centered more than Samira's. On the other hand, it could also indicate that she is a less advanced teacher in technology-based teaching practices than Samira, which made her not utilize synchronous teaching in as many lessons as Samira. What implies the previous interpretation is the study of Woodcock et al. (2015) who found that the competency of prospective teachers to learn and implement e-learning for students depends, among other factors, on eLearning self-efficacy and competency.

The interaction's features supported by the tool influenced the elementary teachers' use of tools and their development in this use. One main feature is that of the teacher-content interaction concerned with the ability of the teacher to have a say regarding the content and pedagogy used in teaching the students. When the tool did not enable the teacher to edit the material, she reverted to a new tool. In Samira's and Nadia's case, the goal of the editing was to make students' learning more meaningful through using different technological tools like Google Docs and Google Form. Samira, for example, said: "I turned into Google Docs to be able to give the students investigative tasks that enabled them to explore the new material". This implies that the teachers believed that using technological tools could make students' learning more meaningful (Keengwe et al., 2008), especially when this use assists students in their exploratory learning.

The electronic book was the first tool used by the teachers, which was expected as they used it before the emergency education imposed by COVID-19. This is in line with researchers' emphasis that teachers' experiences influence their practices, as their socialization processes in the classroom (Fram, 2013). The electronic books used at the beginning by the teachers did not enable the teacher to edit the content. The teachers needed to add to/subtract from the learning materials, or to add/subtract/change the questions to enable the students to explore the content. Not able to do this editing, the teachers reverted to a more flexible tool like Google Docs or Google Forms, where their goal of this editing was to enable flexible teaching and learning of their students (Sivakumar, 2019), especially to support their students' knowledge construction. Doing that, the teachers changed one feature of the teacher-content interaction, which is the flexibility of the content editing by the teacher. Nadia, for example, said: "The electronic mathematics books did not allow me to give the students all types of evaluation questions. I turned into Google Forms that are more flexible as an evaluation tool". Using Google Docs or Google Forms caused the change of the media of communication of the teacher-student interaction. In the case of Samira, using Google Forms enabled her to see the solutions of every student through this tool, where before she interacted with her students through their copybook scans sent to the teacher's WhatsApp. The previous change in the features of the two types of interaction (teacher-content and teacher-student) influenced the behavioral engagement of the teacher, as well as the cognitive engagement of the student. Nadia reverted at the beginning to Google Docs, as she had already known this tool, but had not used it for teaching. Nadia moved then to Google Forms. Nadia said: "Moving into the electronic medium, I moved first into Google Forms as I already knew this electronic tool". This move was to change one feature of teacher-student interaction, specifically the ability to assess student learning. At the same time, this move changed the medium of communication of the student-tool interaction: Instead of interacting with a physical tool (the copybook), the student now interacts with a digital tool (Google Form) to solve the problems in the Google Form. This move also changed the behavioral engagement of the student as she/he would use different actions with the new tool, where these actions are now virtually based (e.g., writing using the keyboard) more than physically-based (e.g., writing using the pen).

The two teachers developed their use of tools in asynchronous teaching through modifying their use of Google Forms, where the goal of this modification was to meet their needs and their students' needs (Beggs et al., 2012), which influenced the interaction and engagement types. This modification varied between the two teachers. Samira started using questions of multiple answers. Her goal was to provide the student with questions of varying knowledge levels, so that the questions cover the different aspects of the topic. Samira said: "I modified my use of Google Forms and started using questions of multiple answers. My goal was to provide the student with questions of varying knowledge levels". This modified the student-content interaction, which indicates Samira's intention to increase her students' cognitive engagement. After this modification, Samira furthered her modification of the use of Google Forms, where now the forms not only included questions of multiple answers but primarily new content with feedback from the tool. Samira said: "My experience with Google Forms made me advance into another modification, that of feedback for questions of multiple answers". The main goal of the new development was to modify two interactions. The first is the student-tool interaction, where now this interaction included the tool's feedback, while the second is student-content interaction, where the student can explore now new content and not only answer questions related to it. Nadia developed her use of Google Forms in a similar way. First, she built activities through which the student receives the tool's feedback on her/his learning actions, and then she built activities that included multimodal resources expected to help the student conceive the scientific concepts and relations. The first modification facilitated the student-tool interaction, which encouraged the behavioral and cognitive engagement of the student with the content. The second modification kept also the same previous interactions but encouraged the affective engagement of the students with the tool and the content as the student would like to work with multimodal resources.

