Journal of Educational Technology & Online Learning
Volume 6 | Issue 1 | 2023
http://dergipark.org.tr/jetol

Web pedagogical content knowledge of early childhood education professionals

Emre Cam [a *], Betul Yilmaz Cam [a]

[a] Tokat Gaziosmanpaşa University, Türkiye.

Suggested citation: Cam, E. & Yilmaz Cam, B. (2023). Web pedagogical content knowledge of early childhood education professionals. *Journal of Educational Technology & Online Learning*, *6*(1), 162-183.

Highlights

- Early childhood education profession profiles have a lack of knowledge on WPCK.
- The web is used by ECE profession profiles mostly for information access.
- ECE profession profiles argue that the pandemic process contributes to their web-related knowledge and experience thanks to distance education.
- ECE profession profiles state that technology integration is not one of the fundamental areas for ECE due to children's developmental nature.

Article Info: Research Article

Keywords: *Early childhood, Pre-service teachers, Academicians, WPCK, Distance education*

Abstract

Early childhood education is the first step of education in which children have their initial experiences with school and learning. Thus, early childhood education (ECE) teachers are expected to be qualified in pedagogy and teaching to have permanent and effective learning among children. With the changing world, technology and the web are becoming an inevitable necessity for children in early childhood, especially during the pandemic in which the web has become the only way to continue teaching via distance education. Therefore, web pedagogical content knowledge of teachers and other professionals related to ECE who will directly or indirectly affect previous experiences with children gains importance to provide meaningful experiences. As a result, the current study aims to explore ECE teachers, pre-service teachers, and academicians' web pedagogical knowledge. To reach this aim, the researchers use case study, one of the qualitative research designs. An interview protocol was applied to participants, and their web pedagogical content knowledge was explored via semi-structured questions. Data analysis was made by NVivo software and two researchers. After the data analysis, it was found that participants generally are not familiar with the WPCK. Still, they use the web in their classroom such as to find new activities in their classroom. Also, most participants argue that the pandemic contributes them to develop their experiences while distance education. As a result, the findings were discussed with the related literature.

1. Introduction

Advances in technology and science change the social structure, so this situation creates differences in educational processes. Modern technology and innovations result from the differences created by previous technological developments in education and prepare the society for the future. As a result of the changes in information technologies, the method and content of education are also changing. Today, technology continues to be an indispensable part of children's lives. Starting from the early childhood period, it is supported to disseminate the use of technology by associations and institutions for children's benefit. A statement by the National Association for the Education of Young Children (NAEYC) noted that

* Corresponding author. Department of Computer Technology, Tokat Gaziosmanpasa University, Türkiye.
e-mail address: emre.cam@gop.edu.tr
This study was partly presented as a proceeding at the 2nd International Conference on Educational Technology and Online Learning Conference held between June, 23-26, 2022.

Doi: http://doi.org/10.31681/jetol.1179663
Received 24 Sep 2022; Revised 24 Nov 2022; Accepted 25 Nov 2022
ISSN: 2618-6586.

technology plays an essential role in the education of young children and forecasts for increasing importance. In addition, it is also important to improve children's exposure to technology through guided interaction and to support children's participation in online learning (NAEYC, 2012).

According to Mishra and Koehler (2008), teachers, who are an important part of the technology integration process in education, need to integrate technology into their lessons effectively and use the knowledge structures that emerge from the interaction of these components together with the relevant pedagogy, content, and technology. In this context, the concept of technological pedagogical content knowledge has emerged based on the idea that technology should also be included in these components (Koehler & Mishra, 2005; Koehler & Mishra, 2009). The technology in the technological pedagogical content knowledge and the interaction of pedagogy and content structures with technology indicate a general knowledge on this concept.

With the development of internet and web technologies, different uses of the concept of technology have emerged, and the necessity of structuring the technological content information of the internet and the web has come to the fore. In this context, Lee & Tsai (2010) described the concept of web pedagogical content knowledge. This concept, which is defined as teaching formed by the combination of web technologies and pedagogical knowledge (Lee & Tsai, 2010), is defined as teachers' self-efficacy levels in integrating the components and functions of the web into learning-teaching environments (Horzum, 2011). Since the web is a more specialized structure of technology knowledge, it is the most important technology teachers often use for research purposes or to benefit from distance education in teaching. The rapid development of web technologies has made distance education environments and tools more flexible and changed these environments to be an alternative to traditional classroom education or to support education. In this respect, distance education supports people's life-long learning and learning independently of time and place. In addition to this general feature of distance education, there are learning and teaching environments within the scope of distance education, such as web-based learning, e-learning, and online learning. While some of these environments are holistic educational environment that covers all educational activities, some of them are in the form of mixed learning to support any course. Thus, with the knowledge of web pedagogical content, the proficiency levels of teachers emerge that will enable the application of appropriate pedagogies to support teaching and web-based online activities suitable for the needs of a course (Lee & Tsai, 2010). Teachers' proficiency levels can play an essential role in integrating distance education and web technologies in lessons. In accordance with this potential, it has great importance to enrich the web technologies used in distance education environments in terms of content and pedagogy.

The use of technology, the web, and distance education has become even more important due to the COVID-19 pandemic, which caused a global crisis. As of March 16, 2020, schools have been closed in 109 countries around the world, including Turkey (UNESCO, 2020). The education of 40 million early childhood education children worldwide has been affected (UN, 2020). In this process, web technologies and distance education applications were used to continue education. According to UNICEF (2020), 60% of the world's countries stated that they developed distance education applications in the early childhood period. Therefore, it has been tried to meet the needs of learners with web-supported distance education environments. Due to this process, it has become inevitable to include such technologies in the education-teaching processes. When this situation is taken into consideration in terms of early childhood profession profiles, it is an undeniable fact that they will play an important role in reflecting the changes that have occurred in educational activities. It has become important to determine the web pedagogical content information of these profession profiles with the use of web-based distance education environments, the implementation of web tools integrated with distance education as well as different web technologies in ECE in this process.

2. Literature

The rapid changes in technology caused changes in individuals' lives in their daily and professional lives (Graham, 2011). Education is one of the areas in that technology is used to increase the effectiveness of teaching (Altun, 2019; Keengwe, 2007). Because children are born in a technology-rich environment, teachers must include technology in education starting from early childhood (Sivin-Kachala & Bialo, 2000). Early childhood is essential for children's primary experiences, development, and learning (Siegler, 1998). Therefore, similar to all experiences in life, experiences and skills related to technology becomes necessary in the early years (Ko, 2002). Even if there are some studies that suggest that computer usage in the classroom can cause less active learning, poorer social skills, and inadequate play activities (Attewell et al., 2003; Guhal & Leonard, 2002; Wood et al., 2008), the other studies argue that computers can support young children's cognitive, social and play development (Kelly & Schorger, 2001; Ko, 2002). Technology-related educational opportunities bring additional responsibilities and burdens for teachers (Becker & Ravitz, 2001; Rosen & Weil, 1995; Specht, Wood & Willoughby, 2002). Skill-related concerns (Becker & Ravitz, 2001), equipment-related issues (Sandholtz et al., 1997), and other issues such as educator anxiety about the quality of education (Demetriadis et al., 2003) may create some barriers to integrating technology in ECE.

