

RESEARCH ARTICLE

Analysis of Early Childhood Teachers' Perceptions and Current Practices Regarding Digital Citizenship Education, and Their Support Needs

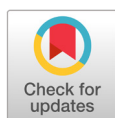
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ABSTRACT

This study examined early childhood teachers' perceptions and practices of digital citizenship education, the factors associated with them, and teachers' support needs. A survey was conducted with 254 kindergarten and daycare center teachers nationwide, with teaching experience, relevant experience, and related training as predictor variables. Teachers' overall awareness of digital citizenship education was moderate or higher, but actual implementation fell short of this awareness. Kindergarten teachers scored significantly higher than daycare center teachers on both awareness ($t(252) = 2.30, p < .05$) and implementation ($t(252) = 4.23, p < .001$); however, because institution type may overlap with differences in teaching experience, curricula, materials, and institutional environments, these differences are reported descriptively, and their sources warrant further research. Across all five content domains, perceived importance significantly exceeded implementation experience, indicating a consistent practice gap. Regression analysis showed that teaching experience was the only variable significantly associated with awareness ($t(250) = 2.44, p < .05$) and practice ($t(250) = 3.16, p < .01$), although the models' explanatory power was modest; relevant experience and related training, as measured in this study, were not significant predictors. None of the three variables significantly predicted the perceived importance of content, possibly indicating that recognition of its importance is relatively widespread regardless of career length or training background. Teachers most strongly requested story-based materials ($M = 4.86$), followed by game and activity materials ($M = 4.74$) and video materials ($M = 4.68$), along with increased awareness among teachers and parents. These findings suggest that strengthening digital citizenship education requires more than raising awareness; it calls for support that helps teachers translate awareness into practice, practical resources, and coordinated support between institutions and families. This study provides foundational data for policy development by clarifying the current status of digital citizenship education in early childhood settings and identifying concrete support needs for teachers.

Keywords: Digital citizenship, Early childhood teacher, digital citizenship education, perception, practice



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Introduction

With the advancement of digital technology enabling a hyper-connected society, the world we inhabit has become one where physical reality, technology, digital media, and social networks are intricately intertwined. People now exchange information and ideas much more rapidly than before, which in turn exerts various influences on one another—whether positive or negative. We are faced with the reality of having to live, act, make choices, and take responsibility as digital citizens in this complex and ever-changing digital world.

As online and digital transformation accelerates across society, fundamental questions have begun to arise regarding ways of life appropriate for the digital age (Choi et al. (2022)). Furthermore, the changes brought about by the rapid development of digital technology and the emergence of a new model of citizenship have led to a paradigm shift in discussions regarding citizenship (Sung, 2024). Across various academic disciplines, scholars continue to take an interest in the emergence of a new form of citizenship and seek to understand its characteristics in order to prepare for the direction and challenges of future society. In the field of education as well, research is being conducted to define “digital citizenship” as a competency necessary for preparing for the future and to explore how students can acquire it.

The concept of digital citizenship in the digital age is increasingly being addressed in numerous debates, alongside policy discourse and related academic literature (Common Sense Media, 2009; Ribble, 2015). Various synonyms or concepts closely related to digital citizenship presented in the literature to date include “digital competence” (Janssen et al., 2013), “digital literacy” (Meyers et al. (2013)), and “digital media literacy education” (Mihailidis, 2018). In other words, digital citizenship, in a comprehensive sense, encompasses not only the competencies and qualities required by the traditional concept of citizenship but also the qualities and competencies necessary for participating and communicating in new ways in the digital age (Jeong & Joo, 2023).

Digital citizenship is distinct from the concept of digital literacy. While digital literacy focuses primarily on the ability to use digital technologies effectively, digital citizenship is a broader concept that encompasses this while also including elements such as digital ethics, digital law, digital safety, and digital health and well-being (Korea Intelligence and Information Society Promotion Agency, 2016). If digital literacy is a technical competency concerning “what one can do and how to do it,” digital citizenship is a normative and ethical competency concerning “how one should act,” focusing primarily on civic participation and citizenship through digital technologies (Choi et al. (2022)). This conceptual distinction serves as the basis for defining digital citizenship education in this study not merely as training in device usage, but as education focused on the formation of values and responsible behavior in the digital environment.

