

DIGITAL CITIZENSHIP EDUCATION IN PRESCHOOL AND PRIMARY SCHOOL: A SYSTEMATIC LITERATURE REVIEW

GIÁO DỤC CÔNG DÂN SỐ Ở BẬC MẦM NON VÀ TIỂU HỌC: MỘT TỔNG QUAN TÀI LIỆU CÓ HỆ THỐNG

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(Received: March 15, 2026; Revised: May 04, 2026; Accepted: May 26, 2026)

DOI: 10.31130/ud-jst.2026.24(7A).152

Abstract - Digital citizenship education (DCE) has become an important priority beginning in preschool and primary education, as children are engaging with digital technologies at an increasingly young age. This article presents a systematic literature review of 18 international studies published between 2012 and 2023 to identify major approaches, forms of implementation, and emerging trends in DCE at these levels. The findings show three main areas of focus: preventing risks such as cyberbullying and online safety threats; fostering safe, responsible, and ethical online behavior; and developing digital and information literacy. Implementation appears in various forms, including integrated classroom activities, digital storytelling, educational games, augmented reality, animated videos, cybersecurity platforms, and community-based projects. However, evidence at the preschool level remains limited, while civic participation, digital voice, and social critique receive less attention. The review highlights the need for age-appropriate approaches, stronger teacher capacity, and closer school-family-community collaboration.

Key words - Digital citizenship; digital citizenship education; preschool; primary education; systematic literature review.

1. Introduction

Digital technology is becoming increasingly embedded in children's lives from the early years. Children use digital devices not only for entertainment but also to participate in various online activities, such as viewing content, searching for information, communicating, and learning [1], [2]. This transformation poses new demands for education: it is no longer sufficient to help children use technology; education must also prepare them to participate in digital environments safely, responsibly, and meaningfully [3]. In this context, digital citizenship education (DCE) has increasingly become an issue that requires attention from preschool and primary education.

In international research, digital citizenship is commonly understood through two main approaches. The first emphasizes protection, focusing on safe, appropriate, and ethical technology use. The second is broader, viewing digital citizenship as a set of competencies that enables individuals to participate in digital society through communication, collaboration, creativity, voice, and critique. Accordingly, various theoretical frameworks have conceptualized digital citizenship as a multidimensional construct, including components such as media and information literacy, digital ethics, participation, and critical competence [4], [5].

Tóm tắt - Giáo dục công dân số (DCE) đang trở thành yêu cầu cần được quan tâm từ sớm ở bậc mầm non và tiểu học, khi trẻ em ngày càng thường xuyên tiếp xúc với công nghệ số. Bài viết này thực hiện tổng quan tài liệu có hệ thống đối với 18 nghiên cứu quốc tế giai đoạn 2012–2023 nhằm làm rõ các hướng tiếp cận, hình thức triển khai và xu hướng nổi bật của DCE ở hai bậc học này. Kết quả cho thấy nghiên cứu hiện nay chủ yếu tập trung vào phòng ngừa các rủi ro như bắt nạt trực tuyến và mất an toàn mạng, hình thành hành vi an toàn và có trách nhiệm, cùng với phát triển năng lực số và năng lực thông tin. Tuy nhiên, bằng chứng ở bậc mầm non còn hạn chế; các chiều cạnh như tham gia công dân, tiếng nói số và phản biện xã hội vẫn chưa được quan tâm tương xứng. Bài viết đề xuất tăng cường tiếp cận phù hợp lứa tuổi, nâng cao năng lực giáo viên và thúc đẩy phối hợp giữa nhà trường, gia đình và cộng đồng.

Từ khóa - Công dân số; giáo dục công dân số; mầm non; tiểu học; tổng quan hệ thống.

However, when examined in educational practice at the preschool and primary levels, current research appears to remain largely oriented toward the protective approach. Most studies focus on topics such as online safety, appropriate conduct in online environments, cyberbullying prevention, and the initial development of information search and processing skills [6]–[9]. These topics are necessary, but they also indicate that DCE in the early years is still primarily understood as a matter of protection and adaptation. Meanwhile, dimensions with a clearer civic orientation, such as social participation, digital voice, and media critique, have not received commensurate attention.