The integration of technology comes with the integration of the web in classrooms (Lightfoot, 2005). In today's world, the necessity to reach information is fulfilled via the web. Web can be described as a tool that enhances and facilitates worldwide information (Horzum, 2011). Individuals may need to reach information in most areas of life, and like technology, the web has become an effective tool to improve teaching practices (Míguez et al., 2009). Thus, Alkhayat et al. (2020) state that teachers may experience the pleasure of becoming adequate to meet the needs of children described as digital citizens. Teachers' self-efficacy and positive attitudes toward technology use are effective in their preferences to use the web in their classroom (Shiue, 2007; Kim et al., 2008; Gialamas & Nikdopoulou, 2010; Lee et al., 2010). Thus, learning about educators' views on web technologies becomes important to understanding web usage in ECE classrooms.

Teachers are the ones who plan, shape, and maintain education (Fang, 1996). Therefore, their professional development (Postholm, 2012), beliefs (Buehl & Beck, 2015), attitudes (Albirini, 2006), characteristics (Neugebauer et al., 2019), and views (Caliskan et al., 2019) have undeniable effects on children's development, learning, and well-being. From this point, learning more about educators may bring about developing a better understanding related to the most recent practices in the classroom in any specific area. Collinson et al. (2009) argue that the world is changing, and teachers are expected to update their professional knowledge in every specific area. From this point, teachers' need for technology-related skills and knowledge becomes one of these specific areas that require attention for every educational level especially during extraordinary situations where using technology and the web are the only ways to continue education like COVID-19 pandemic. Sari and Nayır (2020) found that lack of education on distance education and teacher deficiency are some of the challenges in distance education. Also, teachers' willingness is effective to be successful in this period (Mikušková & Verešová, 2020).

Because teachers' aim is to create effective learning environment for children, the possible arrangements should be made by the teachers. The ways of investigating technology in classroom are described by the related literature. To illustrate, Dayal and Tiko (2020) conducted a case study with four teachers working in two preschool education centers. As a result of the study, they adopted the ways of acting in cooperation, communicating with families and children, and using existing web tools (E-mail, Viber, Zoom, etc.) in order to ensure the continuity of distance education during the pandemic process. Hu et al. (2021) examined the views and practices of 1035 educators (administrators, teachers, and co-teachers) from 169 preschool education centers in Hong Kong on their use of technology in the COVID-19 pandemic. As a result of the research, it was determined that some participants did not consider themselves sufficient for online and distance education. In line with the results of the research, it has been suggested to make web-supported online learning preparations to meet the learning needs of children. As a result, learning about different

profession profiles' views and practices related web becomes one of the important questions to investigate to learn about their efficacy in using the web for education.

Thus, the current study aims to discover web pedagogical content knowledge of individuals from different profession profiles in early childhood education majors. To reach this aim, academicians, in-service and pre-service teachers from early childhood education majors were interviewed with semi-structured questions related to their views on the web, web pedagogical content knowledge, and their self-reported practices on the web in daily life, classroom and distance education practices.

The following research questions led to shaping the process.

RQ1: What are the opinions of the participants about the WEB?

RQ2: What are the participants' views on WEB pedagogical content knowledge?

RQ3: How do the participants evaluate their WEB experiences in the pre-pandemic classroom environment and post-pandemic classroom and distance education practices?

3. Methodology

3.1. Research Model/Design

The study aims to discover the views of different profession profiles from early childhood education major on web pedagogical content knowledge. To reach this aim, this study was carried out in accordance with the case study, which is one of the qualitative research methods. Case study is a method that allows to understand how the research subject works or works by systematically collecting sufficient information about a certain person, social environment, activity or group (Aybek, 2019).

3.2. Data Collecting Tools

To collect data, semi-structured questions on the web, web-pedagogical content knowledge, and self-reported classroom practices related to the web were used. The questions were prepared with the help of related literature and updated in the light of expert opinions. Three of the expert were from early childhood education department and three of them from computer education, and instructional technologies department. As a result of necessary changes, eight semi-structured questions were prepared. Table 1 displays the content of the questions.

Table 1.
Interview questions

Category of Question	Example Questions
Knowledge of the Web	Definition of the web Usage area of the web Difficulties of the web usage Solutions of the web usage difficulties
Knowledge of Web Pedagogical Content Knowledge	Definition of web pedagogical content knowledge
Self-reported Classroom and Distance Education Practices on the Web	Integration of web to classroom activities Integration of web to distance education activities Differences on web integration before and after COVID-19 Pandemic

Before starting to collect data, the participants were sent emails to inform them about the study and ask if they would want to participate in the study or not. Thus, further information about the interview date and place. All participants were interviewed in a time and place where they could feel secure and comfortable

taking their actual answers (Fraenkel et al., 2012). Before the interview, participants are also told that they can quit the study if they do not want to continue. Their names and affiliations will be hidden to ensure confidentiality (Fraenkel et al., 2012). Thus, the researchers gave pseudonyms to participants as PST* for pre-service teachers, IST* for in-service teachers, and A* for academicians. Not to miss any point related to the answers, the researchers recorded audio after taking the necessary permission from the participants. Additional questions were asked to clarify some points, and notes were taken not to miss important points in the data (Creswell, 2007). As a result, the interview protocol was applied to each participant. After this process, the audio-recorded data was transcripted, and the data analysis process was maintained.

3.3. Study Group

In order to provide a broader perspective related to web pedagogical content knowledge of different profession profiles related to ECE, the participants were chosen from different profession groups. In the study, seven newly graduated early childhood education teachers, five in-service ECE teachers, and three academicians teach in the undergraduate ECE program. All of the academicians and in-service teachers were working in public institutions, and the pre-service teachers were the fourth year student at ECE department in a public university. The experience year for the academicians is between ten to twenty, and the experience year of the in-service teachers were between five to fifteen. Convenience sampling is described as including participants that are suitable in terms of their accessibility and proximity (Creswell, 2007). Thus, there were 15 participants (10 female; 5 male), and all were living and working in Tokat. The participants were informed about the content of the study and asked if they were participating in the study via phone call and mail. Thus, the study included those who were willing to participate.

3.4. Data Analysis

First, the data was transcripted and prepared for the coding. Fraenkel et al. (2012) suggest that coding is required to develop an understanding of chunks of data and to capture the major points gathered from the respondents' answers. In the current study, NVivo software was used to create codes that were developed to manage the coding process more objectively and less time-consuming (Hilal & Alabri, 2013). In accordance with Fraenkel et al. (2012), the data was coded with two different coders. One of the coders is a professional with a doctoral degree in computer education and instructional technologies, and another is a doctoral candidate in early childhood education. Content analysis was conducted in which the researchers investigate the data, and the coders emerge (Fraenkel et al., 2012). Almost all the codes were matched between two coders. Only changes were made to the usage of language to provide a clearer and more meaningful presentation of data. The findings that are concluded as a result of data analysis will be presented in the following part.

