

Elementary Teacher Experiences on Digital Safety Professional Development and Facilitation of an Immersion Summer Camp

Florence Martin

Doreen Mushi

Siyu Long

North Carolina State University

Julie Bacak

Drew Polly

WeiChao Wang

Lynn Ahlgrim-Delzell

University of North Carolina Charlotte

Citation for Article

Martin, F., Mushi, D., Long, S., Bacak, J., Polly, D., Wang, W., & Ahlgrim-Delzell (2024). Elementary Teacher Experiences on Digital Safety Professional Development and Facilitation of an Immersion Summer Camp. *Journal of Technology and Teacher Education*, 32(2), 159-186.

Elementary Teacher Experiences on Digital Safety Professional Development and Facilitation of an Immersion Summer Camp

ABSTRACT

Digital safety involves protecting oneself, and one's personal information to mitigate the risks that are inherently associated with using digital technologies. This study employed a multi-method design to explore 26 in-service and pre-service elementary teacher experiences from attending a professional development on digital safety and facilitating a digital safety immersion summer camp. Data was collected through pre- and post-test assessments, surveys, and interviews. Findings from knowledge assessments indicate no significant difference in pre- and post-test assessment. However, elementary teachers displayed high motivation, valuing the critical need for ongoing digital safety education and opportunities for collaboration and self-reflection from the survey and interviews. Teacher challenges included teaching students from different backgrounds with varied expectations and engaging the learners. This study provides recommendations for teacher professional development and has implications for designing teacher professional development on digital safety and for administrators to offer support on digital safety topics amidst the challenges the teachers discussed.

Keywords: Digital Safety, Teacher Preparation, Teacher Professional Development, Elementary Teacher

Teacher Experiences from Digital Safety Professional Development and Facilitation of an Immersion Summer Camp for Elementary Learners

Digital safety is a contemporary topic on which teachers need professional development as they have the responsibility to not only stay safe but also keep learners safe in the digital world (e.g., International Society for Technology in Education [ISTE], n.d.). Digital safety involves protecting oneself, and one's personal information to mitigate the risks that are inherently associated with using digital technologies, platforms, and services (Tomczyk, 2019). The definition of digital safety can be extended to include knowledge and awareness of protection strategies for individuals' personal data, identity, or assets against harmful attacks (Martin et al, 2020; Ribble, 2015; Tomczyk, 2019). These include deploying a set of skills to use technological devices and engage online responsibly and securely (Torres-Hernández & Gallego-Arrufat, 2022). Studies that have focused on digital safety concepts have indicated that there is an alignment between digital safety, digital citizenship, and digital literacy (Tomczyk, 2019; Reisoğlu & Çebi, 2020) and these have collectively been referred to as digital competencies (Reisoğlu & Çebi, 2020). These definitions have been emerging as a response to the rapidly evolving technological advancements that constantly require new skill sets to navigate their use and impact. This means individuals ultimately need to be digitally literate to assess the risks linked to their engagement with digital technologies.

Research suggests that in educational contexts, digital safety education should be conducted separately from digital literacy and digital citizenship (Jones & Mitchell, 2016). Literature recognizes the critical urgency of raising awareness on digital safety

topics and concepts in the K–12 school system (Hollandsworth et al., 2017). For elementary teachers in particular, it is imperative for them to be able to identify and prevent the threats (Kritzing, 2017), especially in teaching elementary-age students who are particularly susceptible to technology misuses and threats (Walters et al., 2019).

In the context of this study, elementary teachers who participated in the digital safety immersion camp built competencies in digital safety education by engaging with four key topics. These include cyberbullying, digital identities and footprint, netiquette and responsible online behavior, digital privacy and security. Earlier works by Martin and colleagues (2019, 2020) describe the process of deriving these core topics from Ribble's framework on digital citizenship (Ribble, 2015; Ribble et al., 2004). The framework highlights Respect, Protect and Educate as three key elements that should be put into consideration for people to use technology properly and responsibly (Ribble, 2015; Ribble & Bailey, 2007).

Digital Safety Professional Development for Teachers

The emphasis on training teachers in digital safety concepts comes from the ongoing recognition of the importance of building capacities and competencies of teachers in digital technologies (Gallego-Arrufat et al., 2019; Reisoğlu & Çebi, 2020). Teachers bear the responsibility of guiding students who are experiencing education in an era where technology is the key driver of essential processes and societies. In the educational environment, it is important for elementary teachers not only to be aware of the threats and risks of digital technologies but also to know how to identify and prevent these threats (Kritzing, 2017). Being a subset of digital literacy (Tomczyk, 2019),

digital citizenry (Ribble, 2015), and digital competence (Gallego-Arrufat et al., 2019), the mastery of digital safety approaches inherently encompasses the acquisition of “cognitive, attitudinal and technical skills that help mitigate challenges and problems in the knowledge society” (Gallego-Arrufat et al., 2019, p. 54). In their study on identifying pre-service teachers’ indicators on digital security, Torres-Hernández & Gallego-Arrufat (2022) contend that professional development goes beyond learning topics such as cyberbullying, online privacy or identity risks; they need to be equipped with didactic and methodological competencies to enable future lesson designs and implementation of effective digital safety programs. The rapid evolution of digital technologies calls for educators who are knowledgeable and skilled to nurture and support the development of responsible digital citizens (Kim & Choi, 2018; Ribble, 2015). Research highlights the urgency of deploying a coherent approach to teaching digital safety in training programs that target pre-service and in-service teachers’ mastery of digital skills (Chou & Peng, 2011; Tomczyk, 2019). Digital safety is considered a key competence in developing a digital citizenry and a crucial element in lifelong learning processes.

Previous studies have developed, explored, and validated topics that are considered significant for the holistic training of digital citizenship and digital safety concepts. For instance, Gallego-Arrufat and colleagues (2019) proposed topics such as netiquette, rules for online communication, secure protection of devices and password creation, identity, digital divide, fingerprint, and personal data protection. The growing and evolving digital culture demands elementary teachers to be useful, practical, and oriented to training critical, responsible citizens.