Digital citizenship education does not merely emphasize technical skills but also encompasses ethical issues that may arise in digital environments and responsible responses to them (James et al. (2019)). While rapid advancements in digital technology have made it easier to access and share information, various ethical issues—such as the reliability of information, privacy violations, and cyberbullying—are emerging. Accordingly, digital citizenship education plays a crucial role in preventing these issues and helping students learn appropriate standards of behavior online (Livingstone, 2014). In particular, given the developmental characteristics of early childhood, it is important to teach responsible digital use starting at this stage, as the digital behavior habits and values formed during this period have a lifelong impact (Ribble, 2012). According to a study by Heath (2018), young children typically begin using digital devices such as smartphones

and tablets before the age of three on average; consequently, the study emphasized that digital citizenship education must be systematically implemented starting in early childhood.

Reviewing prior research on digital citizenship education for young children, Lauricella et al. (2020) surveyed kindergarten and elementary school teachers in the United States regarding the current status of digital citizenship education practices. They reported that kindergarten teachers were less likely to implement digital citizenship education than elementary school teachers, and that implementation rates increased as teachers received more relevant training. Martin et al. (2022) analyzed K-12 teachers' experiences with digital citizenship professional development and found that the more teachers participated in digital education-related training, the higher their implementation rates became. In terms of domestic research, Kim et al. (2021) proposed measures to improve the educational system to strengthen digital citizenship competencies, while Jeong and Joo (2023) developed a digital citizenship assessment tool for college students. However, to date, there have been very few studies in Korea that have systematically investigated early childhood teachers' perceptions and current practices regarding digital citizenship education and analyzed the factors associated with them.

This study aims to understand the current state of digital citizenship education and identify areas for improvement by assessing early childhood teachers' perceptions of digital citizenship education and analyzing how it is actually implemented. The research questions for this study are as follows.

Research Question 1. What are early childhood teachers' perceptions of and current practices regarding digital citizenship education, and do these differ by institution type (kindergarten/daycare center)?

Research Question 2. What factors (teaching experience, relevant experience, and related training) are associated with early childhood teachers' perceptions, practices, and the perceived importance of digital citizenship education content?

Research Question 3. What are the support needs of early childhood teachers for implementing digital citizenship education?

Methods

Participants and Procedure

The participants in this study were early childhood teachers working at kindergartens and daycare centers nationwide. Sampling was based on convenience sampling; however, to ensure regional representativeness, survey links were distributed to teachers working at institutions located in various regions nationwide, including the Seoul Metropolitan Area, the Chungcheong region, the Honam region, and the Yeongnam region. A total of 280 teachers participated in the study, and data from 254 of them—whose survey responses were highly complete—were used in the final analysis. Among the final participants, 130 (51.2%) were kindergarten teachers and 124 (48.8%) were daycare center teachers. In terms of teaching experience, 89 (35.0%) had 1-3 years of experience, 98 (38.6%) had 3-7 years of experience, and 67 (26.4%) had 7 or more years of experience.

Research Tools

To investigate early childhood educators' perceptions and current practices regarding digital citizenship education, the researcher used a self-developed questionnaire. The survey consisted of 40 items across 5 domains and was designed to be answered using a 5-point Likert scale (1 = Not at all, 5 = Very much so). The items were finalized following content validity reviews and a pilot study, and Cronbach's α coefficient of .885 confirmed high reliability.

Table 1. Final questionnaire content structure, response types, and number of items

Survey Section	Survey Content	Response Type	No. of Items
Background Information	Teaching experience, relevant training, type of institution, relevant experience	Single-choice	4
Overall Awareness and Practice	Perceptions and practices of digital citizenship education	Rating scale	4+4
Perceived Importance of Content	Digital citizenship education content for young children	Rating scale	10
Practical Experience	Implementation of digital citizenship education content	Rating scale	10
Digital Education Support Needs	Support needs for effective implementation	Single-choice	8
Total			40

Research Procedure

The research procedure consisted of four stages: ① questionnaire development and validation, ② preliminary survey, ③ main survey, and ④ data analysis. The survey was conducted via an online survey platform from June 20 to July 20, 2024, and 254 valid responses, excluding incomplete or invalid ones, were used for the final analysis.

Data Collection and Analysis

Data were analyzed using SPSS 27.0, and statistical significance was evaluated at the .05 level. The analyses were conducted as follows for each research question.