In addition to this imbalance in content, the literature also shows that teachers play a decisive role in realizing DCE in practice. Many studies indicate that although schools are increasingly aware of the importance of topics such as cybersecurity, media balance, and digital footprints, the actual level of implementation depends largely on teachers' own awareness, experience, and digital competence [10]–[12]. This suggests that DCE is not only a curricular issue but also a matter of pedagogical capacity and the organizational conditions for implementation within schools.

Compared with previous related reviews [13], [14], [15], this article differs in two respects. First, its scope is limited to preschool and primary education rather than

combining the whole K–12 range. Second, the use of a four-dimensional coding framework allows for the simultaneous analysis of content, implementation forms, and measured outcomes within the same body of literature. In the context of Vietnam's implementation of the 2018 General Education Curriculum, which aims to integrate digital competence and DCE from the earliest grades [16], a systematic understanding of the current state of international research provides a necessary foundation for domestic curriculum and policy development.

Another notable limitation is the uneven distribution of evidence across educational levels. Empirical evidence at the preschool level remains substantially more limited than at the primary level [17], [18]. Most intervention models and impact evaluation studies have been conducted with primary school students [19], [20], whereas studies directly targeting preschool children or preschool teachers remain relatively limited [3], [21]. This gap indicates that although DCE in the early years has been acknowledged theoretically, its empirical evidence base and implementation models are still not sufficiently developed.

Against this background, a more systematic understanding of research on DCE in preschool and primary education is needed. This article conducts a systematic literature review to answer three questions: (1) What content areas do current studies focus on? (2) In what forms is DCE implemented? and (3) What prominent trends and research gaps can be identified from the existing body of literature? In doing so, the article contributes to clarifying the contours of the field and provides a basis for future research directions and educational practice.

2. Theoretical background

2.1. The concept and structure of digital citizenship competence

In the Internet era, the concept of digital citizenship has moved beyond the traditional understanding of possessing computer skills or the ability to access the Internet. According to Choi [22], digital citizenship is defined as the ability to participate in online society safely, ethically, and responsibly, while also encompassing the capacity to use technology to create social value. Structurally, this study uses Choi's framework of digital citizenship competence [22] as its overarching theoretical foundation. This framework divides digital citizenship into four mutually reinforcing pillars:

(1) Media and information literacy: the ability to search for, access, evaluate the reliability of, and create digital content.

(2) Ethics: awareness of compliance with communication norms, or netiquette; the protection of privacy; and the prevention of hostile behaviors, such as cyberbullying.

(3) Participation/Engagement: the use of technology to connect with communities, engage in discussion, and contribute one's voice to social issues.

(4) Critical resistance: the ability to identify bias, resist manipulative information, and protect democratic values in cyberspace.

Applying this four-dimensional structure to each educational level enables researchers to identify which

competencies are being prioritized and which gaps remain unaddressed in educational programs.

Choi's digital citizenship framework [22] was selected as the theoretical foundation of this study for two main reasons. First, it is one of the few frameworks that both comprehensively covers the four dimensions of competence, ethics, participation, and critique, and does not limit digital citizenship to a protective or defensive meaning. Second, the framework can be flexibly applied across different educational levels and contexts, making it suitable for synthesizing a body of literature that is diverse in terms of target groups and intervention forms.

Within the reviewed literature, the three concepts of digital competence, information literacy, and digital citizenship often appear in close relation and are sometimes used interchangeably. This article distinguishes the three concepts as follows: digital competence refers to instrumental competence, namely the ability to search for, use, and create digital content; information literacy refers to the ability to evaluate and verify information; and digital citizenship refers to the overarching competence to participate responsibly, ethically, and critically in digital environments. These three concepts are not used interchangeably in this article.

2.2. Characteristics of DCE in preschool and primary education

Although the digital citizenship competence framework is universal in nature, its application to preschool and primary education requires a lens appropriate to the developmental characteristics of children under 11 years of age. Current studies indicate two prominent characteristics of DCE for this age group.