Teacher Experiences Teaching Digital Safety

The frameworks of digital citizenship have highlighted the role of schools, teachers, and educational practitioners in raising awareness of concepts of digital citizenship and proliferating risks of online engagement to students. This call is part of efforts put in place to prepare young learners as responsible and smart users of digital devices, platforms, and their associated technologies (James et al., 2019; Ozturk, 2021; Ribble, 2015; Ribble & Bailey, 2007)

Previous empirical research has linked teachers' competencies in teaching digital safety as part of competencies in digital literacy (Tomczyk, 2019). In fact, discussions and arguments regarding digital safety awareness for teachers have emerged from studies that have investigated the process of teaching digital literacy and digital citizenship (Ozturk, 2021; Ribble, 2007). For instance, the DIGCOMP framework by Ferrari and Punie (2013) categorized safety as a component of five digital literacy areas that teachers need to possess. The safety dimension includes protecting devices, personal data, and netiquette.

Focusing on teachers, studies have indicated that competencies and experiences in teaching digital safety are associated with different factors including years in the career (Tomczyk, 2020), the technology subjects taught and background exposure to ICT. In their study investigating the levels of digital literacy and safety among low-secondary teachers, Tomczyk (2020) and colleagues report that low levels of safety skills prevailed in teachers who were in the early years of their teaching career. The following aspects of digital literacy were measured: awareness of the mechanisms of communication with other Internet users and any threats resulting thereof, understanding what sexting is and what is meant by the invasion of privacy, knowledge

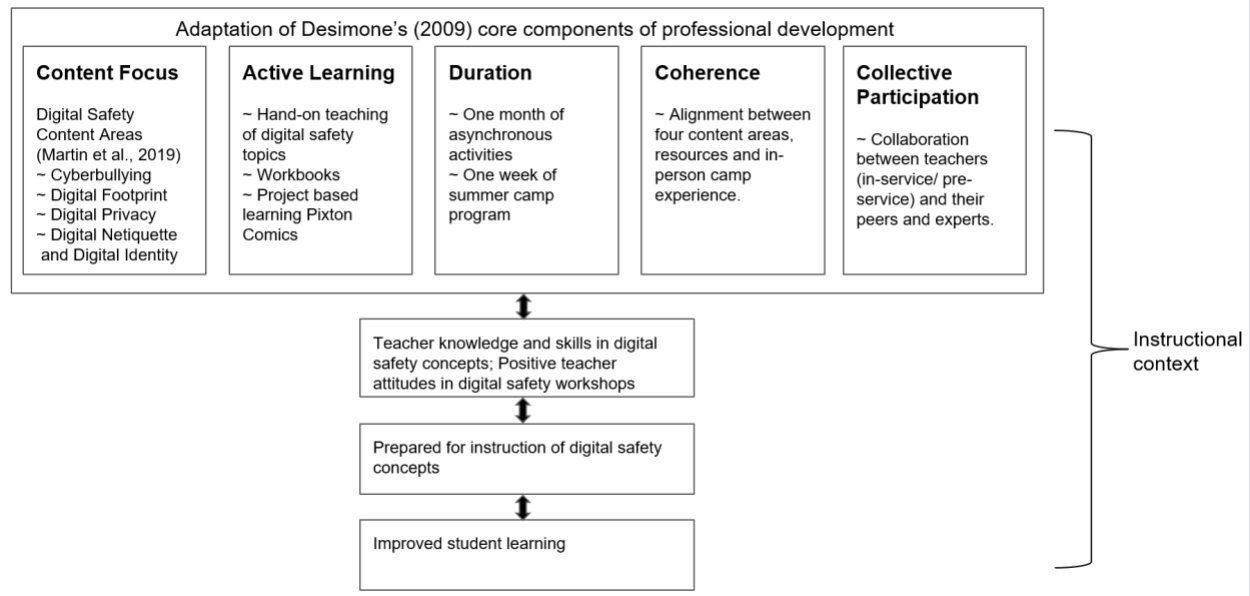
about copyright, ability to verify the credibility of information available online, and awareness of cyberbullying and its prevention.

Conceptual Framework

In this study, we employ Desimone's (2009) framework to evaluate teachers' experiences within a professional development program. Desimone's (2009) framework provides a comprehensive structure for assessing the effectiveness of professional development programs by focusing on four key components: content focus, coherence, active learning, and duration, along with collective participation. By applying this framework (see Figure 1), we aim to gain a deeper understanding of how these elements contribute to teachers' knowledge and skill acquisition in the context of digital safety education. Research emphasizes the importance of content focused professional development programs that has seamless alignment of resources and active learning activities in a designated timeframe (Desimone, 2009; Desimone & Garet, 2015). In the digital safety program, teachers are capacitated in digital safety content areas (Martin et al., 2019) which are aligned with their needs and expectations. We utilize this dimension to examine the relevance, depth, and breadth of these content areas in addressing the challenges posed by exposure to digital platforms and online presence. Moreover, the framework offers a perspective for investigating how the program's activities facilitated teachers in understanding and applying digital safety concepts, both for themselves and their students. This involves analyzing how experiences such as collaborating with peers on activities, Pixton comics projects, and reflection opportunities, provide valuable insights for the study.