Samira did not develop further her tool use in an asynchronous setting, but Nadia did. Nadia advanced towards using electronic games, where this use has the same previous goals and encouraged the same interactions and engagements as before. This development, as emphasized by the teacher herself, came to establish the cognitive and affective engagements of the students in the online activities. Nadia noted: "I used games because they support students' interaction while learning a mathematical topic, besides motivating them to learn this topic". Nadia also modified her use of Games, where the first game, built with a PowerPoint template, gave feedback only for the student. In the first modification, she reverted to games that she built with Quizizz to provide the student with feedback from the teacher on her/his learning actions. In the second modification, she reverted to games built with Wordwall to enable collaboration between the students and feedback to the student. Nadia said: "I used games first to give the students feedback on their solutions, but afterward to encourage their collaboration besides the feedback". The first modification facilitated the student-teacher interaction, which in addition to encouraging the behavioral and cognitive engagement of the student with the content, it took care of the affective engagement. The second variation not only kept the same previous interactions and engagements of the students with other students, the tool, and the content but also enriched them. Thus, using games enabled Nadia to attend to her students' affective learning as games are suitable tools for encouraging the affective feature of learning (Watson et al., 2011). Comparing Samira and Nadia in using tools in the asynchronous teaching, Nadia was concerned with the affective engagement of the students while Samira was little concerned about this aspect in her asynchronous teaching. This concern of Nadia could indicate her student-centered teaching, where this

approach to teaching, as we claimed above, could be behind her use of more asynchronous teaching than synchronous ones (Murphy et al., 2011).

Teachers' Tool Use in The Synchronous Teaching:

Figures 3-4 show the two teachers' use of tools in their synchronous teaching, together with the types of engagement and type of interaction. These types are described according to the interviews with the teachers.

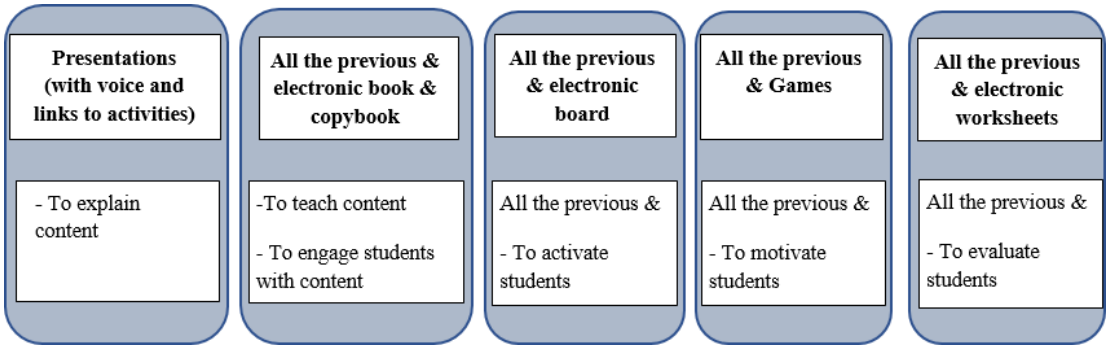

Figure 3. Samira's Use of Tools in Her Synchronous Teaching

Figure 3 shows that Samira tried to use various tools in her synchronous teaching. Doing that, she added each time an additional tool to the previous ones that she used.

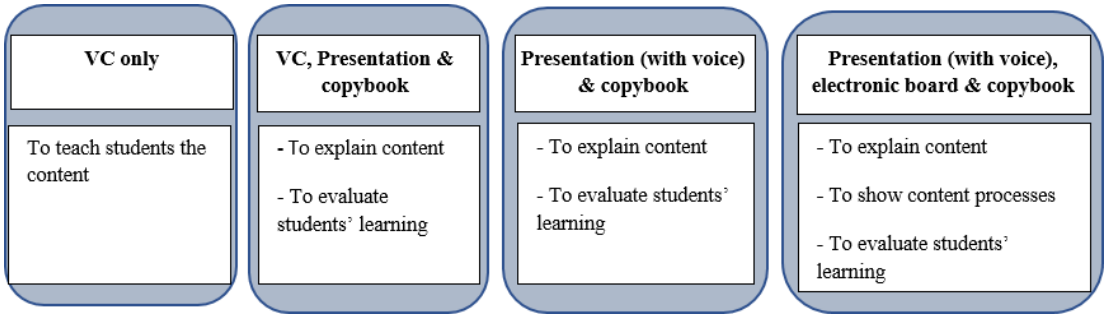

Figure 4. Nadia's Use of Tools in Her Synchronous Teaching

Figure 4 shows that Nadia used verbal communication and presentation in her synchronous teaching. Doing that, she kept requesting the students to use a copybook to evaluate their learning.