First, there is a shift from a protective mindset to a constructive one. Previously, children were often regarded as vulnerable subjects who needed to be kept away from technology. However, as digital devices have become part of childhood [12], DCE cannot be limited to prohibition or risk warnings. Modern education emphasizes helping children move from being passive recipients to becoming responsible creators [2]. Through activities such as video production and digital storytelling, children gradually develop critical thinking about how information is created, circulated, and preserved.

Second, the intermediary ecosystem is indispensable. Because children's capacity for self-regulation remains limited, DCE must be implemented through adult mediation. In schools, this requires teachers' digital pedagogical competence [1], [10]. In families, parental accompaniment is an important condition for maintaining healthy online habits [19]. Overall, DCE in the early years is a process of socialization within a safe environment rather than merely teaching children how to use tools.

3. Research methodology

3.1. Research design

This study employed a systematic literature review (SLR) to synthesize, systematize, and analyze empirical evidence on DCE in preschool and primary education. The research process was implemented through sequential steps:

identifying the research questions, developing criteria for literature selection, establishing a coding framework, and synthesizing the results through thematic analysis. This approach helps ensure the systematicity, transparency, and reliability of the synthesis process, while also allowing the identification of relationships among educational objectives, forms of pedagogical implementation, and outcomes achieved among young children.

3.2. Data sources and selection criteria

The corpus for analysis consisted of 18 peer-reviewed international journal articles selected from reputable academic databases. To ensure relevance, the studies included in the analysis had to meet three criteria: (1) in terms of content, they were directly related to DCE or closely associated components such as digital competence, information literacy, cybersecurity, responsible online communication, cyberbullying prevention, and civic participation in digital environments; (2) in terms of participants, they focused on preschool children, primary school students, or teachers and educators directly associated with these two educational levels; and (3) in terms of study type, they provided empirical data or intervention evaluation. The inclusion of teaching staff in the review was necessary because their competence and readiness directly affect the feasibility of implementing DCE in practice [1], [3], [10], [11].

The exclusion criteria were as follows: articles were excluded if they (a) were purely theoretical papers without empirical data; (b) did not focus on preschool children, primary school students, or teachers/educators at these two levels; (c) did not have accessible full texts; or (d) were not written in English.

The search strategy was conducted on Scopus and peer-reviewed open-access scientific journals, covering the period from January 2012 to December 2023, using the following keyword combination: ("digital citizenship" OR "digital citizenship education" OR "digital competence") AND ("early childhood" OR "preschool" OR "kindergarten" OR "primary school" OR "elementary school"). The screening process involved three sequential steps: (1) screening by title and abstract; (2) reading the full text to examine the detailed criteria; and (3) selecting 18 articles that fully met the three groups of criteria.

3.3. Coding framework and data analysis

To systematize the corpus, the study developed a deductive coding framework consisting of four analytical dimensions, as presented in Table 1.

The four analytical dimensions were established for specific purposes: (1) the dimension of research participants identifies who is the focus of DCE interventions - children, teachers, or parents; (2) the dimension of content focus identifies the approach to DCE, ranging from instrumental competence to participation and critique; (3) the dimension of implementation form describes the pedagogical design, such as integration, specialized interventions, or learning through play; and (4) the dimension of measured outcomes records the evaluated effects, including awareness, attitudes, or behavior/behavioral intentions - three domains referenced from Krathwohl's taxonomy [23].

Table 1. Coding framework of the study

Research subjects	Research focus	Implementation	Measured Aspects
- Preschool children - Primary school students - Teachers / Educators - Teacher training groups	- Digital competence and information literacy - Digital ethics, communication, and digital responsibility - Digital safety, cybersecurity, online bullying, and digital wellbeing - Participation, creation, and active digital citizenship	- Integration into learning activities - Interventions / Specialized programs - Game design or game-based learning - Videos, digital platforms, or digital learning resources - Teacher / Educator capacity building - Family - school - community collaboration	- Perception / Knowledge - Attitude / Awareness - Behavior / Practice - Implementation conditions

This coding framework not only supports the description of the characteristics of the corpus but also provides a basis for comparing educational content, intervention forms, and achieved outcomes. As a result, the study can identify prominent trends, recognize gaps in the existing literature, and suggest future directions for the development of DCE in preschool and primary education.