Figure 1

Desimone's (2009) Components Of Professional Development



Purpose of the Study and Research Questions

Digital safety workshops are critical for all K–12 educators. Research team members have previously worked on projects with middle school and high school educators (Martin et al., 2022). However, with the increase in the use of digital technologies by young learners, this study focused on preparing elementary school teachers as it is critical for them to be equipped to teach digital safety to ensure the well-being of their elementary students in today's digital age. As discussed in the literature, there are cyber risks such as cyberbullying, digital security, and privacy challenges for both elementary learners and teachers. In addition, it is also essential to be prepared on cyber hygiene topics such as digital netiquette, digital footprint, and digital identity, which are essential for modeling digital citizenship. The purpose of the

study is to explore elementary educators' experiences, motivation, and challenges related to participating in professional development on digital safety and teaching digital safety to elementary school learners. Specifically, the study is framed around these research questions:

1. What are elementary educators' experiences (knowledge gained and attitudes) from attending digital safety professional development and facilitating the summer camp?
2. What motivated elementary educators to participate in a digital safety professional development and facilitate the summer camp?
3. What are elementary educator challenges and needs for teaching digital safety?

Methods

The prior contributions of Martin and colleagues (2019), which also act as building blocks for this study, describe digital citizenship in the context of cyberbullying, digital footprint, digital privacy, digital netiquette, and digital identity. These concepts describe and highlight responsible digital habits that are fundamental for individuals to function in a digital world. The design of the program as well as the evaluation of experience in study is based on these tenets.

This study used a multi-methods design that included both quantitative and qualitative data collection methods on professional development for elementary school teachers to facilitate a summer camp on digital safety. Quantitative data included pre- and post-test assessments on teachers' knowledge of digital safety concepts and survey data about teachers' perceptions about their experiences from the professional

development and from facilitating the summer immersion camp for elementary learners. Qualitative data included open-ended survey items about teachers' perceptions on the professional development and camp facilitation and interviews with teacher participants on their motivation, needs and challenges. This multimethod design provided us to get a thorough understanding of the small sample in the context and have been recommended as good practice for case study evaluations (Datta, 1997). Though data on student outcomes were collected, they are reported in a separate manuscript.

Digital Safety Teacher Training

The teachers, who included both pre-service and in-service teachers, participated in professional development on digital safety delivered over a month asynchronously before the summer immersion camp. Understanding the need and value of collaboration between pre-service and in-service teachers (Chen, 2012), as teacher educators we wanted to provide opportunities not only for in-service teachers but also pre-service teachers to be prepared on digital safety and facilitate summer camps. These digital safety knowledge and skills are important to both groups of teachers, and it is a meaningful opportunity for pre-service teachers to be in a classroom with in-service teachers and co-facilitate with them. The four modules included digital identity and digital footprint, cyberbullying, digital netiquette and responsible online behavior, digital privacy and digital security based on prior research and needs assessment. The instructional material was developed by an educational technology expert who had collaborated with teachers for more than 30 years and had also previously developed another digital safety training for K–12 educators (Martin et al., 2022). The research team reviewed and provided feedback on the material. Table 1

displays the description of each module topic. Figure 2 includes a screenshot of a sample module in Canvas and the landing page with learning objectives. Each module included readings, videos, discussion board posts, and practice activities. The professional development course was the same for both years except for few minor updates based on feedback received in year 1.

Table 1

Digital Safety Training Topics

Module	Description
1. Digital Identity and Digital Footprint	Digital Identity is how one perceives themselves and how others perceive them online. Digital footprint is data one leaves online when they share personal information about themselves
2. Cyberbullying	Cyberbullying takes place when someone deliberately upsets or harasses someone else repeatedly using online or mobile technology
3. Netiquette & Responsible Online Behavior	Netiquette is the unspoken rules that guide on how to behave and communicate online
4. Digital Privacy and Digital Security	Digital security refers to how one can secure his/her identity and technology in the online world, and digital privacy refers to the privacy of the digital information shared

Figure 2

Screenshot of Digital Safety Module from Teacher Professional Development

⋮	▼ Module 1: Cyber Bullying
⋮	📄 Cyber Bullying
⋮	📄 Cyber Bullying Goal
⋮	📄 Cyber Bullying Introductory Video
⋮	📄 Types of Bullies
⋮	📄 Cyber Bullying Learning Activities
⋮	💬 Module 1 - Activity 1 Discussion
⋮	💬 Module 1 - Activity 2 Discussion
⋮	💬 Module 1 - Activity 3 Discussion
⋮	📄 Module 1 Interactive Practice Activity Submission May 26, 2022 8 pts
⋮	Module Resources for Teachers
⋮	📄 Cyberbullying Instructional Resources

Workshop Participants

In Year 1 and 2, elementary teachers were recruited from two different school districts in the southeastern United States. The district in Year 1 was a small district (six elementary schools) with a large majority of their students experiencing poverty. The district in Year 2 was a larger district (20 elementary schools) that had a balance of schools with some more affluent populations and some with large proportions of students experiencing poverty. In Year 2, the camp was offered at this large school district and also at a university location, expanding its reach as recovering from the previous year's COVID-19 restrictions. In year 1, 10 teachers participated in the professional development, and in year 2, 16 teachers participated in the professional development. Grade levels and content areas taught by teachers are included in Table

2. As elementary school teachers, some teachers taught more than one grade level and content area. Most teachers have not attended a workshop on digital safety prior to the current workshop. Two teachers had attended one and one teacher had attended two previous workshops on digital safety. Once the teachers completed the workshop, they facilitated the summer camp for which they received financial incentives.

Table 2

Teachers Grade Level and Content Areas

	Year 1		Year 2	
	<i>F</i>	<i>%</i>	<i>F</i>	<i>%</i>
Grade level*				
3 rd	2	20	3	21.4
4 th	1	10	5	35.7
5 th	2	20	8	57.1
Other	7	70	12	85.7
Content areas currently teach*				
ELA	4	40.0	8	57.1
Math	4	40.0	3	21.4
Science	3	30.0	6	42.9
Social Studies	3	30.0	10	71.4

Media/Technology	3	30	2	14.3
Other	3	30	8	34.8
Teacher Status				
In-service	5	50	9	56
Pre-service	5	50	7	44

* some teachers taught more than one grade level and content area

Interview Participants

Five teachers who attended the workshop participated in interviews on zoom to discuss their professional development and camp experience. The selection of these participants was based on indicated interest upon responding to recruitment email communication from the researchers. The participants' demographics included three in-service teachers, one pre-service teacher, and one media coordinator serving in elementary schools across North Carolina. The in-service teachers taught Science, Media Technology, and ELA with years of teaching experience ranging from 7 to 29. All participants were white and female.