3.5. Validity and Reliability

To ensure validity and reliability, the researchers need to obstruct the misleading data (Fraenkel et al. 2012). One of the attempts was to choose the suitable language that all the participants can understand the questions in the same way. To ensure this, expert opinions were taken from one associate professor from Computer Education and Instructional Technology and a Ph.D. candidate from early childhood education department were taken. Also, during the interviews, the researcher observe the language and behaviors not to miss any point and take notes to have deeper understanding related to the answers. Audio recording is another way for reliability and validity (Fraenkel et al. 2012). In this way, it is possible to evaluate the answers by catching every point. Another way was to having two independent coders for validity and consistency was checked (Creswell, 2007). The rich, thick description is also provided to allow the other reader to transfer the results (Creswell, 2007). As a result of the inter-coder agreement, the reliability of the findings was found %95 with the consideration of Miles and Huberman's (1994) explanation that approve reliability of 70% to ensure consistency of findings.

4. Findings

The current study aims to explore different profession profiles' web-pedagogical content knowledge in early childhood education majors. The data and codes will be presented in accordance with research questions and in a way in which the differences between different profession profiles, pre-service, in-service teachers and academicians can be highlighted.

4.1. Web Knowledge

In the first part of the interview protocol, participants were asked about their views on the web. The questions in this part were mainly about participants' views on how they define the web, in what areas they use the web, what kind of challenges they experience and how they solve their problems related to the web. There are different sub-groups among participants. Table 2 presents the definitions of web in terms of the academicians, in, service ECE teachers, and pre-service ECE teachers will be presented.

Table 2.
Definitions of the web

Participants	Categories	Codes	
Pre-service teachers	Definitions of web	21. CC applications Information production Information access Negative technology	Source of false information Danger Addiction
In-service Teachers	Definitions of web	Information access Digital Environment Network Social Media	
Academicians	Definitions of web	Information Access	Academia Google Mail ResearchGate Social Media

As displayed in Table 2, there are both similar and not similar answers related to the definition of the web among different profession profiles. For example, information access was the most common answer among all professional profiles. The following sentence may be one of the examples for participants' answers;

> "Information resource and various tools. Easily accessible source of information. Because it is very common right now, we can access all kinds of information from the phone or computer." A3

In addition to the similar answers, there are also different ideas of different profession profiles. That is, when the pre-service teachers' views were determined, it was observed that some of the mentioned the opposing perspectives of the web. Thus, they argue that the web can be a source of false information, danger, and addiction. PST4's sentences can be an example for this code.

> "An endless sea. If used correctly, it will elevate your knowledge. But if you spend too much time, it will affect you negatively. I could be addicted to the screen; my correct use is always good." PST4

In addition to pre-service teachers' views, in-service teachers defined the web as a network and social media. On the other hand, when the academicians' answers were examined, it was found that they generally focused on the web's function for research. Thus, when they were asked about the web, they talked about the research tools on the web.

The second question in the interview protocol was about the areas that the participants' web usage preferences. Table 3 displays the categories and codes related to the answers.

Table 3.
Web usage areas

Participants	Categories	Codes	
Pre-service teachers	Web usage areas	Research	
		Information access	
		Preparing assignments and presentations	
		Distance Education	Web 2.0 tools
		Effective teaching	Office applications
In-service Teachers	Web usage areas	Applications related to profession	Finding educational activities
		Social media	
		Concept teaching	
Academicians	Web usage areas	Research	Literature
			Article
			Thesis
		Information access	Google
			YouTube
		Social media	Twitter

Another question that was asked to the participants was that "In which areas do you need web usage?" Thus, the participants shared their daily practices related to the web. Like the previous questions, the different profession profiles shared both similar and not dissimilar answers. To illustrate, social media and to use web for the profession are the most common answers among all participants. IST3's sentence is provided below as an example.

> "I use social networks. Apart from that, I do research that requires my profession or I am used to preparing events." IST3

When we look at the dissimilar answers, one of the code from pre-service teachers' answers take attention. That is, using the web for distance education was observed among pre-service teachers, who explained their comments on the effects of being undergraduate students in the COVID-19 process.

> "Lectures, doing research. Homework, exam preparation, online lectures, pdf and slides as it is time-consuming to do research in the library. I also use it for communication because it is an easier and cheaper way." PST7

In addition to this dissimilarity, similar to the previous question, academicians' answers differ and focus on the web's function of researching. Thus, this was observed that academicians use the web for literature review and to improve their studies.

After learning about their daily practices related to the web, participants were also asked the point that challenged them in using the web. Table 4 displays the codes and categories related to the answers to this question.

Table 4.
Challenges in using the Web

Participants	Categories	Codes
Pre-service teachers	Challenges in using the Web	Understanding information Hardware problems Internet collection Problems with the Web applications
In-service Teachers	Challenges in using the Web	Web browser problems Internet connection problems at school
Academicians	Challenges in using the Web	Difficulties in transitioning to different interfaces Difficulty using new apps

Table 4 displays that most common problems are about reaching to the internet and learning to use the tools related to the web. Thus, most participants argued that it is hard to adapt to the systems they are unfamiliar with. For example, PST7 shares his/her ideas in the following sentence.

> "Adapting foreign applications here and not being compatible with some devices for some applications gives me problems. However, since we were born into the internet age, I do not experience difficulties in using it." PST7

Similarly, problems in internet connection and internet speed affect participants' the web usage in a negative way as IST2, and s/he states that

> "As a school, there is a problem with the network in the school, yes, but we are trying to solve it with the same portable networks." IST2

As table 4 reveals, all of the participants experienced some difficulties in using the web, and they still continue to use it in their daily life. Therefore, the next question was about their ways of solving their problems related to the web. Table 5 provides an outlook for the codes and categories on the answer to the question "Dealing with situations that require web use and improving your web knowledge. What do you get help from/what resources do you use? "

Table 5.
Sources to solve the problems on web

Participants	Categories	Codes	
Pre-service teachers	Sources to solve the problems	Research engines Knowledge from teaching strategies courses Experts and experienced people YouTube	
In-service Teachers	Sources to solve the problems	CEIT teachers Individual solutions Inservice education Searching from the web Courses on master education	
Academicians	Sources to solve the problems	Google Web sources and articles Experts and experienced people YouTube	Academicians from CEIT department

*CEIT: Computer Education and Instructional Technology

As the table 5 presents, participants shared several ways to solve their problems related to the web, and one of the most common answers was using the web, and searching about the experienced problem. Thus, most of the codes were in the same direction. For example, "research engines," "google," or "searching from the web" are the codes transferred by the answers of different profession profiles. To clarify these code, the following sentences is provided below.