4. Results

4.1. Distribution of research participants

The analysis of the corpus shows a clear differentiation in the distribution of research participants in the early years. Most empirical interventions directly targeted primary school students aged 6 to 11 in order to measure changes in awareness and behavior [5], [7], [21]. Meanwhile, at the preschool level, due to barriers related to children's self-reporting ability, studies tended to conduct indirect measurement through the perspectives of teaching staff, including preschool teachers [10], preservice teachers [3], and leisure-time educators [11]. This distribution reflects the fact that the younger the children are, the more central the guiding role of adults becomes in the formation of digital citizenship competence.

Table 2. Distribution of research participants across the 18 studies in the review corpus

Group	n	Studies	Notes
Primary school students	12	[2], [4], [5], [6], [7], [9], [17], [18], [19], [21], [24], [25]	Direct measurement of students' DCE competence/ behavior
Preschool children	1	[12]	Data collected through parent and family reports
Teachers and preservice teachers	4	[1], [3], [10], [11]	Including in-service teachers and preschool/ primary preservice teachers
Parents/ community	1	[20]	Community-based media education project
Total		18	

Source: Synthesized by the author from the 18 studies in the review corpus.

A noteworthy characteristic at the preschool level is that, because children's self-reporting ability remains

limited, studies have to measure outcomes indirectly through behavioral observation or surveys of teachers and parents. This creates a distinctive type of evidence: evidence on the impact of DCE at the preschool level is primarily inferred evidence rather than self-reported evidence. In the context of Vietnam's implementation of the 2018 General Education Curriculum and its goals for digital transformation in education, this distribution of participants suggests the need to develop DCE assessment tools that are appropriate to the developmental characteristics of each age group.

4.2. Content focus of DCE (RQ1)

The analysis of the corpus according to RQ1 shows that the 18 studies are unevenly distributed across four content groups of DCE. As shown in Figure 1, the group concerning digital safety, cybersecurity, and online bullying accounts for the largest number of studies ($n = 12$), followed by digital ethics, communication, and digital responsibility ($n = 8$), and then digital competence and information literacy ($n = 7$), while the group concerning participation, creation, and active digital citizenship accounts for the smallest proportion ($n = 3$). Because a single study may address more than one content area, the category counts sum to more than the number of studies. This trend reflects a pattern already noted in recent reviews: DCE in the early years is still primarily shaped around foundational competence and risk prevention rather than participatory empowerment.

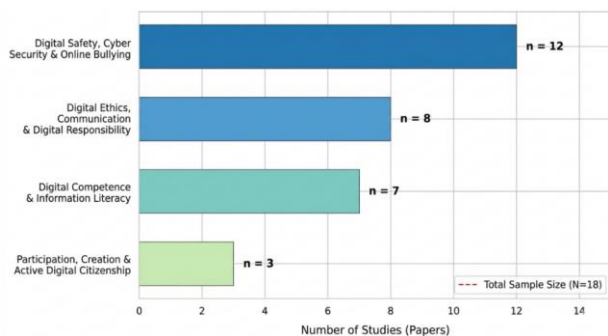


Figure 1. Distribution of research focus

4.2.1. Digital competence and information literacy

The analysis of the dataset shows that digital competence and information literacy constitute a foundational group of objectives commonly targeted among preschool and primary school children, though not the most frequently studied content area (see Figure 1). Pedagogical interventions mainly focus on developing operational skills and information-processing strategies through specific learning projects. Typical studies have measured the effectiveness of creating digital stories on mobile devices [2], designing augmented reality (AR) content [7], developing collaborative games [9], and analyzing children's navigation and information-search strategies in intensive ICT-based environments [18]. These findings demonstrate that DCE in the early years often takes foundational competencies - including searching for, processing, creating, and using digital content - as a prerequisite starting point.