We continue the reporting of the results and discuss them by focusing on the types of engagement and interactions that the use of tools supported. Considering the use of tools by the two teachers, Samira started her synchronous teaching by using PowerPoint presentations that included links to different contents and activities. Samira said: "At the beginning of my synchronous teaching, I used PowerPoint presentations that enabled me to control the organization of the content". Her goal was to encourage an organized student-content interaction, which would lead to organized behavioral engagement of the student with the content. On the other hand, Nadia started her synchronous teaching with verbal communication with the students and then moved into using PowerPoint presentations. Nadia said: "I did not have experience with synchronous teaching. At the beginning, I taught only verbally, but I soon moved into PowerPoint presentations". In this move, she modified two types of interactions in which the student is involved. First, is the learner-content interaction, where the PowerPoint tool enables the learner to interact visually with the content. Second, is the teacher-student interaction, where the teacher can now show the activity and ask questions about it. These two types of interaction encourage the cognitive engagement of the learner, as the learner can see shapes related to the content and conceive it. They also encourage behavioral engagement by encouraging the learner's participation in the synchronous lesson, and the affective engagement by increasing the motivation of the learner to interact with the content and the teacher (Mukhari, 2016).

Samira and Nadia both modified their PowerPoint use by embedding their voice in PowerPoint, where they intended by this modification to modify the teacher-student interaction by helping the absent students learn the topic. Samira, for example, said: "I started embedding my voice into the presentations ad this embedding supported the absent students to learn the new topic more deeply". The previous modification had consequent modification in the teacher's and students' behavioral and cognitive engagements, as, the voice warned the students from making mistakes when they answer some specific processes related to the content. In the case of Nadia, the students were also requested to solve mathematical problems on their copybooks, where the goal of this solving was to enable the teacher to see, through Zoom Video,

students' work. Nadia said: "I turned into requesting the students to show me their solutions using the Zoom Video, so I could comment on their solutions". Thus, this modification resulted in modifying primarily the teacher-student interaction, which resulted in the modification in the teacher's and students' behavioral (solving on the copybooks and showing the solution through Zoom Video) and cognitive engagements (deepening their understanding through the teacher's feedback on their solutions). Koumi (2006) has described three key types of educational value that video is well placed to add: (a) cognitive value, (b) nurturing value, and (c) experiential value. Here, the voice clips of the teacher served the first couple of values. The nurturing value lies in nurturing the relationship between the teacher and the students through showing the students that the teacher makes effort to make them understand the content.

After embedding her voice in the PowerPoint presentation, Samira, advanced her use of her voice to the electronic book, together with requesting the students to solve problems on their copybooks. Her goal was to evaluate students' work; specifically, to ensure that the student learn the planned content. Samira said: "I started making use of the copybook again. This enabled me to evaluate the students' work". This goal influenced three types of interaction: student-tool (through utilizing new tools such as the recorded voice and copybooks), student-content (The two new tools enable paying attention to different aspects of the content), and teacher-tool (The teacher could influence students' learning of the content through her recorded voice clip). This influence on the interactions was accompanied by influence on the behavioral (as writing in the copybooks) and cognitive engagement in the learning (as engaging with content explained by the recorded voice clip). The use of a Whiteboard & copybook could also increase students' motivation to participate as they use various learning tools, especially new ones such as the Whiteboard. This is supported by research that pointed at new technologies motivating students' learning (e.g., Bravo et al., 2011).

Samira continued to use different tools in her synchronous teaching, where this could be explained by the higher number of lessons that she implemented in her synchronous teaching. This higher number of lessons probably made Samira aware of electronic resources and how to use them and supported her in gaining comfort with them (Roblyer et al., 2009). This increased the confidence of Samira to use new tools. Specifically, Samira started using games (Memory games, wheel cards, names), where her main goal was to motivate students to have active participation in the synchronous lessons. Samira said: "I moved into using games in my teaching, especially to motivate students to continue being interested in distance learning". Games influenced mainly the student-tool interaction accompanied by behavioral and affective engagements. In addition, it encouraged the students' affective engagement (Hromek & Roffey, 2009). Samira also used Google translator to encourage the independence of the learner through student-tool interaction related to the behavioral engagement related to new ways of arriving at learning resources, and affective engagement related to developing students' self-efficacy in learning.