> "I'm trying to cope myself. I'm trying to find it by typing in the search engine. If I can't find it, I write to Youtube to make it more concrete. If I still can't find it, I ask my more experienced friends." PST1

> "By doing research on the web." IST3

> "Again, I do research on google and follow the steps there. I get help from people who are experts in computers and I benefit from the experiences of people who have experienced the problem I had before in forums on the web." A2

In addition to these codes, another common code that was extracted from the participants' sentences was "experts and experienced people." From this code, it was understood that when the participants from all profession profiles prefer to ask some other people who are may know the solution. The following quotations are provided as an example.

> "A friend of mine who is good with computers. A friend of mine who is studying computer science." PST4

> "I can say that my friends around me are computer engineers dealing with computers or our friends who work in other jobs that work on computers." IST1

Even if participants mostly prefer to search on the web or ask their questions to more knowledgeable others, the courses from undergraduate programs or in-service education are the other sources that help to develop participants' knowledge to find solutions on the web.

In addition to participants' views and practices related to the web, their educational practices were also investigated. In the next part examined the findings related to their web pedagogical content knowledge.

4.2. Web Pedagogical Content Knowledge

The aim of the study was to discover different profession profiles on ECE's web pedagogical content knowledge. Therefore, in the second part of the study, first of all, they were asked that "Can you share with us the definition that comes to mind when you think of web pedagogical knowledge?" and the categories and codes were created with regard to the answers for this question. Table 6 presents the codes and categories for each profession profile.

Table 6.
Definition of web pedagogical content knowledge

Participants	Categories	Codes	
Pre-service teachers	Definition of WPCK	No idea	**Evoked ideas** Educational websites Internet-based pedagogy training Information sharing of education experts over the Internet Information for younger age groups
In-service Teachers	Definition of WPCK	No idea Information that makes children's life easier Integration of education and training with internet technologies ECE related information on the web	
Academicians	Definition of WPCK	Computer training by experts Educational use of the web Nonexistent information	

*WPCK: Web Pedagogical Content Knowledge, *ECE: Early Childhood Education

When the answers of the participants were examined related to this question, it was clear to see that all of the participants has lack of the information about web pedagogical content knowledge concept. To illustrate, whereas PST1 stated that "I heard the first time." IST1 said, "I have no information." When further questions about this concept evoked them, they shared their additional ideas. For example, the codes created by pre-service teachers were "educational websites" or "information for younger age groups." Similarly, in-service teachers argued that this might be about information that makes children's life easier and ECE-related information on the web. Furthermore, finally, academicians' ideas were computer training

by experts for the definition of web pedagogical content knowledge. When all the answers and codes were investigated, the most related answers were "integration of education and training with internet technologies" from in-service teachers and "educational use of the web" from academicians. The sentences related to these codes are shared below.

> "It is the integration of education and training with internet technology." IST4

> "There may also be information necessary for using the web for educational purposes or learning the web." A3

In addition to the definition of the web pedagogical content knowledge, participants' educational practices related to the web and how they integrate the web into their teaching were also asked. Table 7 presents the categories and codes created from the related answers.

Table 7.
Teaching practices by integrating the web

Participants	Categories	Codes	
Pre-service teachers	Web integration to teaching	Creating activities for children	
		Developing web-based instructional technologies for children	Animation Simulation Music Visual
		Researching about ECE	Activity Concept
In-service Teachers	Web integration to teaching	Finding Activity	Play Video
		Web 2.0 tool	Canva Code.org Kahoot
Academicians	Web integration to teaching	Web use in the course	Information (Current/International) Video Visual Music
		Distance education	Source sharing

*ECE: Early childhood education

When the participants' answers were examined, it was seen that all of the participants have common points in including the web into their teaching. That is, it can be seen that the web is used to make the concepts more visualized and concrete. PST5's and A1's views provided below can be shown as examples.

> "I use images or cartoons to appeal to their visual intelligence to teach the concepts I will teach. If I am going to make a presentation, I use it to enrich the presentation." PST5

> "I use images. I am using it to transfer some article information to PowerPoint. If there is 1 video on the subject, I use it to find and add it." A1

In addition, finding different activities and current sources related to their teaching is another aim for teachers in the web usage. As IST2, A2 and A3' stated below.

IST2 argues that;

> "Finding activities, shopping for books about these activities, benefiting from the ideas of my colleagues who do different things. I use it very intensively, that is, when there is a subject that I can't get out of in classroom management, I thought about what I can do with a new application." IST2

A2 states that;

> "I'm searching sources to update. If I am going to lecture on a subject lately, the internet helps me a lot in bringing examples from abroad to the classroom. I may have brought things into the classroom setting that are not currently available in our country. . In order to turn on music in the classroom or to find current issues in the drama class, I find the basic concepts on the internet and make the drama of it, instead of repeating the known ones, we can focus on the original, creative or things that we can't find a solution to." A2

A3 shares that;

> "When using the course content I just taught, Turkish resources are not enough, I use English resources to download. I use it for the environmental education lesson to find and share the developments in the current world about the environment with the students." A3

Even if most of the answers were related to contributing to in-class activities, distance education was another code created by academicians' sentences. It is possible to say that using the web for distance education might be an outcome of COVID-19 with the following quotations.

A1 said that;

> "There were no online lessons, live broadcasts at work, and using social media for some information. These came into my life after the pandemic." A1

A3 argued that;

> "I use the distance education system to share resources with students." A3

In the light of these codes and quotes, it is possible to say that all of the participants use the web in some ways. In the following part, findings on the effect of COVID-19 on web usage will be shared.

4.3. Web Experiences Before and After the Pandemic in terms of Classroom and Distance Education

The final question directed to the participants was "When you think about the before and after the pandemic classroom and distance education, how would you evaluate your web content knowledge and practices?", and participants were required to share their general evaluations related to the process. In Table 8, the created codes and categories are shared.

Table 8.
Web experiences before and after the pandemic in terms of classroom and distance education

Participants	Categories	Codes	
Pre-service teachers	Pandemic evaluation on the web	Positive	Ease of use
			Web-based material preparation
			Experience in distance education
			Increase in WPCK
			Promote life-long learning
		Negative	No improvement in web knowledge
			No need for ECE
In-service Teachers	Pandemic evaluation on the web	Beneficial for ECE	Web-based material and activity usage in classroom
			Children's active engagement to web-based activities
			Using the web as a source
			Web 2.0 tools training in in-service education
		No Need for ECE	
		The need for enrichment of web-based education in pre-school education	
Academicians	Pandemic evaluation on the web	Going back to the usage frequency of before pandemic	
		Lack of technical infrastructure	
		Learning web 2.0 tools	
		Insufficient web pedagogical content knowledge (for ECE and Instructors)	
		Not using when not required	

*WPCK: Web Pedagogical Content Knowledge, *ECE: Early childhood education

In the last table, the findings related to participants' self-reported experiences on before and after pandemic. All participants engaged in education as teachers or undergraduate students in pandemic and had to participate in distance education in some way.