Nevertheless, some studies have begun to expand the scope of this competence group toward a deeper approach. Through critical literacy practices embedded in project-based science learning [24], the data confirm that information literacy is not limited to purely technical operations but must also include the ability to understand, evaluate, and reflect on digital content. Even so, in the overall landscape of current research, the axis of technological skills and basic information processing still plays the most prominent constructive role.

4.2.2. Digital safety, digital ethics, and responsible communication

Another major strand of research positions the objectives of DCE around safety, ethics, and responsibility in interaction with technology. Empirical evidence shows that designing a specialized cybersecurity learning platform for primary school students [5], as well as teachers' promotion of responsible online communication patterns [11], represents essential forms of intervention. At the preschool level, survey data also indicate that educators pay particular attention to topics such as Internet safety, media balance, and digital footprint management [10]. These findings confirm a pattern: in the early years, digital citizenship competence is primarily constructed and operated according to a logic of protection and the guidance of normative behavior.

This approach is further reinforced by studies focusing on digital well-being and risk-prevention competence [12]. Notably, a large proportion of empirical studies examine the identification and prevention of cyberbullying and evaluate the effectiveness of pedagogical interventions [17], [19], [21]. Taken together, these data show that, in the current research ecosystem, digital citizenship among young children is first understood as a protective system that helps children develop self-protection capacities and minimize immediate risks in cyberspace.

4.2.3. Participation, creativity, and active digital citizenship

Compared with the two directions above, the dimensions of civic participation, digital voice, and social creativity appear less frequently. The study by Tomé et al. [20] is a representative example, approaching digital citizenship through a community project for preschool and primary school children in which children used media to participate in and connect with social issues. Wong et al. [24] also suggest a critical dimension through critical literacy in project-based science learning. In addition, the application of game-design environments has been shown to be an effective way to create collaborative spaces, stimulate creative thinking, and train collective decision-making skills [6], [19]. However, across the entire corpus, this area remains considerably less visible than the two axes of digital competence and digital safety. This indicates that DCE in preschool and primary education still mainly leans toward the development of foundational competence and risk prevention, while the dimensions of social participation and active citizenship in digital environments have not been explored commensurately.

4.3. Forms of DCE implementation (RQ2)

Based on the coding dimension concerning implementation forms, with each study assigned only one primary code, the 18 articles in the review corpus show that DCE in preschool and primary education is currently implemented mainly in four directions: (1) game-based learning and simulated environments, accounting for 7 out of 18 studies (38.9%); (2) project-based learning and digital content creation, accounting for 5 out of 18 studies (27.8%); (3) teacher/educator capacity building, accounting for 4 out of 18 studies (22.2%); and (4) family and community collaboration, accounting for 2 out of 18 studies (11.1%). This result shows that DCE in the early years is rarely taught as a standalone subject; rather, it is primarily embedded in guided learning experiences. The principle of assigning one primary code to each study was applied to ensure mutual exclusivity in classification, allowing the proportions across groups to be compared. The author acknowledges that many studies in practice combine multiple forms of intervention simultaneously; assigning each study to a single primary code is a simplification that can be discussed and is recognized as a limitation of the coding method in this article.

Two of these directions form the adult-mediation cluster, which views teachers, parents, and the pedagogical environment as determinants of DCE quality. Teacher/educator capacity building is reflected in the digital competence of support teachers and preschool teachers [1], [10], the digital citizenship awareness of preservice teachers [3], and teachers’ role in responsible online communication [11]; family and community collaboration is reflected in the influence of families on children’s digital behavior [12], [19].

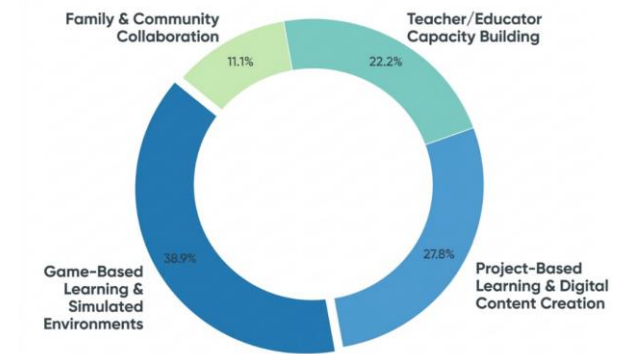


Figure 2. Proportion of implementation forms of DCE

Game-based learning and simulated environments use highly interactive settings to help children approach digital situations under safe conditions. Representative examples include Minecraft [6], collaborative game design [9], board games for cyberbullying prevention [17], cybersecurity learning platforms [5], educational animated videos [21], and the DCE program integrating the digital game Interland [25].