Instruments

The instruments included pre and post-test assessment, survey, and interview questionnaire. The assessment and survey were developed by educational technology expert who led the professional development for teachers and feedback was provided by the research team. The interview questionnaire was developed by the lead researcher and feedback was provided by the research team.

Pre and Post-test

At the beginning of the professional development, teachers completed a curriculum-based pre-test related to their knowledge of digital safety topics. The pre-test included 25 multiple-choice items related to the four digital safety topics (cyberbullying, digital security and privacy, digital footprint, and digital netiquette) addressed in the modules. The same instrument was used as a post-test once teachers completed the online training modules. Content validity is established through the use of an expert in the field and connection to a conceptual model and instructional modules. Reliability for this assessment was not established due to the small sample size.

Survey

After completing both the online training modules and the in-person professional development workshop, teachers completed a survey to better understand their perceptions of the training they received. The survey included 10 Likert scale items related to the effectiveness of the professional development they received and how likely they were to use the content of the modules in their own classroom. Additionally, the survey instrument included three open-ended items. These open-ended items asked teachers to share the aspects of the camp materials they liked the most and the least. Teachers were also asked to share suggestions for improvements to the camp content and materials used. Content validity of the survey was established through the use of experts in the field and survey design.

Interview Questionnaire

The interview protocol consisted of two parts. The first part included six demographic questions aiming to collect information on teaching roles, years of

experience, grade and subjects taught, gender, and race/ethnicity. For pre-service teachers, the demographic information collected was narrowed to the grade level they anticipate teaching as well as gender and ethnicity. The second part of the questionnaire consisted of 15 open-ended questions targeting teachers' experiences in facilitating the four digital safety topics (cyberbullying, digital security and privacy, digital footprint, and digital netiquette) during the summer camp. The open-ended questions were categorized into five sections covering motivation and importance, experience, practice, challenges as well as needs and support.

Reliability was enhanced using the zoom transcription and re-reviewing it for accuracy. The coding scheme was cross-checked independently by the lead researcher to prevent coder bias and the codes were discussed with other researchers as part of peer debriefing before finalizing. To enhance validity, the findings were checked for credibility, to make sure the results provided an accurate interpretation of participants' meaning. In addition, the findings were reviewed for authenticity, making sure different voices were heard (Creswell & Poth, 2013).

Data Collection

In Year 1, all of the 10 teachers (five pre-service and five in-service) who participated in the professional development completed the pre and post workshop knowledge assessments and end-of-training survey. In year 2, 16 teachers (eight pre-service and eight in-service) completed the pre and post knowledge assessments and 14 completed the end of the workshop survey. All the evaluation activities were completed online and accessed through Canvas Learning Management System where the training material was delivered. The pre and post-tests were created as

assessments in Canvas, however, the post workshop survey was created on Qualtrics. After the workshop and summer camps, the interviews were conducted virtually through zoom with five teachers. Each interview lasted on average 30-minutes. While teachers completed the workshop before they taught the summer camp, and they were paid for facilitating the camp, they had the opportunity to receive an additional \$25 gift card for participating in the interview.

Data Analysis

Data was entered into and analyzed using SPSS 26. Descriptive statistics for the pre and post-tests were conducted upon completion of the training to assess the increase in teacher knowledge of digital safety. Because of the small sample size, nonparametric statistics were used to examine the differences between pre- and post-test and type of teacher. A related-samples Wilcoxon signed ranks test was conducted to examine statistical differences between the pre and post-tests. An Independent-Samples Mann-Whitney U test examined the differences between pre-service and in-service teachers separately for the pre-test and post-test. A workshop evaluation was conducted after teachers completed the training where teachers reported their opinion. Four-point Likert scale with *strongly agree*, *agree*, *disagree*, and *strongly disagree* was used to collect feedback about the training. These results include frequency and percent for each item of the survey as well as thematic analysis of the open-ended responses.

The process of analyzing interview data involved transcribing the recordings and performing two cycles of coding to generate themes. The first cycle utilized descriptive coding (Saldaña, 2016) which summarized passages of respondents' data based on the topic. The emergent codes were then categorized according to patterns and the final

themes were identified by aligning the categories to the key constructs from the research questions.

Results

The results are presented by each research question.

Digital Safety Teacher Experience

Knowledge Assessments

The pre-test and post-test consisted of 25 questions with each correct item assigned one point. In Year 1, for the 10 teachers who completed the assessments, the mean percent correct and standard deviation for the pre-test was 82.4 and for the post-test was 82.8. In order to examine whether the difference between pre- and post-test was statistically significant, a Related-Samples Wilcoxon Signed Rank test was conducted. The difference was not statistically significant, $z = -.272$, $p = .78$. Differences between pre-service and in-service teachers were also examined (see Table 2) separately for the pre-test and post-test using the Independent-Samples Mann-Whitney U test. Neither test was statistically significant, pre-test $U = 7.5$, $p = .31$ and post-test $U = 9.0$, $p = .55$. The mean score for pre-service teachers was slightly higher (ranging from 80% to 88%) than in-service teachers (ranging from 76% to 84%) teachers for the pre-test. The mean score for pre-service teachers was also slightly higher (ranging from 80% to 88%) than in-service teachers (ranging from 76% to 96%) teachers for the post-test.

In year 2, 16 teachers completed the pre-test assessment prior to completing the digital safety training module. The pre-test score was 72.8% and the post-test score was 72%. One teacher dropped out of the summer camp prior to the post-test. Due to

the small sample size a related-samples Wilcoxon signed ranks test was conducted.