As a result, one of the study's aims was to display their views on the process in terms of the web. With the consideration of the codes presented in Table 8, it is possible to say that web-based materials and activities started to be used with COVID-19. IST2 shared his/her ideas on these codes with the following sentence;

> "Yes, it has definitely benefited us. It has been a difficult process and we had to strengthen our bond with this technology. But it made it a lot easier. We still hold parent meetings online. When he has something to offer my teacher friends, it happens a lot when we do them online." IST2

Similarly, IST4 shared supportive ideas with the sentences below.

> "Before the pandemic, we were using the web in our lessons, but during the pandemic, using the web in distance education has become a necessity for me. The important point in this regard was to prepare studies that we will use in accordance with the pedagogy. I had concerns about the long-term control of children in front of the screen regarding web and internet use in distance education. As I improved myself on this subject, I realized that we can use it not only in distance education or coding, but in all activities. The process of preparations made on the web may take longer, but I have observed that children willingly participate in activities more actively." IST4

PST4 and PST5 also shared similar experiences.

> "In the pandemic, we needed more internet. I learned more about the web. Now I can access and use the internet without any questions." PST4

> "It was more beneficial for me. I had no experience with distance education. I learned how to enter the system and how to communicate with teachers. It may be necessary in situations such as pandemic or war." PST5

As a result, these examples can show that the distance education participants engaged more as a result of COVID-19, participants' knowledge and experiences related to the web. In addition, as a result of this process, participants realized their lack of knowledge of the web and the insufficiency of the systems related to it. A3 shares his/her ideas with the following sentences that might be shown as an example of the lack of web knowledge.

> "The lack of knowledge of the academics is one part of the problem, but the fact that they cannot reach that technology is a serious problem. (Internet in the dormitory, very bad computers, etc.). One of the problems in this regard is the inability to use the internet in the classrooms and the constant problems. Every software must be installed on the computer and every technology must be available for use." A3

Even if most participants argued the importance and need for the web in the classroom due to pandemic and distance education, some of them shared different explanations, particularly ECE. That is, web usage and distance education were explained as unnecessary and insufficient attempts for teaching in ECE because of the nature of early childhood children. The sentences below can be shown as examples of these ideas.

> "I wasn't exposed to distance education much, I came face to face with my children again, but during the periods when I was exposed, it is a bit better to have it rather than nothing, but it is questionable that how much it is very useful. Because when you come back one-on-one with the children in the classroom environment, you can't handle an event where you can interfere

> with one touch or eye contact. I can say that you lose the child more quickly. Children become much more open to outside interventions." IST1
>
> "But when I think about the preschool period, it is difficult to fix the children in front of the screen. There are so many things on the internet that can distract kids. So it's not very helpful. It can only be used as an additional support. It can be used to show them things that children cannot experience in the classroom, but a completely internet-based education is not correct in my opinion." PST5

These codes and quotes show that pandemic and distance education, as its consequences, caused changes and attitudes toward participants' web experiences. Because participants had to use the web in their teaching and learning, their skills and knowledge changed thanks to their experiences in this process. Therefore, in the next part, the related literature with the current study's findings will be discussed, and the conclusion and implications concerning the study's aim will be shared.

5. Discussion

As stated above, the aim of the current study was to investigate the web pedagogical content knowledge of pre-service, in-service teachers, and academicians in ECE. To reach this aim, several research questions were included in the study. The research questions were about participants' views on the web, web pedagogical content knowledge, and their web-related experiences before and after pandemic. As a result of the data collection and analysis process, the findings are presented in the previous part. Thus, in the discussion part, these findings will be discussed in accordance with the research questions.

5.1. Views on the Web

The first research question aimed to learn participants' views on the web. Thus, they were asked about their definition of the web, their usage areas, the challenges they experience on the web, and their ways to solve the problem. First of all, when their descriptions were examined, it was seen that participants described the web as a tool for information access and production. Also, they are focused on its function related to connecting others and developing networks. Zang et al. (2005) also described the web as a tool that people use to reach information. Uzun (2008) also argues that the web enables individuals to find pages with information throughout the web. It was also noted that the web gives a chance to develop communication and collaboration via social networks (Korucu & Yucel, 2015; Selwyn, 2007). With the investigation of the related literature, it can be concluded that the participants' definitions were parallel to the previous studies. In addition, some participants focused on the negative perspective of the web. They stated that the web could be a source of false information and danger, and it can cause addiction. Similarly, Busch (2019) shares the negative sides of the web related to safety and suggests developing solutions to use the web in education. Mäntymäki and Islam (2016) also talk about the danger related to exhibitionism and voyeurism and mention the importance of awareness not to be affected by these negative effects.

The second interview question under this research question was to learn about participants' daily uses of participants on the web. The results revealed that the using styles differ in accordance with the profession profiles. That is, whereas pre-service teachers use the web for preparing assignments and distance learning, in-service teachers use it to find activities and for concept teaching. Finally, academicians generally use the web for searching and reaching for information. In addition, when their experiences on the web were

investigated in a detailed way, it was realized that internet access, hardware problems, or lack of knowledge of the web applications were the common challenges for the participants (Dayal & Tiko, 2020; Hu et al., 2021; Mikušková & Verešová, 2020; Sari & Nayır, 2020). And they generally try to solve their problems by asking experienced others or searching on the web. Experiencing similar problems and solving them in similar ways for all participants can be a clue to finding ways to create opportunities in the long term for educators. Alhassan (2017), Kale (2013), and Lim and Newby (2020) also support these findings by emphasizing the importance of teachers' knowledge and the need for courses to deal with the problems that the teachers experience and increase their self-efficacy relatively.

5.2. Views on Web Pedagogical Content Knowledge

In addition to the questions related to participants' web usage, their web pedagogical content knowledge was investigated, and the definition was asked. All of the participants stated that they had no idea related to this topic, and they shared their ideas on what the term evoked them. Only two participants shared similar definitions and said that this term might be about "integration of education and training with internet technologies" and "educational use of the web." Lee and Tsai (2010) state that web pedagogical content knowledge is expressed as teaching knowledge with the web. In the definition of web pedagogical content knowledge, there are three basic elements: content, pedagogy, and web (Horzum, 2011). Therefore, when teachers' WPCK is investigated, these three elements must be taken into account.

Even if the participants are unfamiliar with the content, when their web practices related to teaching were questioned, it was revealed that they integrated the web into their classrooms. That is, most of the participants integrate the web to make their teaching more concrete and effective by providing visuals, videos, and plays. Also, the web is used to find creative and current activities to develop their teaching. As stated in Horzum's (2011) definition, the participants need to have a background in content, pedagogy, and the web to integrate the web effectively. Even if the participants stated that they use the web in a way that is suitable for early childhood education, it was observed that they use it in limited ways. When the importance of development of WPCK on the self-efficacy to use the web in the classroom in suitable ways, the solutions for improving educators' WPCK becomes an important point to discuss (Akayuure et al., 2013; Kaşçı & Selçuk, 2021; Lang et al., 2013; Lee & Tsai, 2010).