For Research Question 1, independent-samples t-tests were conducted to examine differences between kindergarten and daycare center teachers in their perceptions and practices of digital citizenship education, as well as in the perceived importance of each content domain. In addition, paired-samples t-tests were conducted to compare teachers' perceived importance of each digital citizenship education content item with their implementation experience of the same item, and paired-samples correlation coefficients were calculated to examine the relationship between the two.

For Research Question 2, three multiple regression analyses were conducted to identify factors associated with teachers' (a) perceptions of digital citizenship education, (b) practices of digital citizenship education, and (c) perceived importance of digital citizenship education content. In each model, teaching experience, relevant experience, and relevant training were entered simultaneously as predictor variables. Teaching experience was entered as an ordinal variable coded 1 = 1 to less than 3 years, 2 = 3 to less than 7 years, and 3 = 7 years or more. Relevant experience and relevant training were entered according to their ordered response categories. Because these variables were treated as ordered predictors rather than nominal groups, dummy variables were not created.

For Research Question 3, means and standard deviations were calculated for each support need item, and the items were ranked by their mean scores to identify teachers' priorities for support in implementing digital citizenship education.

Results

Early Childhood Teachers' Perceptions and Current Practices Regarding Digital Citizenship Education

As shown in Table 4, the mean perception scores were 3.83 for kindergartens and 3.58 for daycare centers, while the mean practice scores were 3.68 for kindergartens and 3.28 for daycare centers, indicating levels of 3 or higher on a 5-point scale. The results of the independent samples t-test showed that the overall mean for perceptions ($t(252) = 2.30, p < .05$) and the overall mean for practices ($t(252) = 4.23, p < .001$) were statistically significantly higher among kindergarten teachers than among daycare center teachers. Significant differences were also observed in most individual items. These results show differences between institution types in self-reported levels; they do not by themselves identify the sources of these differences.

Table 4. Perceptions and practices regarding digital citizenship education ($N = 254$)

Category	Kindergarten Teachers Mean (SD)	Daycare Center Teachers Mean (SD)	$t(252)$
I am generally very interested in digital citizenship education.	3.68(1.452)	3.47(.967)	1.36
I believe digital citizenship education is important.	4.24(.687)	4.02(.756)	2.42*
I believe digital citizenship education should be a required course.	3.96(.746)	3.58(.889)	3.68***
I have a good understanding of digital citizenship education.	3.42(.689)	3.25(.754)	1.87
Perception of Digital Citizenship Education (Average)	3.83(.890)	3.58(.840)	2.30*
I am well aware of the teaching and learning methods for digital citizenship education.	3.64(.690)	3.28(.652)	4.28***
I typically plan my daily activities with the goal of fostering digital citizenship in young children.	3.87(.867)	3.20(.875)	6.13***
I am well aware of the assessment methods for fostering young children's digital citizenship.	3.50(.778)	3.25(.751)	2.61**
I frequently implement digital citizenship education.	3.70(.679)	3.40(.744)	3.35***
Digital Citizenship Education Practices (Average)	3.68(.753)	3.28(.755)	4.23***

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 5 presents the results of an analysis using a paired t-test to examine early childhood teachers' perceptions of the importance of digital citizenship education content and their level of practice. For all items, there were statistically significant differences between the perceived importance and the level of implementation, and the paired-sample correlation coefficients (r) ranged from .46 to .87, indicating a significant positive linear relationship. This suggests the existence of a “practice gap,” where teachers recognize the importance of digital citizenship education but do not fully translate that recognition into actual practice.

Table 5. Analysis results on perceptions of the importance of digital citizenship education content and implementation experience ($N = 254$)

Category	Item Content	Importance Mean (SD)	Implementation Mean (SD)	$t(253)$	r
Media Balance & Well-being	1. Balancing digital media device usage time	4.82(.633)	4.24(.954)	3.95***	.58***
	2. Limiting digital media usage time	4.75(.653)	4.54(.754)	2.98**	.71***
Privacy & Safety	3. Avoiding strangers and unfamiliar websites	4.32(.904)	3.83(.685)	5.63***	.83***
	4. Distinguishing disclosable vs. non-disclosable information	4.15(.768)	4.01(.874)	9.55***	.56***
Digital Footprint	5. Persistence of online records	3.70(.689)	3.54(.887)	4.67***	.78***
	6. Persistence of personal information records	3.82(.874)	3.52(.956)	2.36*	.46***
Relationships & Communication	7. Online mutual support methods	4.10(.844)	3.76(.746)	4.85***	.75***
	8. Being kind online	4.20(.932)	3.64(.744)	9.36***	.74***
Media Literacy	9. Determining authenticity of information	4.18(.856)	3.88(.980)	7.36***	.86***
	10. Selecting age-appropriate content	4.07(.659)	3.24(.784)	5.89***	.87***