There is no statistical difference between the pre-test and post-test scores ($W = 40.0$, $p = .73$). In order to examine the differences between pre- and in-service teachers in Year 2, an independent-samples Mann-Whitney U test was conducted. There is no significant difference between in-service and pre-service teachers on the pre-test ($U = 15.0$, $p = .09$) or post-test ($U = 25.0$, $p = .86$). Table 3 displays the descriptive statistics for Year 1 and 2 knowledge assessments.

Table 3. Teacher Knowledge and Assessments

	Year 1 Pre-test		Year 1 Post-test		Year 2 Pre-test		Year 2 Post-test	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Pre-service	84.0	2.8	83.2	3.3	69.2	1.6	69.3	3.1
In-service	80.0	4.4	82.4	8.3	75.6	2.2	73.8	2.30

Digital Safety Workshop Attitudes

In Year 1, for the questions on the post-survey, all of the teachers either agreed or strongly agreed, except for two items. When asked about whether the workshop was effective in learning about digital practices, two teachers disagreed. One teacher disagreed that they were likely to take this content to their own classroom or school.

In Year 2, 14 teachers completed the professional development evaluation. Table 4 displays the results of the evaluation survey after the Year 2 training. Immediately after the training, the teachers rated all aspects of professional development positively with the lowest mean rating for “The online course was effective in helping me learn digital

citizenship practices” ($M = 3.0$). Table 4 includes responses from teachers in Year 1 and 2.

Table 4

Teacher Post-Survey Results

	Year 1		Year 2	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
The directions in the training were easy to follow.	3.4	.52	3.4	.32
The camp training materials were easy to navigate	3.3	.48	3.3	.42
The content was presented in an organized manner.	3.4	.52	3.4	0
The face-to-face training encouraged critical engagement with the material.	3.4	.52	3.4	.42
Access to the online digital course allowed me to familiarize myself with digital citizenship content.	3.3	.48	3.3	.48
The face-to-face training allowed me to familiarize myself with the camp content.	3.3	.48	3.3	.32
The information I learned during the face-to-face training was worth my time.	3.2	.42	3.2	.42

The online course was effective in helping me learn digital citizenship practices.	3.0	.66	3.0	.32
The face-to-face training was engaging.	3.2	.42	3.2	0
I am very likely to take this content to my own classroom/school	3.2	.63	3.2	.50

Most-liked camp material

A majority of the participants shared that the organization of the camp resources made their involvement exciting, motivating, and effective. The resources such as the lesson plans, slides and books enhanced their teaching experience and allowed them to adapt and modify content to be relevant to their classrooms. For instance, one participant wrote, “I enjoyed the chance to see the lesson modules in advance and have the ability to modify/enhance the lesson to be personable to the students we will have in the classroom (Teacher F).”

In terms of particular topics, cyberbullying had the most positive sentiment, with teachers emphasizing its importance to students and their treatment of others. Participants appreciated the guest speakers and the connections that the topics and resources had with real-life situations. Teacher D shared, “I think the connections to real life are wonderful. Several topics presented were issues we experienced in class.” Additionally, project-related, the integration and use of Pixton comics to support students’ understanding of the topics was appreciated in the responses.

Least-liked camp material

Regarding the least-liked camp material, the participants frequently cited the workbooks as being dense and lacking in interactive learning components. In the coded responses, participants proposed digitization of the workbooks to make the activities more engaging and collaborative. Teacher S shared “Workbook pages. Is there a way to make it more tech-engaging instead of workbook pages?” Additionally, respondents shared that:

It may have been more beneficial for the students to have interactive lessons that allow them to work with a partner, small group, get up and move, etc. The lessons also felt relatively long as I was teaching them. For this reason, the teachers I worked with decided it would be best to incorporate more brain breaks to give students the time to re-energize and become more engaged. (Teacher M)

Teacher motivation to participate in a digital safety professional development course and facilitate the summer camp

The following themes emerged when studying teacher motivation to participate in the digital safety professional development course and facilitate the summer camp.

The Need for Digital Safety Education for Elementary Learners

The teacher participants indicated that the critical need for digital safety education was one of the core factors that motivated them to take part in the program. Teachers highlighted the importance of bridging the existing gap between the extent of use of digital platforms and the education that is being offered on the risks that come with engaging in such spaces at a young age. One teacher wrote:

The need for training in digital safety topics as the use of social media is rapidly increasing. There’s a lot of kids who don’t get it at home, and especially the population that I teach, and they absolutely deserve to know this for their safety and for their future. (Teacher E)

Additionally, interviewed participants shared that the need for teaching digital safety has become more crucial after the COVID-19 pandemic shutdown and the shift toward online learning. A majority of students were exposed to digital technologies without receiving safe guidance regarding their adoption and use. One teacher shared:

I realized very quickly that during the COVID shut down all these kids were just given these phones so that they weren't home alone when schools were shut down, but nobody ever gave them anything to do with it. (Teacher B)

Another important perspective that was shared in the responses is the motivation that came from observed behaviors and concerns from their students during their teaching practice. One respondent in particular stated, "I also really struggled last year with my students. There was a lot of online bullying, so we had to visit the office several times for things that happened outside of school (Teacher D)." Teachers emphasized that taking part in offering digital safety education was the timely thing to do that would impart change to their students.

Gaining Experience in Teaching Digital Safety

Participants shared that their involvement in the program would contribute to developing competencies and supplemental skills needed for their job roles and responsibilities as digital citizenship educators in their respective schools. One participant shared that one of the digital components of their job is to teach digital citizenship to fifth graders. They further stated:

I felt that teaching the camp would give me experience and resources that I could use to further educate students in regard to digital citizenship and being safe online and everything that has to do with students today, and how the platform is ever-changing. (Teacher C)

Teachers highlighted the importance of their role and involvement in bridging the existing gap between the levels of use of digital platforms at a young age and the education offered.