5.3. Distance Education Practices on the Web

Even if the web is in individuals' life in every area with the increasing development of technology, the COVID-19, and the distance education that is observed as a result of the pandemic process, teachers and students had to develop their practices (Williamson et al., 2020). Also, Williamson et al. (2020) argued that the distance education process revealed the need for educators' skills and knowledge related to the web. When the results of the current study were examined, participants argued that the engagements in distance education increase the web knowledge and skills for each profession profile. Whereas they had a chance to improve their abilities, they also realized the needs related to their knowledge and infrastructural problems. Even if all participants had web-related experiences and used the web to maintain their teaching and to learn via distance education, under the early childhood education content, the participants see the web as unnecessary, harmful, and not beneficial even if distance education was also maintained. In Ford's (2021) study, the ECE teachers reported a lack of knowledge and skills for virtual teaching, limited social interaction and developmentally appropriate practices of including children in the virtual learning format, and limited technological support.

Moreover, Alan (2021) emphasized that the technological competencies of the teachers are essential for developing their web-related practices in the classroom. In his study, Solekhah (2020) also shares the barriers to ECE teachers' skills and knowledge in maintaining distance education in suitable ways for children's developmental areas. This result also emphasizes the need for knowledge on content, pedagogy, and the web that is related to web pedagogical content knowledge. With consideration of the opportunities provided by distance education, even for the ECE settings, teachers' abilities in preparation, implementation, and reflection are important points to examine (Dini, 2021; Kim, 2020; Hidayati, 2021).

As a result, it can be concluded that one of the biggest reasons why teachers believe that distance education cannot be maintained in ECE setting is about teachers' lack of information, experiences, and skills. From this point, the need for web pedagogical content knowledge, skills, and practices related to WPCK becomes one of the current problem areas in the early childhood education context.

6. Conclusion and Suggestions

The current study aimed to reveal different profession profiles' web pedagogical content knowledge in early childhood education. Due to the COVID-19 pandemic, teachers, academicians, undergraduate students, and even early childhood children had to engage in distance education. Therefore, learning how they maintained this process and providing different points of view was the motivation of the current study. From this point, the first step was to investigate their views on the web, web pedagogical content knowledge, and their self-reported classroom and distance education practices on the web. The results from the qualitative analysis revealed that pre-service, in-service teachers and academicians on early childhood education has an initial knowledge on web and they integrate it in their daily and professional life. On the other hand, when they were questioned about the web pedagogical content knowledge, it was seen that they did not have theoretical and practical knowledge. From this point, it could be concluded that even though educators use the web somehow, they lack of information and experience on the integration of the web into the classroom. Thus, knowledge on using the web in a way that can increase classroom quality and children's learning was not observed among participants, even the web is seen an unnecessary tool for early childhood classrooms due to the nature of children's development. In addition, most of the participants shared their increased practice on the web during distance education in pandemic. Even if they must have continued education in this period, early childhood education was seen not suitable for such education. From this point, the ways to adapt the web to early childhood education classrooms becomes another point to research. Even though there are many web-integrated classroom programs for the older age groups, adaptations for the early years should be made. However, to reach this aim, first of all, the web pedagogical content knowledge must be supported among ECE teachers and academicians. That is why if they have the necessary theoretical knowledge on the web and WPCK, it would be possible for them to integrate into ECE settings.

As a result, policymakers must consider increasing teachers' knowledge on the web by starting undergraduate years, and they need to support web usage in ECE classrooms. Suitable software and hardware must be developed. In addition, pre-service and in-service teachers should develop their awareness that today's children are digital natives, and they start to engage in technology and the web just after they are born. Therefore, early childhood classrooms must be where children would have their initial and beneficial experiences. With this consideration, they might be more motivated to integrate the web into their classrooms. Finally, even though the current study shared the teachers' self-reported practices, it is

important to make in-class observations to learn more about profession profiles' web-related experiences, and more experimental studies must be conducted to be able to find the most effective interventions related to the web usage in ECE settings.

References

Akayuure, P., Nabie, J. M., Sofo, S., & Sofo, S. (2013). Ghanaian prospective mathematics teachers' perceived self-efficacy towards web pedagogical content knowledge. *International Journal of Liberal Arts and Social Science, 1*(3), 132-140. https://ijlass.org/data/frontImages/gallery/Vol._1_No._3/13.pdf

Alan, Ü. (2021). Distance education during the COVID-19 pandemic in Turkey: Identifying the needs of early childhood educators. *Early Childhood Education Journal, 49*(5), 987-994. https://doi.org/10.1007/s10643-021-01197-y

Albirini, A. (2006). Teachers' attitudes toward information and communication technologies: The case of Syrian EFL teachers. *Computers & Education, 47*(4), 373-398. https://doi.org/10.1016/j.compedu.2004.10.013

Alhassan, R. (2017). Exploring the Relationship between Web 2.0 Tools Self-Efficacy and Teachers' Use of These Tools in Their Teaching. *Journal of Education and Learning, 6*(4), 217-228. http://doi.org/10.5539/jel.v6n4p217

Alkhayat, L., Ernest, J., & LaChenaye, J. (2020). Exploring Kuwaiti preservice early childhood teachers' beliefs about using web 2.0 technologies. *Early Childhood Education Journal*, *48*(6), 715-725. https://doi.org/10.1007/s10643-020-01036-6

Altun, D. (2019). Investigating Pre-Service Early Childhood Education Teachers' Technological Pedagogical Content Knowledge (TPACK) Competencies Regarding Digital Literacy Skills and Their Technology Attitudes and Usage. *Journal of Education and Learning*, *8*(1), 249-263. https://eric.ed.gov/?id=EJ1203450

Attewell, P., Battle, J., & Suazo-Garcia, B. (2003). Computers and young children: Social benefit or social problem?. *Social forces*, *82*(1), 277-296. https://doi.org/10.1353/sof.2003.0075

Aybek, E. C. (2019). *Durum Çalışmaları. İçinde: Sosyal Bilimlerde Nitel Araştırma Yöntemleri*(9. Baskı) (Bruce L. Berg & Howard Lune, Çeviren: Asım Arı). Eğitim Yayınevi

Becker, H. J., & Ravitz, J. L. (2001, March). Computer use by teachers: Are Cuban's predictions correct. In *Annual Meeting of the American Educational Research Association, Seattle, WA* (pp. 10-14). https://citeseerx.ist.psu.edu/viewdoc/download?doi=10.1.1.90.6742&rep=rep1&type=pdf

Buehl, M. M., & Beck, J. (2015). The relationship between teachers' beliefs and practices. In H. Fives & M. Gregorie Gill (Eds.), *International handbook of research on teachers' beliefs* (pp. 66-84). Routledge

Busch, C. (2019). *Brave New World: Can Positive Developments in Safety Science and Practice also have Negative Sides?*. In MATEC Web of Conferences (Vol. 273, p. 01003). EDP Sciences.