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 6. Perceived importance of digital citizenship education content by institution type ($N = 254$)

Digital Citizenship Education Content	Daycare ($N = 124$) Mean	SD	Kindergarten ($N = 130$) Mean	SD	$t(252)$	p
Media Balance & Well-being	4.54	.59	4.78	.45	3.61***	<.001
Privacy & Safety	4.01	.63	4.53	.52	6.65***	<.001
Digital Footprint	3.65	.42	3.92	.61	2.87**	<.01
Relationships & Communication	3.90	.62	4.29	.52	3.65***	<.001
Media Literacy	4.11	.28	4.28	.61	4.39***	<.001
Total	4.04	.51	4.36	.54	4.86***	<.001

* $p < .05$. ** $p < .01$. *** $p < .001$.

Table 6 presents the results of an independent samples t -test analyzing whether there are differences in the perceived importance of digital citizenship education content by institution type. The analysis revealed significant differences in the following areas: media balance and well-being ($t(252) = 3.61, p < .001$), privacy and safety ($t(252) = 6.65, p < .001$), digital footprint ($t(252) = 2.87, p < .01$), relationships and communication ($t(252) = 3.65, p < .001$), and media literacy ($t(252) = 4.39, p < .001$). In terms of overall averages, kindergarten teachers ($M = 4.36$) also demonstrated a significantly higher perception of importance than daycare center teachers ($M = 4.04$) ($t(252) = 4.86, p < .001$). In all five domains, the average perception of importance among kindergarten teachers was higher than that of daycare center teachers, showing a pattern consistent with the differences in overall levels of awareness and practice between institution types identified earlier in Table 4. In particular, the difference between the two groups was most pronounced in the domain of privacy and safety ($t(252) = 6.65$). However, because the present analysis did not control for differences in the distribution of teaching experience, curricula, teaching materials, or institutional environments, it is difficult to determine whether this difference stems from institution type itself; this issue should be examined in future research.

Factors Associated with Early Childhood Teachers' Practice of Digital Citizenship Education

The results of the regression analysis conducted to identify the key variables associated with perceptions of digital citizenship education (Table 7) showed that teaching experience was the only statistically significant factor ($t(250) = 2.44, p < .05$). The extent of relevant experience ($t(250) = 1.68, p > .05$) and the extent of relevant training ($t(250) = .52,$

$p > .05$) were not statistically significant. This indicates only that the level of training as measured in this study did not show significant explanatory power; it should not be taken to mean that training itself is ineffective or unimportant. The regression model was statistically significant ($F(3,250) = 4.31, p < .01$). This suggests an association whereby teachers with longer careers tend to report higher levels of perception regarding digital citizenship education, although the cross-sectional design precludes causal inference, and the model explained only a limited proportion of the variance ($R^2 = .068$).

Table 7. Variables associated with early childhood teachers' perceptions of digital citizenship education: Regression analysis results ($N = 254$)

Variable	B	Standard Error	Beta	t(250)
(Constant)	14.44	.56	-	25.60***
Teaching Experience	.79	.32	.15	2.44*
Level of Relevant Experience	.56	.34	.26	1.68
Level of Relevant Training	.14	.28	.34	.52

* $p < .05$. ** $p < .01$. *** $p < .001$.

The results of the regression analysis conducted to identify variables significantly associated with the practice of digital citizenship education (Table 8) confirmed that teaching experience was a significant variable ($t(250) = 3.16, p < .01$). The level of relevant experience ($t(250) = 1.24, p > .05$) and the level of relevant training ($t(250) = 1.05, p > .05$) were not significant. The regression model was statistically significant ($F(3,250) = 6.11, p < .001$). As with perceptions, this result reflects an association rather than a causal effect, and the explanatory power of the model was limited ($R^2 = .091$); therefore, it cannot be concluded that teaching experience directly improves the practice of digital citizenship education.