Project-based learning and digital content creation places children in the role of creators of digital products or participants in project-based activities. Studies show that digital storytelling, augmented reality, ICT projects, community media, and problem-based learning can support the development of digital competence, critical thinking, and a sense of responsibility toward digital content [2], [7], [18], [20], [24].

Table 3. Forms of DCE implementation

Primary code groups	Coded studies
Game-based learning and simulated environments	[5], [6], [9],[17], [21], [25], [4]
Project-based learning and digital content creation	[2], [7],[18], [20], [24]
Teacher/educator capacity building	[1], [3], [10], [11]
Family and community collaboration	[12],[19]

4.4. Impact outcomes and implementation conditions (RQ3)

The studies in the review corpus show that DCE in preschool and primary education often produces impacts across three domains: awareness, attitudes, and behavior/behavioral intentions. However, the level of impact is uneven; current evidence is generally stronger for awareness and attitudes than for sustainable behavioral change.

In the awareness domain (n = 11), this is the most commonly reported group of outcomes. Many interventions help children improve their understanding of digital safety, online risks, and how digital environments operate. Giannakas et al. [5] show that a cybersecurity learning platform supports students in accessing concepts of security and privacy in a more visual way. Quintana et al. [18] report improvements in information-search and navigation strategies. In the direction of content creation, Churchill [2] and Hsu et al. [7] show that digital storytelling or digital product creation helps children develop initial awareness of creating, sharing, and preserving digital content.

Table 4. Synthesis of DCE measurement outcomes

Analyzed domains	Core empirical evidence	Representative studies (N = 18)
Perception	Enhancing the understanding of online risks, digital safety, basic privacy, and methods for information seeking/ navigation; initially forming awareness of digital content creation, sharing, and storage	[2], [5], [7],[18]
Attitude	Increasing empathy toward others in online environments; reinforcing confidence, interest, and positive orientation when participating in digital activities	[17], [21], [24]
Behavior / Behavioral intention	Increasing readiness to report to adults, intervening to protect victims or choosing more cautious behavior in different digital scenarios	[17], [21]

In the attitude domain (n = 9), programs not only convey rules but also contribute to cultivating empathy, confidence, and active participation. Vlaanderen et al. [21] show that an intervention on cyberbullying increased empathy toward victims and children’s intentions to defend them. Wong et al. [24] also show that technology-integrated learning and critical literacy can increase students’ interest and proactivity.

In the behavior/behavioral intention domain (n = 7), the evidence is more limited and mainly remains at the level of intention to act. Interventions through games and situational simulations reported positive tendencies in children’s willingness to report incidents, intervene to protect others, or

side with victims in harmful online situations [17], [21].

The effectiveness of these interventions also depends strongly on implementation conditions. Although teachers are clearly aware of the importance of DCE, they still lack professional competence and supporting resources for systematic implementation [3], [10], [11], [26]. The gap between awareness of DCE and classroom practice was also identified by Hui and Campbell [8] as a common challenge. In addition, families play an important mediating role; positive digital habits are difficult to sustain without consistent parental accompaniment and supervision [12], [19].

Compared with recent related reviews, this article makes several distinct contributions. Li et al. [13] reviewed DCE in the early years with a focus on describing implementation; Tadlaoui-Brahmi et al. [14] synthesized DCE at the primary level; and Walters et al. [15] focused on elementary education with a broader filter. This article differs in two respects: (1) it combines both preschool and primary education to identify the evidence gap between the two levels; and (2) it simultaneously analyzes three dimensions - content, form, and outcomes - instead of describing each dimension separately.