Opportunities to Collaborate and Network with Other Teachers

The program presented a platform for collaboration among elementary teachers who share similar interests in educating about digital safety topics and concepts. Pre-service teachers shared that the program served as a great preparation as they got to work with students and in-service teachers who are more knowledgeable and experienced in the field. Teacher A wrote, “Good preparation as a pre-service teacher to work with students and to make connections with other teachers in the field.”

Topics Cultivated Self-Reflection in Digital Safety Practices

A prevalent theme across responses is that the topics taught at the camp led to self-reflection opportunities for teachers and students. Considering that student participants came from different backgrounds and engaged with digital platforms in a myriad of ways, one teacher wrote:

I know with video games a lot of times kids are playing with random people that they don't know and that's really dangerous, too. So even talking to them about knowing who you're talking to online like they shouldn't be playing with strangers, and if they are, they shouldn't be like, you know, messaging them. If they don't know who they are, You know really the weight of those types of actions online?(Teacher A)

Teachers were positive about digital safety and in the coded interview responses, they indicated that the topics were also beneficial to them. Digital footprint and privacy were stated to be of primary interest to the teachers. One respondent shared, “I feel like I benefited more from the idea of the footprint, maybe more than the kids. I think it was necessary to introduce it (Teacher C).” Additionally, one teacher responded:

It gave me a chance to reflect on my own habits. I think that was important. I definitely found I think, digital security and privacy were areas that I also needed to kind of think about. How to protect myself and approach other people.
(Teacher D)

Teacher Challenges and Needs for Teaching Digital Safety

The following themes emerged when studying teacher challenges and needs for teaching digital safety.

Different Backgrounds and Expectations

Participants shared that students came with different expectations influenced by their respective backgrounds, values, and norms. In some cases, teachers reported that the perceptions and expectations of students contradicted the elements taught in the program. The core challenge was speaking at each of those different levels of experiences and to reach a unified understanding. For example, Teacher B shared, “I think the challenge was that all kids come in with different home expectations. There were some kids who were like, I am not allowed to do that like my mom makes me plug my phone and downstairs my mom does not let me have a social media account. She checks my phone, and she puts limits on my phone. And then there were other kids who came in like, “it’s a free for all I can do what I want (Teacher B).”

Load and Engagement

The coded responses indicated that teachers found the camp material to be content heavy and they had to deploy various strategies to make the experience age-appropriate, interactive, and engaging. Teacher D shared:

I think one of the challenges I had was kind of teaching in a way that was going to really engage the students, because this is like the camp is a lot of information, and it’s very like content, heavy, and sometimes it was challenging to make sure that they’re having fun and engaged, and it’s making it not feel so much like school, but like an educational camp.

However, teachers shared that resources such as video games and comic strips were more age appropriate, and their students happened to enjoy them more. One teacher shared:

So, there were some games throughout the lessons, and you know they really liked the videos and doing their comic strips. But I feel like it was a bit challenging to make it the content sort of age-appropriate for them, because it is a lot of terms they've probably never heard of, and so sometimes I think you have to work a little harder to make it engaging for them when you are introducing such a big topic with lots of vocabulary that they might be unfamiliar with. (Teacher E)

Professional Development and Continual Support for Teachers

A prevalent theme in participants' responses is the need for professional development programs for teachers on digital safety and its corresponding topics. In addition, teachers shared the need for continual support in accessing coherent and up-to-date teaching resources and curriculums that can make their instructional experiences more relevant and effective. One of the respondents shared:

The resources are great, but you know, if the teachers think it's just the same old thing. Well, I've seen that. Well, I've known that I've watched that video. I've done that training. If we can continue to make things relevant to them, and even make them aware of situations that are happening in schools and updated articles and updated events. This is a new thing that is threatening our students in the digital world. Then I think teachers will be more willing to continue to implement it in their classroom. (Teacher B)

Technology is rapidly changing, and it is imperative that teachers stay current with ongoing issues and proposed classroom strategies for mitigating potential challenges prone to their students. In order to enhance the impact of the program, participants emphasized the importance of progression in teaching digital safety topics. The efforts should not just serve elementary school teachers and students but should progress all the way through middle and high school systems. "There's got to be a logical progression that continues all the way up through the middle schools, and then the high

schools, and I think it needs to adapt as they're getting older, and their needs are going to adapt (Teacher B).”

Discussion

The findings from the digital safety professional development and summer camp for elementary learners describe and examine the experiences of the K–12 educators, their motivation, needs, and challenges. This study contributes to the current literature as it shares elementary educators’ experiences, motivations, and challenges for teaching digital safety. The findings warrant further discussion, which we elaborate below. In this section, we discuss the importance of digital safety professional development for elementary teachers and the various components that were used in the professional development. We also discuss the factors that enhance teacher motivation to participate in professional development on digital safety, the various challenges elementary teachers face when facilitating the summer camp, and the implications for pre-service and in-service teachers.

Teacher Experience from Professional Development

Surprisingly, there was no significant difference in pre- and post-test assessments. One possible explanation for the limited scope of improvement could be the participants’ prior baseline knowledge of digital safety topics. Additionally, the small sample size of teachers might limit the ability to detect changes. Future research should include larger samples and explore factors influencing teachers’ acquisition of the training content.

Overall, teacher attitudes toward the digital safety immersion camp were quite positive. For the most-liked camp material, teachers showed a preference for the

integration of technology-based resources over workbooks for students. Previous research by Gordillo and colleagues (2021) has also shown positive teacher experience in technology-based digital safety training. The integration of Pixton comics was also appreciated among teachers. The use of digital storytelling as an effective teaching tool was highlighted. This aligns with Çetin's study (2021) showing that digital storytelling increased motivation and interaction and provided better learning and performance. For the least-liked camp material, teachers proposed to include more interactive lessons and activities. This could be attributed to the restriction of COVID-19 pandemic in Year 1. The need was then fulfilled in the second year. At this point, it was emphasized that digital safety training for teachers should be given in a way to incorporate interactive approaches (Reisoğlu & Çebi, 2020).