Caliskan, S., Guney, Z., Sakhieva, R., Vasbieva, D., & Zaitseva, N. (2019). Teachers' views on the availability of web 2.0 tools in education. *International Journal of Emerging Technologies in Learning (iJET), 14*(22), 70-81. https://www.learntechlib.org/p/217156/

Collinson, V., Kozina, E., Kate Lin, Y. H., Ling, L., Matheson, I., Newcombe, L., & Zogla, I. (2009). Professional development for teachers: A world of change. *European journal of teacher education*, *32*(1), 3-19. https://doi.org/10.1080/02619760802553022

Creswell, J. W. (2007). *Qualitative inquiry and research design: Choosing among five approaches* (2nd ed.). Sage Publications.

Dayal, H. C., & Tiko, L. (2020). When are we going to have the real school? A case study of early childhood education and care teachers' experiences surrounding education during the COVID-19 pandemic. *Australasian Journal of Early Childhood*, *45*(4), 336-347. https://doi.org/10.1177/1836939120966085

Demetriadis, S., Barbas, A., Molohides, A., Palaigeorgiou, G., Psillos, D., Vlahavas, I., ... & Pombortsis, A. (2003). "Cultures in negotiation": teachers' acceptance/resistance attitudes considering the infusion of technology into schools. *Computers & Education*, *41*(1), 19-37. https://doi.org/10.1016/S0360-1315(03)00012-5

Dini, J. P. A. U. (2021). The impact of distance learning implementation in early childhood education teacher profesional competence. *Jurnal Obsesi: Jurnal Pendidikan Anak Usia Dini*, *5*(2), 1815-1824. https://doi.org/10.31004/obsesi.v5i2.1009

Fang, Z. (1996). A review of research on teacher beliefs and practices. *Educational Research*, *38*(1), 47-65. https://doi.org/10.1080/0013188960380104

Ford, T. G., Kwon, K. A., & Tsotsoros, J. D. (2021). Early childhood distance learning in the US during the COVID pandemic: Challenges and opportunities. *Children and Youth Services Review*, *131*, 106297. https://doi.org/10.1016/j.childyouth.2021.106297

Fraenkel, J. R., Wallen, N. E., & Hyun H. H. (2012). *How to design and evaluate research in education* (8th ed.). McGraw Hill.

Gialamas, V., & Nikolopoulou, K. (2010). In-service and pre-service early childhood teachers' views and intentions about ICT use in early childhood settings: A comparative study. *Computers & Education*, *55*(1), 333-341. https://doi.org/10.1016/j.compedu.2010.01.019

Graham, C. R. (2011). Theoretical considerations for understanding technological pedagogical content knowledge (TPACK). *Computers & Education*, *57*(3), 1953-1960. https://doi.org/10.1016/j.compedu.2011.04.010

Guhal, S., & Leonard, J. (2002). Motivation in elementary mathematics: How students and teacher benefit from computers. *TechTrends*, *46*(1), 40. https://www.proquest.com/scholarly-journals/motivation-elementary-mathematics-how-students/docview/223129116/se-2

Hidayati, N. (2021, March). *Distance Learning in Early Childhood Education During Pandemic Covid-19*. In 5th International Conference on Early Childhood Education (ICECE 2020) (pp. 207-211). Atlantis Press.

Hilal, A. H., & Alabri, S. S. (2013). Using NVivo for data analysis in qualitative research. *International interdisciplinary journal of education 2*(2), 181-186. https://www.proquest.com/scholarly-journals/motivation-elementary-mathematics-how-students/docview/223129116/se-2

Horzum, M. B. (2011). Web pedagojik içerik bilgisi ölçeği'nin türkçeye uyarlaması. *İlköğretim Online*, *10*(1), 257-272. https://doi.org/10.17583/qre.2020.5872

Hu, X., Chiu, M. M., Leung, W. M. V., & Yelland, N. (2021). Technology integration for young children during COVID-19: Towards future online teaching. *British Journal of Educational Technology*, *52*(4), 1513-1537. https://doi.org/10.1111/bjet.13106

Kale, U. (2014). Can they plan to teach with Web 2.0? Future teachers' potential use of the emerging web. Technology, pedagogy and education, 23(4), 471-489.

Kaşcı, T., & Selçuk, G. (2021). Examination of classroom teachers' technological pedagogical content knowledge and teacher self-efficacy beliefs. *Journal of Educational Technology and Online Learning*, *4*(4), 774-792. http://doi.org/10.31681/jetol.1018879

Keengwe, J. (2007). Faculty integration of technology into instruction and students' perceptions of computer technology to improve student learning. *Journal of Information Technology Education: Research*, *6*(1), 169-180. https://www.learntechlib.org/p/111414/.

Kelly, K. L., & Schorger, J. R. (2001). "Let's Play 'Puters": Expressive Language Use at the Computer Center. *Information Technology in Childhood Education Annual*, *2001*(1), 125-138. https://www.learntechlib.org/primary/p/8497/.

Kim, J. (2020). Learning and teaching online during Covid-19: Experiences of student teachers in an early childhood education practicum. *International Journal of Early Childhood*, *52*(2), 145-158. https://doi.org/10.1007/s13158-020-00272-6

Kim, P., Miranda, T., & Olaciregui, C. (2008). Pocket school: Exploring mobile technology as a sustainable literacy education option for underserved indigenous children in Latin America. *International Journal of Educational Development*, *28*(4), 435-445. https://doi.org/10.1016/j.ijedudev.2007.11.002

Ko, S. (2002). An empirical analysis of children's thinking and learning in a computer game context. *Educational psychology*, *22*(2), 219-233. https://doi.org/10.1080/01443410120115274

Koehler, M. J., & Mishra, P. (2005). What happens when teachers design educational technology? The development of technological pedagogical content knowledge. *Journal of educational computing research*, *32*(2), 131-152. https://doi.org/10.2190/0EW7-01WB-BKHL-QDYV

Koehler, M. J., & Mishra, P. (2009). What is technological pedagogical content knowledge? *Contemporary Issues in Technology and Teacher Education*, *9*(1), 60–70. https://www.learntechlib.org/primary/d/29544

Korucu, A. T., & Yücel, A. (2015). İnformationtechnologiesteachers' ideasaboutdynamic webtechnologies use in education. *Eğitim Teknolojisi Kuram ve Uygulama,5*(2), 126-152. https://dx.doi.org/10.17943/etku.78815

Lee, J., Cerreto, F. A., & Lee, J. (2010). Theory of planned behavior and teachers' decisions regarding use of educational technology. *Journal of Educational Technology & Society*, *13*(1), 152-164. https://www.jstor.org/stable/jeductechsoci.13.1.152