Table 8. Variables associated with early childhood teachers' digital citizenship education practices: Regression analysis results ($N = 254$)

Variable	B	Standard Error	Beta	t(250)
(Constant)	16.436	.26	-	62.26***
Teaching Experience	.39	.12	.15	3.16**
Level of Relevant Experience	.66	.53	.25	1.24
Level of Relevant Training	.34	.33	.27	1.05

* $p < .05$. ** $p < .01$. *** $p < .001$.

The results of the regression analysis conducted to identify variables associated with early childhood teachers' perceived importance of digital citizenship education content (Table 9) showed that teaching experience ($t(250) = 1.78, p > .05$), level of relevant experience ($t(250) = 1.68, p > .05$), and level of relevant training ($t(250) = 1.30, p > .05$) were not statistically significant predictors. The regression model itself was also not statistically significant ($F(3,250) = 2.10, p > .05$). In other words, the three independent variables included in this study alone could not significantly explain individual differences in the perceived importance of educational content; this may suggest that the perception of the importance of educational content is relatively uniform among early childhood teachers, regardless of their career length, experience, or training status, although the high overall mean scores may also have limited the variance available to be explained.

Table 9. Variables associated with early childhood teachers' perception of the importance of digital citizenship education content: Regression analysis results ($N = 254$)

Variable	B	Standard Error	Beta	t(250)
(Constant)	19.54	.26	-	74.56***
Teaching Experience	.68	.38	.24	1.78
Level of Relevant Experience	.72	.43	.15	1.68
Level of Relevant Training	.44	.34	.36	1.30

* $p < .05$. ** $p < .01$. *** $p < .001$.

Early Childhood Teachers' Needs for Support in Digital Citizenship Education

As shown in Table 10, which presents the survey results in ranked order, the early childhood teachers who participated in the survey generally expressed a high level of need for support in implementing digital citizenship education across various domains, with scores ranging from 4.86 to 3.83. In particular, the demand for support regarding the development and distribution of story materials applicable to young children (4.86) was very high, and it was also found that there was a high demand for the development of game and activity materials (4.74) and the development and distribution of video materials (4.68). In addition, the demand for increased interest in digital citizenship education among teachers and parents, as well as for a shift in their perceptions, was 4.62 and 4.54, respectively, indicating that a change in the perceptions of the adults around children is necessary for the successful implementation of digital citizenship education.

Table 10. Analysis results of support needs for digital citizenship education ($N = 254$)

Rank	Item Description	Mean	SD
1	Development and dissemination of thematic story materials on digital citizenship	4.86	.53
2	Development and distribution of thematic game and activity materials	4.74	.67
3	Development and distribution of thematic video materials	4.68	.53
4	Increased interest and shifting perceptions among teachers	4.62	.65
5	Changes in perceptions of digital citizenship education and parent education	4.54	.72
6	Development and distribution of teacher resource materials	4.52	.63
7	Various teacher training programs on digital citizenship education	4.35	.39
8	Revitalizing teacher communities and research groups	3.83	.38

Discussion

This study examined early childhood teachers' perceptions of digital citizenship education, their current practices, and their support needs. We will now summarize and discuss these findings in relation to the research questions.

First, an analysis of early childhood teachers' overall perceptions and practices regarding digital citizenship education revealed that, while they generally recognized the importance of digital citizenship education, the level of implementation fell short of their perceptions. In particular, while both kindergarten (4.24) and daycare center (4.02) teachers rated the statement "Digital citizenship education is important" highly, their ratings for the statement "I have a good understanding of digital citizenship education" were relatively low. This suggests that their recognition of its importance may not yet be accompanied by sufficient specific understanding and practical competencies. These results are consistent with the findings of Lauricella et al. (2020), which showed that a low percentage of early childhood educators were actually implementing digital citizenship education. Meanwhile, kindergarten teachers reported significantly higher levels of both perception and practice than daycare center teachers. Although this difference between institution types is itself

a meaningful finding, the present analysis cannot determine whether it stems from institution type per se or from the combined influence of other factors, such as differences in the distribution of teaching experience, curricula, teaching materials, and institutional environments between the two types of institutions. Accordingly, this result should not be interpreted as indicating that the perceptions or competencies of daycare center teachers are insufficient; rather, it should be understood as a difference observed between institution types, and future studies are needed to examine its sources by controlling for these potential factors.