After synthesizing the corpus, three theoretical gaps can be identified. First, most studies describe outcomes without explaining the mediating mechanisms - that is, the pathways through which DCE interventions generate changes in young children's awareness or behavior remain theoretically unclear. Second, there is no standardized DCE measurement framework appropriate to the developmental characteristics of preschool and primary school children, resulting in a lack of basis for comparison across studies. Third, evidence on boundary conditions is lacking, including teacher conditions, program scale, and the continuity of interventions, which determine the effectiveness of DCE in specific contexts.

Future research should prioritize: (1) designing experimental studies with control groups for preschool education, where evidence remains limited; (2) developing age-standardized DCE measurement tools; and (3) conducting deeper research on the dimensions of student voice and active citizenship in digital environments during the early years.

Regarding the limitations of this article, the search scope was limited to Scopus and accessible open sources, excluding WoS and ERIC; the study was conducted by a single researcher, so inter-rater reliability was not checked; and only English-language literature was synthesized. These limitations affect the comprehensiveness of the corpus and should be considered when interpreting the results.

5. Discussion

Three main points can be drawn from the findings of this study. First, DCE in preschool and primary education is still oriented more toward protection than construction. Most interventions focus on digital safety, cyberbullying prevention, responsible communication, and compliance with online codes of conduct [17], [21]. This orientation is appropriate to the developmental characteristics of young children. However, if DCE remains limited to a defensive

logic, digital citizenship may be narrowed to a competence for avoiding risks. Some studies have suggested directions for expansion through digital storytelling, media product creation, and age-appropriate participation in community projects [2], [20]. In Vietnam, recent studies also show an increasingly clear need to integrate digital competence, media and information literacy, and DCE into the general education curriculum [16], [27], [28]. Within this journal, prior work has likewise examined the design of technology-supported teaching resources for primary students [29] and the opportunities and challenges of artificial intelligence for teaching and learning [30], reinforcing the local relevance of preparing children to engage with digital environments from an early age.

Second, effective forms of implementation are often those that are experiential, interactive, and simulation-based. Children learn better when they participate in games, simulated situations, digital product design, or learning projects, rather than merely receiving rules in a one-way manner [5], [6], [9]. This implication is also consistent with domestic studies on the development of critical competence, information evaluation skills, and digital competence among general education learners [27], [28], [31].

Third, the effectiveness of DCE depends strongly on the adult ecosystem surrounding children. Teachers and parents play a decisive mediating role, but they do not always have sufficient competence and resources to support children consistently [3], [10]–[12], [19]. Therefore, DCE in the early years needs to be organized as a process of coordination between schools and families.

6. Conclusion

DCE in preschool and primary education is no longer a matter of the future but an urgent priority in the current context of digitalization. Through a systematic review of 18 empirical studies, this article has outlined a multidimensional picture: current educational objectives are strongly focused on digital safety and digital ethics; implementation methods prioritize learning through games and projects; and the effects are clearly evident in the domains of awareness, empathy, and positive behavioral intentions. However, the study also identifies major gaps: the lack of interventions aimed at developing critical competence, the scarcity of in-depth studies at the preschool level, and barriers related to teachers' implementation capacity. These findings provide an important evidence base for policymakers, curriculum designers, and teacher education institutions to make strategic adjustments toward creating a safe cyberspace environment in which children are empowered to become resilient digital citizens from the early years.

Academically, this review reaffirms that DCE in preschool and primary education is still primarily constructed according to a logic of protection and risk prevention; evidence on social participation and active digital citizenship remains limited. At the same time, this study also shows that teachers and parents play an indispensable mediating role, and that the effectiveness of DCE depends strongly on the ecosystem conditions surrounding children. In addition,

several practical pedagogical implications emerge from the study: DCE interventions should be experiential, interactive, and age-appropriate; investment is needed in strengthening teachers' digital competence; and a family-school-community collaboration framework should be developed for the early implementation of DCE. This study also suggests several directions for future research: prioritizing empirical evidence for preschool education; developing standardized DCE measurement tools; and expanding research into the dimensions of digital voice and active civic participation appropriate to the early years.

Acknowledgments: This research was funded by the Da Nang City Department of Science and Technology, under contract number 01-5/HĐ-SKHCN.

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