Samira also started to use alternative tools like YouTube videos, live worksheets, and Google Forms to motivate students' learning and, at the same time, to provide the students with the learning resources in different ways. Samira said: "I decided to use alternative tools to reach the simultaneously different objective: to enable deeper learning of the students, to make them collaborate and to motivate them to learn with interest". This use influenced the different interaction types in which the student is involved, and at the same time, the three types of engagement: the behavioral, the cognitive, and the affective. This extensive use of tools by Samira implies her advanced level in technology use in an online setting.

Discussion

Madden (2014) says that educational leaders are beginning to consider digital learning a necessity rather than a possibility. The educational emergency resulting from COVID-19 proved to teachers, as educational leaders in the classrooms, that digital teaching and learning is a must that each teacher needs to be qualified to implement tools in such digital teaching and learning (Abukhalil et al., 2021; Hamdan et al., 2021).

Assaf and Nehmeh (2022) say that even though it is flexible, remote learning is a complex process that requires consideration of several pillars of online learning and which, in turn, affect one another. Hernandez-de-Menendez and Morales-Menendez (2019) stress that the choices in the digital tools available for emergency education are as varied as the possible pedagogies and learning contexts and applications. In the present research, the context impacted the use of digital tools by the elementary school's teachers. Specifically, the emergency education imposed by COVID-19 which necessitated the use of technological tools in asynchronous and synchronous online teaching. Thus, emergency education constituted a context for professional development in online teaching, not only for ICT-novice teachers but for advanced-ICT teachers too.

The two teachers reported in the present research attempted to use a variety of tools in their asynchronous and synchronous teaching and learning. This success of the two teachers, although each in a different way, to teach asynchronous and synchronous lessons using different tools and variations of tools indicates that the teachers indeed saw the need for qualifying in digital teaching and learning to succeed professionally during emergency education.

The utility of tools was a factor behind the elementary school teachers' choice and implementation of technological tools in their online teaching. In the present research, this utility consisted of two aspects: the interaction and the engagement aspects. A second factor was the teacher's approach to teaching. Çoklar and Yurdakul (2017) found that the four participating teachers took a teacher-centered approach in technology integration, while their leading cause to start

technology integration was to ensure quality in education. In the present research, Nadia seemed to follow a student-centered approach to teaching, which seems to be one reason why she spent more asynchronous teaching than synchronous, while Samira behaved otherwise. A third factor that impacted the use of digital tools by elementary school teachers was their knowledge and experience regarding the use of these tools. Samira had more knowledge and experience than the other two teachers, which could be the reason why she moved earlier to synchronous teachers, and why she used more tools than the two in synchronous teaching.

The teachers utilized tools that they already knew before the crisis as the copybook. This is in line with previous research who found that teachers tend to turn to what they already know and the tools they have in place before the crisis (Dill et al., 2020). This did not only happen for physical tools, but also for presentation tools, as the PowerPoint, and a communicational tool as the WhatsApp.

The technology coordinator in the school was the teachers' tutor who supported teachers' professional development in online teaching. The findings regarding the role of the technology coordinator in the present research supports previous findings regarding this role (e.g., Cutts, 2019).

Management of students' learning was one of the main issues with which the teachers in emergency education were concerned. Iglesias-Pradas et al. (2021) found that organizational factors may contribute to successful implementation of emergency remote teaching. Here too, the teachers were aware of the role of tools in supporting the organizational aspects of teaching, especially through PowerPoint, as means for successful distance education. This awareness of the role of organizational aspects of teaching and learning helped overcome the challenges of emergency online learning (Ishtiaq Khan et al., 2022).

Taking into consideration Competency Framework for Teachers developed by the UNESCO (2018), the two participating teachers proved to possess Knowledge Acquisition as they made appropriate ICT choices related to technological tools, which supported them by enriching their teaching and learning methods. They specifically experienced Knowledge Deepening, especially Samira, as they blended varied digital tools and resources to create an integrated digital learning environment to support their students' problem-solving. Nadia used tools flexibly to administer the learning process in her asynchronous teaching, while Samira did that in her synchronous teaching. All the participating teachers experienced Knowledge Creation in which they took decisions regarding how best to incorporate student-centered and collaborative learning to ensure the three types of engagement, especially the affective one which was considered by the participating teachers after they took care of the cognitive and behavioral engagements.