Teacher Motivation

Teachers' motivation to participate in the training program was driven by their cognition of critical needs for digital safety education. The increasing use of digital platforms among students, coupled with the potential risks involved, has been acknowledged in previous literature (Kritzing, 2017; Potter, 2017). Teachers' commitment to preparing students for safe and responsible digital citizenship reflects the growing importance of digital safety education in contemporary K–12 settings.

Networks and collaborations among teachers in the summer camp enhanced the exchange of instructional strategies in teaching digital safety concepts. In particular for pre-service teachers, this aligns with previous research indicating pre-service teacher progress in content sharing and collaborative works (Reisoğlu & Çebi, 2020).

Additionally, both pre- and in-service teachers highlighted the relevance of professional

development in cultivating their self-reflection regarding digital safety practices. Future professional development of digital safety topics is expected to engage teachers to solve problematic situations in their classrooms or schools.

Teacher Challenges and Needs

Teaching students from diverse backgrounds with varying expectations and experiences related to digital safety posed a significant challenge for elementary teachers. Gudmundsdottir and Hatlevik (2018) also found that teachers did not receive sufficient training to enable compatibility with different groups of students. Designing instructional strategies that accommodate diverse learners and cater to their unique needs is crucial in ensuring the efficacy of digital safety education. Concerns about engaging learners aligned with Reisoğlu & Çebi's (2020, p.10) consideration of putting "actively engaging learners" sub-competences into use. A possible line of future research proposed by Gordillo and colleagues (2021) suggested the effectiveness of incorporating video game-based resources in digital safety education.

Teachers' calls for ongoing professional development and support reflected the dynamic nature of digital technologies and the ever-evolving challenges that students encounter in digital safety topics. In the process of preparing students for digital threats, this study demonstrates the need for building a network of support and providing up-to-date resources. Efforts from professional sectors are required for the progression in teaching digital safety topics in educational practice. In particular for pre-service teachers, who have shown a notable lack of training in digital citizenship and its sub-themes (Kansu & Öksüz, 2019), practical training experiences with knowledge and skills

related to digital safety should be offered before their entrance to the teaching profession.

Limitations

There were a few methodological limitations to this study. The data is from a small group of teachers who participated in the professional development on digital safety and facilitated the camps for elementary students in a particular region of southeastern United States. The findings might not be generalizable to all populations. Participating teachers are likely to have a working knowledge of digital safety and this self-selection bias, which potentially resulted in the nonsignificant difference in pre- and post-test knowledge assessments. Though teachers participated in the pre and post-test and completed a post-survey, and a few teachers participated in the interviews, these data sets were not linked, and data was analyzed separately as anonymized data was collected in the post-survey.

Implications for Practice

This study provided recommendations for teacher professional development on digital safety topics. This format of professional development can be offered for both pre-service and in-service teachers to equip them with skills to identify and prevent digital threats. Teacher educators are encouraged to include digital safety topics in their courses when integrating technology-based instructional activities and keeping the curriculum updated with latest trends in digital threats and safety measures. Digital safety can also be embedded in various courses and not just as a stand-alone module. In addition, the collaboration between pre-service and in-service teachers were also found mutually beneficial and similar professional development and camp models can

be implemented. Teacher education institutions are recommended to provide authentic experiences and implement training in digital safety to enable pre-service teachers and in-service teachers to collaborate on digital issues. Teachers valued interactive and engaging activities, so it is recommended to provide hands-on experiences where teachers can practice digital safety (e.g. Setting privacy settings, recognizing phishing attempts).

Findings from this study contribute to the current literature on instructional design of digital safety professional development. Designers are recommended to include elements of motivation in the digital safety professional development. This study also has recommendations for administrators specifically to examine the needs and challenges and provide ongoing professional development on digital safety topics. For schools with restrictions to implement a camp model, digital safety modules developed in this study can also be delivered in the classroom format. Findings from this study also provide recommendations for the creation of current resources and mechanisms for continual support in digital safety topics. Finally, this study also benefits elementary students to keep abreast of evolving digital threats.

Future Directions for Research

Research studies can be conducted on preparedness of K-12 teachers to teach digital safety and their professional development needs in varied contexts. Future research can examine teachers' practices in their K–12 classroom after participating in professional development on digital safety. Researchers can also examine different types of teacher professional development and its impact on teaching digital safety. This could include longitudinal studies on digital safety practices and attitudes over time

among teachers and students. Studies focusing on administrators and the support they offer for their teachers on digital safety professional development and implementation warrant examination. Digital safety can be integrated into various subjects for the elementary students and the impact can be studied. Researchers can also examine parent involvement and the impact on elementary student digital safety practices and home-school collaboration to reinforce digital safety practices.

Acknowledgement

This project was supported by the U.S. National Science Foundation Project 2015554 and 2319015.

References

- Çetin, E. (2021). Digital storytelling in teacher education and its effect on the digital literacy of pre-service teachers. *Thinking Skills and Creativity*, 39, 100760. <https://doi.org/10.1016/j.tsc.2020.100760>
- Chen, W. C. (2012). Professional growth during cyber collaboration between pre-service and in-service teachers. *Teaching and Teacher Education*, 28(2), 218–228. <https://doi.org/10.1016/j.tate.2011.09.010>
- Chou, C., & Peng, H. (2011). Promoting awareness of Internet safety in Taiwan in-service teacher education: A ten-year experience. *The Internet and Higher Education*, 14(1), 44–53. <https://doi.org/10.1016/j.iheduc.2010.03.006>
- Creswell, J., & Poth, C. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (4th ed.). SAGE Publications.