Second, an analysis of the perceived importance and implementation experience of digital citizenship education revealed that, while teachers generally recognized the five themes of digital citizenship education as highly important, their actual implementation experience was relatively low. This gap between perception and practice can be interpreted using the concepts of primary barriers (lack of infrastructure and resources) and secondary barriers (teacher beliefs and self-efficacy) in teachers' educational innovation practices, as proposed by Ertmer (1999). Both kindergarten and daycare center teachers consistently prioritized media balance and well-being, and their practical experience in these areas was higher than in other categories. Furthermore, relationships and communication, as well as privacy and safety, align with the core elements of Social and Emotional Learning (SEL) (CASEL, 2010); these findings are consistent with Ohler's (2011) assertion that digital citizenship education is also a form of character education.

Third, an analysis of the factors associated with early childhood teachers' perceptions, practices, and perceived importance of digital citizenship education content (teaching experience, relevant experience, and relevant training) revealed that teaching experience was the only variable significantly associated with perceptions of digital citizenship education ($t = 2.44, p < .05$), while the extent of relevant experience and relevant training were not statistically significant. Similarly, regarding practice, only teaching experience was identified as a significant variable ($t = 3.16, p < .01$), while relevant experience and related training were not significant predictors. In contrast, none of the three variables significantly predicted the perceived importance of educational content. Given the cross-sectional design and the limited explanatory power of the regression models ($R^2 = .068-.091$), these results indicate associations and should not be interpreted as evidence that teaching experience directly improves teachers' perceptions or practices.

These results are somewhat at odds with a study by Martin et al. (2022) of K-12 teachers, which reported that relevant experience and participation in training had a significant impact on the practice of digital citizenship education. However, they are consistent with previous studies that emphasized the influence of teaching experience on teachers' beliefs about technology integration and their practices. Ertmer and Ottenbreit-Leftwich (2010) argued that teachers' beliefs are shaped through personal experiences—including their own teaching experiences in the classroom—vicarious experiences gained from observing other teachers, and sociocultural influences; they specifically reported that early successful teaching experiences have a strong influence on the subsequent development of technology integration competencies. This offers one possible explanation: successful teaching experiences accumulated over the course of a teaching career may contribute to changes in teachers' beliefs and their willingness to engage in new areas of education. At the same time, the non-significant result for related training should be interpreted within the scope of this study. It indicates only that the level of training as measured here did not show significant explanatory power, and it may reflect variation in the content, duration, and quality of the training teachers received, which the present measure did not capture.

Similar findings have been reported in the field of early childhood education in Korea. Kim's (2019) study revealed

that early childhood teachers' digital literacy factors and teaching efficacy influence the implementation of smart education; this finding can be interpreted in conjunction with the results of the present study, as it suggests that teachers' digital competencies and teaching efficacy, which may develop through accumulated teaching experience, may be linked to teachers' engagement in new digital-related educational practices, a relationship that warrants further investigation using longitudinal or experimental designs.

Meanwhile, it is noteworthy that none of the three variables—teaching experience, relevant experience, and related training—were found to be statistically significant in terms of perceived importance of educational content. This may imply that the perception of the importance of the five thematic areas of digital citizenship education is already widely shared across early childhood teachers, regardless of their career length or training history; however, because the mean importance scores were high overall, a ceiling effect may also have restricted the variance available to be explained. This interpretation aligns with Ohler's (2011) perspective, which views digital citizenship education as an extension of character education, given that its importance is widely recognized even without specific professional development pathways. However, the fact that this widespread consensus does not translate into actual practice—when considered alongside the previously identified practice gap (see Table 5)—suggests that while teachers already recognize “what is important,” the lack of specific methodologies and resources regarding “how to teach” may act as a substantial barrier hindering their practice. This finding is consistent with Ertmer's (1999) discussion, which distinguishes between primary barriers—such as a lack of resources and training—and secondary barriers—such as teachers' beliefs and self-efficacy.