Conclusions

It could be concluded that different factors influenced the use of technological tools of the participating elementary school teachers for online engagement and interaction. These factors include individual factors such as teacher's history of using technologies in teaching; teacher's perceptions of using technologies in teaching and social factors as the school community, including the principal and the technology coordinator. These conclusions are in line with researchers pointing at these factors as impacting teachers' decisions to implement technology-based learning in the classrooms. Researchers found that the previous factors and other individual and social factors, such as rules regulating the use of technologies in teaching mathematics; and division of labor regarding this use, impact teachers' decisions to use technology in the classroom (Anabousy, & Tabach, 2021; Baya'a & Daher, 2013; Baya'a, et al., 2019). In addition, Schmidt (2004) claims that the selection of online tools by the teacher depends "not only on the instructional content but also on the quality of the available tools and the level of technical ability of teacher and students" (p. 89). In the present research, we saw that teachers reverted to new tools as they considered them fitter for their instructional goals. In addition, the modification of tools was also influenced by the teachers' ability to work with technological tools.

Researchers say that teachers need to participate in professional development workshops that support their keeping up with the rapid developments in technology (e.g., Mortensen, 2000). In this context, technology integration becomes a key concept for sustainability of educational processes (Çoklar & Yurdakul, 2017), especially in emergency education as that resulting from COVID-19 Pandemic. Teachers are main agents in the technology integration processes as they impact the educational environment with their practices (Gooler et al., 2000). This principal role of the teachers in technology integration makes it necessary that they participate in professional development workshops that focus on technology integration. The first period of the COVID-19 educational emergency (in our case from Mars 2020 to June 2020) constituted a hands-on workshop for teachers to experience asynchronous and synchronous online teaching. Thus, it is expected that teachers turn into more use of distance learning, what agrees with researchers call for this action be teachers (e.g., Almonacid-Fierro et al., 2022).

Recommendations

The research results indicated that the participating teachers, though they were different in their modes of online learning, including tools' use in this learning, they succeeded to use a variety of tools in this learning. It is recommended that the school management attempts to persuade the teachers regarding the need to apply a variety of tools even in regular times. Teachers need to be prepared for times of emergency in which they use a variety of tools, so it is

recommended that they do that in regular times too. Future research would verify how teachers' preparation for using a variety of tools would influence their actual use of technological tools in the classroom.

The research results indicated that the teachers' knowledge and experience in tool use impacted the variety of this use. School management should encourage teachers to participate in professional development programs so that they become more knowledgeable and experience regarding tools' use in the classroom. This would encourage them to attempt to use a variety of tools in their regular teaching, which would make them prepared for online teaching, including the use of various tools in this mode of teaching.

The research results indicated that emergency education constituted a context for professional development in online teaching. The ministries of education should take the COVID-19 emergency education into account when they come to put their policy for the professional development programs for teachers, as well as for school textbook writing for authors. For example, in one or more textbooks, one part needs to be written to fit times of emergency. Future research is needed to examine how emergency education influenced the ministries of education policies for textbooks authorship.

The research results indicated that the technology coordinator in the school was the teachers' tutor who supported teachers' professional development in online teaching. This role of the technology coordinator points to the need for technology coordinators in every school. It also points out that the technology coordinator should be prepared for emergency education in which online learning becomes the only mode of learning. More research is needed to verify the impact of technology coordinators in the school on teachers' adoption of online learning.

Limitations

The research participants were two primary school teachers, where one of them taught mathematics and the other taught English, so it is a limitation of the present research that it targeted only two teachers, that it targeted teachers of only two disciplines and that it targeted teachers of only the elementary school. Future research is needed to investigate teachers' use of tools in distance education in other disciplines and other school levels.

The present research used mainly qualitative means to investigate teachers' use of tools in distance education in other disciplines and other school levels. Future research needs to investigate, also quantitatively, this issue, in addition to the impact of teachers' knowledge and experience on the variety of their tool use.

Authorship Contribution Statement

Daher: Conceptualization, analysis, writing. Anabousy: Design, editing, reviewing. Alfahel: editing, reviewing

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