Lee, M.H. & Tsai, C.C. (2010). Exploring Teachers' Perceived Self Efficacy and Technological Pedagogical Content Knowledge with Respect to Educational Use of the World Wide Web. *Instructional Science: An International Journal of the Learning Sciences*, *38*(1), 1-21. https://doi.org/10.1007/s11251-008-9075-4

Liang, J. C., Chai, C. S., Koh, J. H. L., Yang, C. J., & Tsai, C. C. (2013). Surveying in-service preschool teachers' technological pedagogical content knowledge. *Australasian Journal of Educational Technology*, *29*(4), 581- 594, https://doi.org/10.14742/ajet.299

Lightfoot, J. M. (2005). Integrating emerging technologies into traditional classrooms: A pedagogic approach. *International Journal of Instructional Media*, *32*(3), 209. https://www.proquest.com/scholarly-journals/integrating-emerging-technologies-into/docview/204276761/se-2

Lim, J., & Newby, T. J. (2020). Preservice teachers' Web 2.0 experiences and perceptions on Web 2.0 as a personal learning environment. *Journal of Computing in Higher Education*, *32*(2), 234-260. https://doi.org/10.1007/s12528-019-09227-w

Mäntymäki, M., & Islam, A. N. (2016). The Janus face of Facebook: Positive and negative sides of social networking site use. *Computers in Human Behavior, 61*, 14-26. https://doi.org/10.1016/j.chb.2016.02.078

Míguez, R., Rubén, S., & Anido-Rifón, L. (2009). Using Web 2.0 Technologies in Early Childhood Education. In *Proc. of TELearn* (pp. 6-8).

Mikušková, E. B., & Verešová, M. (2020). Distance education during COVID-19: the perspective of Slovak teachers. *Problems of Education in the 21st Century, 78*(6), 884-906. https://doi.org/10.33225/pec/20.78.884

Miles, M. B. & Huberman, A.M. (1994). *Qualitative data analysis: an expanded sourcebook.* (2nd Edition). SAGE Publications.

Mishra, P., & Koehler, M. J. (2008, March 24-28). *Introducing technological pedagogical content knowledge*. Annual Meeting of the American Educational Research. http://www.matt-koehler.com/publications/Mishra_Koehler_AERA_2008.pdf

NAEYC. (2012). *Technology and interactive media as tools in early childhood programs serving children from birth through age 8.* NAEYC. https://www.naeyc.org/sites/default/files/globally-shared/downloads/PDFs/resources/position-statements/ps_technology.pdf

Neugebauer, S. R., Hopkins, M., & Spillane, J. P. (2019). Social Sources of Teacher Self-Effcacy: The Potency of Teacher Interactions and Proximity to Instruction. *Teachers College Record*, *121*(4), 1-32. https://doi.org/10.1177/016146811912100405

Postholm, M. B. (2012). Teachers' professional development: a theoretical review. *Educational research*, *54*(4), 405-429. https://doi.org/10.1080/00131881.2012.734725

Rosen, L. D., & Weil, M. M. (1995). Computer availability, computer experience and technophobia among public school teachers. *Computers in human behavior*, *11*(1), 9-31. https://doi.org/10.1016/0747-5632(94)00018-D

Sandholtz, J. H., Ringstaff, C., & Dwyer, D. C. (1997). *Teaching with technology Creating student-centered classrooms*. Teachers College Press.

Sari, T., & Nayır, F. (2020). Challenges in distance education during the (Covid-19) pandemic period. *Qualitative Research in Education*, *9*(3), 328-360. https://doi.org/10.17583/qre.2020.5872

Selwyn, N. (2007). *Web 2.0 applications as alternative environments for informal learning –a critical review.* Paper for OCEDKERIS expert meeting. Session 6 –alternative learning environments in practice: using ICT to change impact and outcomes. http://www.oecd.org/education/ceri/39458556.pdf

Shiue, Y. M. (2007). Investigating the sources of teachers' instructional technology use through the decomposed theory of planned behavior. *Journal of Educational Computing Research*, *36*(4), 425-453. https://doi.org/10.2190/A407-22RR-50X6-2830

Siegler, R. S. (1998). *Emerging minds: The process of change in children's thinking*. Oxford University Press.

Sivin-Kachala, J., & Bialo, E. (2000). *2000 research report on the effectiveness of technology in schools* (7th ed.). Washington, DC: Software and Information Industry Association.

Solekhah, H. (2020). Distance learning of Indonesian early childhood education (PAUD) during the COVID-19 Pandemic. *International Journal of Emerging Issues in Early Childhood Education*, *2*(2), 105-115. https://doi.org/10.31098/ijeiece.v2i2.409

United Nations (UN). (2020). *Policy brief: The impact of Covid-19 on children.* https://unsdg.un.org/sites/default/files/2020-04/160420_Covid_Children_Policy_Brief.pdf

United Nations Educational, Scientific and Cultural Organization (UNESCO). (2020). *Education: From disruption to recovery.* https://en.unesco.org/covid19/educationresponse

United Nations International Children's Emargency Fund (UNICEF). (2020). *Covid19: Are children able to continue learning during school closures?* https://www.unicef.org/brazil/media/10006/file/remote-learningfactsheet.PDF

Uzun, A. (2008). *Eğitim Fakültelerinde Bilgisayar Okur-Yazarlığının İnternet Tabanlı Öğretim Tasarımı İle Desteklenmesi* Doktora Tezi. Uludağ Üniversitesi Sosyal Bilimler Enstitüsü.

Williamson, B., Eynon, R., & Potter, J. (2020). Pandemic politics, pedagogies and practices: digital technologies and distance education during the coronavirus emergency. *Learning, Media and Technology, 45*(2), 107-114. https://doi.org/10.1080/17439884.2020.1761641

Wood, E., Specht, J., Willoughby, T., & Mueller, J. (2008). Integrating computer technology in early childhood education environments: issues raised by early childhood educators. *Alberta Journal of Educational Research, 54*(2), 210–228. https://ajer.journalhosting.ucalgary.ca/index.php/ajer/article/view/630/613

Wood, E., Willoughby, T., Specht, J., Stern-Cavalcante, W., & Child, C. (2002). Developing a computer workshop to facilitate computer skills and minimize anxiety for early childhood educators. *Journal of educational psychology*, *94*(1), 164. https://doi.org/10.1037/0022-0663.94.1.164

Zhang, Z., Zhou, Y., Huang, X., Wu, L. (2005). Answering Definition Questions Using Web Knowledge Bases. In: Dale, R., Wong, KF., Su, J., Kwong, O.Y. (eds) *Natural Language Processing* – IJCNLP 2005. IJCNLP 2005. Lecture Notes in Computer Science(), vol 3651. Springer, Berlin, Heidelberg. https://doi.org/10.1007/11562214_44