Fourth, an analysis of support needs for digital citizenship education (Table 10) revealed that early childhood teachers expressed the highest demand for the development and distribution of story-based materials ($M = 4.86$), followed by games and activity materials ($M = 4.74$) and video materials ($M = 4.68$). These results are consistent with prior research indicating that an approach utilizing media appropriate for the early childhood developmental stage is particularly important in digital citizenship education (NAEYC & Fred Rogers Center, 2012), and they are also in line with the study by Lauricella et al. (2020), which pointed out that the quality of curricula and teaching materials provided in early childhood education settings plays a crucial role in practice.

This high demand for specific educational materials does not simply indicate a quantitative shortage of resources. A joint position statement by the National Association for the Education of Young Children (NAEYC) and the Fred Rogers Center on the use of technology and media in early childhood education institutions also emphasized that while technology and interactive media can be effective tools for supporting learning and development when used intentionally and appropriately, this requires that teachers and institutional administrators have access to information and resources regarding the characteristics and implications of using these tools (NAEYC & Fred Rogers Center, 2012). In other words, the phenomenon where teachers fully recognize the importance of digital citizenship education but do not fully translate this into practice may be attributable, at least in part, to structural conditions, namely the lack of actionable, concrete resources and tools.

In addition, the demand for increased interest and a shift in perception regarding digital citizenship education among teachers and parents was relatively high, at 4.62 and 4.54, respectively. These results can be interpreted in connection with Bronfenbrenner's ecological theory of development, which views children's development as occurring through

interactions among overlapping environmental systems, such as the family, institutions, and society (Bronfenbrenner, 1979). According to this theory, children's development, growth, and behavior are shaped by various interconnected environmental influences ranging from the closest environment, such as the family, to broader social structures. In particular, not only do direct interactions between the family and institutions occur within the microsystem, but the mesosystem—the link between these two microsystems, where parents and teachers communicate regarding the child's growth—also exerts a significant influence on development. From this perspective, fostering digital citizenship in young children has its limitations when relying solely on education within the institution; it can only be effectively achieved when accompanied by consistent guidance on digital use at home. The fact that teachers strongly expressed a need for support in changing parental perceptions can be interpreted as evidence that they are already acutely aware of the necessity for home-institution collaboration in the field.

Conclusions and Implications

Based on the findings of this study, we offer the following recommendations to improve the quality of digital citizenship education in the future, within the scope supported by the results.

First, given the differences observed according to institution type and teaching experience, it is necessary to examine more closely how the digital citizenship education practices of teachers with less teaching experience and of teachers in each type of institution can be supported. Such support measures should be designed on the basis of further research that identifies the sources of these differences, rather than on the assumption that particular groups lack competence.

Second, since teachers already recognize the importance of digital citizenship education but do not fully put it into practice, teaching methods that emphasize practical experience should be introduced to help teachers translate this recognition into practice. In particular, there is a need for experience-based educational programs that provide opportunities to cultivate ethical judgment and a sense of responsibility in digital environments, starting from the pre-service early childhood teacher training stage.

Third, continuous support should be provided so that teachers can accumulate practical experience in digital citizenship education. Since the level of training as measured in this study was not a significant predictor, the content and format of training should be further examined, with a focus on practice-oriented approaches. Specifically, the development and distribution of story-, game-, and video-based teaching and learning materials appropriate for young children, which teachers identified as their most pressing needs, should be a top priority.

Fourth, it is necessary to operate parent education programs in conjunction with early childhood education programs to ensure that digital citizenship education for young children is consistently implemented not only in institutions but also at home.

Fifth, as this study is based on a cross-sectional design, it has the limitation of being unable to clarify the temporal sequence among teaching experience, relevant experience, and related training. Furthermore, the use of convenience sampling limits the representativeness of the sample, and self-report questionnaires may involve response bias. Although efforts were made to recruit teachers from multiple regions, the regional distribution of the final sample was neither reported nor controlled for, which limits claims of regional representativeness. Future studies should employ stratified

sampling by region to address this limitation. In addition, the explanatory power of the regression models was limited, and institution type was not analyzed jointly with teaching experience or other institutional characteristics. Future research should examine the sources of the differences between institution types using analyses that control for these variables (e.g., multiple regression or multilevel analysis including both institution type and teaching experience). The introduction of random sampling, longitudinal designs, and observational research methods is recommended for future studies.

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Conflicts of Interest

The author declared no conflicts of interest.