- Datta, L. E. (1997). Multimethod evaluations. In Chelimsky & Shadish (Eds.), *Evaluation for the 21st century* (pp. 344–359). SAGE Publications.
- Desimone, L. M. (2009). Improving impact studies of teachers' professional development: Toward better conceptualizations and measures. *Educational researcher*, 38(3), 181–199. <https://doi.org/10.3102/0013189X08331140>
- Desimone, L. M., & Garet, M. S. (2015). Best practices in teacher's professional development in the United States. *Psychology, Society, & Education*, 7(3), 252–263
- Ferrari, A., & Punie, Y. (2013). *DIGCOMP: A framework for developing and understanding digital competence in Europe*. Publications Office of the European Union.
- Gallego-Arrufat, M. J. G. A., Torres-Hernández, N. T. H., Pessoa, T. P., Gallego-Arrufat, M. J., Torres-Hernández, N., & Pessoa, T. (2019). Competence of future teachers in the digital security area. *Comunicar. Media Education Research Journal*, 27(2), 53–62. <https://doi.org/10.3916/C61-2019-05>
- Gordillo, A., Barra, E., López-Pernas, S., & Quemada, J. (2021). Development of teacher digital competence in the area of e-safety through educational video games. *Sustainability*, 13(15), 8485. <https://doi.org/10.3390/su13158485>
- Gudmundsdottir, G. B., & Hatlevik, O. E. (2018). Newly qualified teachers' professional digital competence: Implications for teacher education. *European Journal of Teacher Education*, 41(2), 214–231. <https://doi.org/10.1080/02619768.2017.1416085>

Hollandsworth, R., Donovan, J., & Welch, M. (2017). Digital citizenship: You can't go home again. *TechTrends*, 61(6), 524–530. <https://doi-org/10.1007/s11528-017-0190-4>

International Society for Technology in Education (ISTE) (n.d.). *Digital citizenship*. <https://iste.org/digital-citizenship>

James, C., Weinstein, E., & Mendoza, K. (2019). Teaching digital citizens in today's world: Research and insights behind the Common Sense K–12 Digital Citizenship Curriculum. *Common Sense Media*, 2021–08.

Jones, L. M., & Mitchell, K. J. (2016). Defining and measuring youth digital citizenship. *New Media & Society*, 18(9), 2063–2079. <https://doi-org/10.1177/1461444815577797>

Kansu, C. Ç., & Öksüz, Y. (2019). The perception and level of digital citizenship on pre-service classroom teachers. *Journal of Education and Training Studies*, 7(10), 67–77. <https://doi.org/10.11114/jets.v7i10.4443>

Kim, M., & Choi, D. (2018). Development of youth digital citizenship scale and implication for educational setting. *Journal of Educational Technology & Society*, 21(1), 155–171. <http://www.jstor.org/stable/26273877>

Kritzinger, E. (2017). Cultivating a cyber-safety culture among school learners in South Africa. *Africa Education Review*, 14(1), 22–41. <https://doi.org/10.1080/18146627.2016.1224561>

Martin, F., Gezer, T., & Wang, C. (2019). Educators' perceptions of student digital citizenship practices. *Computers in the Schools*, 36(4), 238-254. <https://doi.org/10.1080/07380569.2019.1674621>

- Martin, F., Gezer, T., Wang, W., Petty, T., & Wang, C. (2022). Examining K-12 Educator Experiences from Digital Citizenship Professional Development. *Journal of Research on Technology in Education*, 54(1), 143-160.
<https://doi.org/10.1080/15391523.2020.1815611>
- Martin, F., Hunt, B., Wang, C., & Brooks, E. (2020). Middle school student perception of technology use and digital citizenship practices. *Computers in the Schools*, 37(3), 196-215. <https://doi.org/10.1080/07380569.2020.1795500>
- Öztürk, G. (2021). Digital citizenship and its teaching: A literature review. *Journal of Educational Technology and Online Learning*, 4(1), 31–45.
<https://dergipark.org.tr/en/pub/jetol/issue/60134/857904>
- Potter, J. (2017). Framing the terms and conditions of digital life: New ways to view “known” practices and digital/media literacy. *Learning, Media and Technology*, 42(4), 387–389.
<https://doi.org.prox.lib.ncsu.edu/10.1080/17439884.2017.1397019>
- Reisoğlu, İ., & Çebi, A. (2020). How can the digital competences of pre-service teachers be developed? Examining a case study through the lens of DigComp and DigCompEdu. *Computers & Education*, 156, 103940.
<https://doi.org/10.1016/j.compedu.2020.103940>
- Ribble, M. (2015). *Digital citizenship in schools: Nine elements all students should know*. International Society for Technology in Education.
- Ribble, M. S., & Bailey, M. (2007). *Digital citizenship in schools*. International Society for Technology in Education.

- Ribble, M. S., Bailey, G. D., & Ross, T. W. (2004). Digital citizenship: Addressing appropriate technology behavior. *Learning & Leading with Technology*, 32(1), 6–11.
- Saldaña, J. (2016). *The coding manual for qualitative researchers* (3rd ed.). SAGE.
- Tomczyk, Ł. (2019). What do teachers know about digital safety?. *Computers in the Schools*, 36(3), 167–187. <https://doi.org/10.1080/07380569.2019.1642728>
- Tomczyk, Ł. (2020). Skills in the area of digital safety as a key component of digital literacy among teachers. *Education and Information Technologies*, 25(1), 471–486. <https://doi-org/10.1007/s10639-019-09980-6>
- Torres-Hernández, N., & Gallego-Arrufat, M. J. (2022). Indicators to assess preservice teachers' digital competence in security: A systematic review. *Education and Information Technologies*, 27(6), 8583–8602. <https://doi.org/10.1007/s10639-022-10978-w>
- Walters, M. G., Gee, D., & Mohammed, S. (2019). A literature review: Digital citizenship and the elementary educator. *International Journal of Technology in Education*, 2(1), 1–21.