References

- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Harvard University Press.
- CASEL. (2010). What is SEL? Retrieved from <https://casel.org/what-is-sel/>
- Choi, J., Lee, Y., & Jung, S. Y. (2022). A literature review of digital citizenship in Korea. *Journal of Education & Culture*, 28(5), 175–199. <https://doi.org/10.24159/joec.2022.28.5.175>
- Common Sense Media. (2009). *Digital literacy and citizenship in the 21st century*. San Francisco, CA: Common Sense Media.
- Ertmer, P. A. (1999). Addressing first- and second-order barriers to change: Strategies for technology integration. *Educational Technology Research and Development*, 47(4), 47–61. <https://doi.org/10.1007/bf02299597>
- Ertmer, P. A., & Ottenbreit-Leftwich, A. T. (2010). Teacher technology change: How knowledge, confidence, beliefs, and culture intersect. *Journal of Research on Technology in Education*, 42(3), 255–284. <https://doi.org/10.1080/15391523.2010.10782551>
- Heath, M. K. (2018). What kind of (digital) citizen? A between-studies analysis of research and teaching for democracy. *International Journal of Information and Learning Technology*, 35(5), 342–356. <https://doi.org/10.1108/ijilt-06-2018-0067>
- 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*. San Francisco, CA: Common Sense Media.
- Janssen, J., Stoyanov, S., Ferrari, A., Punie, Y., Pannekeet, K., & Sloep, P. (2013). Experts' views on digital competence: Commonalities and differences. *Computers & Education*, 68, 473–481. <https://doi.org/10.1016/j.compedu.2013.06.008>
- Jeong, Y., & Joo, S. (2023). A study on the development and validation of a digital citizenship measurement tool for college students. *Journal of Learner-Centered Curriculum and Instruction*, 23(8), 373–389. <https://doi.org/10.22251/jlcci.2023.23.8.373>

- Kim, B.-H., & Lee, H.-J. (2019). The effects of digital literacy and teaching efficacy on smart education adoption. *Journal of Future Early Childhood Education*, 26(2), 97–119. <https://doi.org/10.22155/JFECE.26.2.97.119>
- Kim, B.-Y., Kwon, H.-Y., & Kim, M. R. (2021). A study on the improvement of educational system to strengthen digital citizenship in the age of artificial intelligence. *The Journal of Korean Association of Computer Education*, 24(3), 67–88. <https://doi.org/10.32431/kace.2021.24.3.007>
- National Information Society Agency. (2016). *2016 digital culture forum policy research report*.
- Lauricella, A. R., Herdzina, J., & Robb, M. (2020). Early childhood educators' teaching of digital citizenship competencies. *Computers & Education*, 158, Article 103989. <https://doi.org/10.1016/j.compedu.2020.103989>
- Livingstone, S. (2014). Developing social media literacy: How children learn to interpret risky opportunities on social network sites. *Communications: The European Journal of Communication Research*, 39(3), 283–303. <https://doi.org/10.1515/commun-2014-0113>
- Martin, F., Gezer, T., Wang, W. C., 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>
- Meyers, E. M., Erickson, I., & Small, R. V. (2013). Digital literacy and informal learning environments: an introduction. *Learning, media and technology*, 38(4), 355–367. <https://doi.org/10.1080/17439884.2013.783597>
- Mihailidis, P. (2018). Civic media literacies: Re-imagining engagement for civic intentionality. *Learning, Media and Technology*, 43(2), 152–164. <https://doi.org/10.4324/9781315526058-5>
- National Association for the Education of Young Children & Fred Rogers Center for Early Learning and Children's Media. (2012). Technology and interactive media as tools in early childhood programs serving children from birth through age 8: A joint position statement. Washington, DC: NAEYC.
- Oehler, J. (2011). Digital citizenship means character education for the digital age. *Kappa Delta Pi Record*, 47(sup1), 25–27. <https://doi.org/10.1080/00228958.2011.10516720>
- Ribble, M. (2012). Digital citizenship for educational change. *Kappa Delta Pi Record*, 48(4), 148–151. <https://doi.org/10.1080/00228958.2012.734015>
- Ribble, M. (2015). *Digital citizenship in schools* (3rd ed.). Eugene, OR: ISTE.
- Sung, K. (2024). Conceptual understanding of digital citizenship and implications in citizenship education of social studies. *Theory and Research in Citizenship Education*, 56(1), 243–274. <https://doi.org/10.35557/trce.56.1.202403.009>

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