Systematic literature review on digital citizenship education for primary school students

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Abstract

The trend toward the digitalization of all areas of human activity has had a significant impact on education. Today, more than ever, there is a lot of discussion about developing the students' specific skills to adapt to future changes. In this context, research investigating practices at the primary school level is constantly expanding, out of the desire for researchers to identify how specific digital citizenship content is implemented in the work of young learners. This study aims to systematically review the scholarly articles to examine primary school practices related to digital citizenship. Studies conducted on participants, students, and primary school teachers, were included in the analysis. The systematic review was also developed taking into account empirical studies that investigated practical applications in the field of digital citizenship. The results showed that the practices used in primary school focus on students' digital literacy and personal development through an interdisciplinary approach. The studies were theoretically grounded, focusing on only a few dimensions of digital citizenship. These results are the prerequisites for the realization of elementary education in line with the needs of young learners, taking into account the trend of digitalization in all areas of human activity.

Keywords: digital citizenship; education; primary school.

1. Introduction

Over the last twenty years, the importance of introducing digital citizenship content into the school curriculum has increased, especially as children spend considerable time in front of screens.

The virtualization of school and out-of-school environments is an invitation to all educational institutions to take up the challenges of engaging school children in cyberspace (Tadlaoui-Brahmi, Cuko & Alvarez, 2022). Thus, digital citizenship can be

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developed in primary school students not only in school but also in non-formal and informal settings (Gleason & von Gillern, 2018). Although schools' educational offerings do not usually provide digital citizenship education at different age levels, the measures that are required when such content is delivered are an argument for analysis (Alonso-Ferreiro et al., 2020). Research shows that the organization of educational experiences related to digital citizenship for young school-age students differs depending on the country of origin because each corner of the world has its specificities (Tadlaoui-Brahmi, Cuko & Alvarez, 2022). Empirical evidence also shows that there is an emphasis on developing technical skills and digital access at early school age (Ball & Skrzypek, 2019), with children also engaged in civic and social engagement activities (Gutierrez de Blume et al., 2016). Thus, digital citizenship becomes an umbrella concept under which educational programs for developing the digital competencies of students of primary school age and beyond are hidden. Ribble, Bailey, and Ross (2004, p. 7) state that digital citizenship is the "norms for appropriate, responsible about technology use" and James, Weinstein, and Mendoza (2021, p. 13) define this concept as "using technology responsibly to learn, create and participate. To better understand it is about digital and citizenship, the former lexeme shows a unique set of skills and dispositions in online contexts and the use of technology. The term citizenship refers to being a member and inhabitant of a community, while also taking into account the rights and responsibilities each person has towards the wider community and world."

The literature reflects a lack in the transmission of content, with primary school curricula showing a significant deficit in teaching philosophical knowledge or knowledge related to ethics in general (Tadlaoui-Brahmi, Cuko & Alvarez, 2022). This is why digital citizenship education, although usually connected only to a few school subjects, must be carried out by extending the links to subjects such as philosophy, ethics, or ecology. In this way, pupils are supported in developing critical thinking and resilience to the appropriate use of technology.

Concerning early childhood, empirical data are scarce, with most research focusing on schooling. The difficulty of collecting data at this age level and the need for time-consuming qualitative approaches may explain the reality reflected. Despite this, knowing that the topic of digital technology use is a topical one, including that addressed to young children, social media is the space where young children spend more and more time (Tomé, 2016). Efforts to introduce content specific to digital citizenship have led to researchers' interest in measuring the effects of these interventions in elementary education through studies. Given that most systematic reviews focus on research conducted on groups of adolescents or adults, this study brings an element of innovation by including in analysis only the investigations organized in elementary education.

2. Methodology

2.1. The methodology of systematic review

The study we propose is a systematic review that aims to analyze empirical evidence, according to eligibility criteria, that answers the research questions (Tadlaoui-Brahmia, Çukoa & Alvarez, 2022). We used relevant methods that were selected to minimize the bias, thus providing reliable findings from which conclusions can be drawn and decisions made (Green et al., 2015). Conducting a systematic review involves following a predefined procedure, described by Newmann and Gough (2020) who mention the following steps: formulation of research questions, selection of studies according to inclusion/exclusion criteria, coding strategy, in-depth analysis and synthesis, a structure that will be detailed in the following sections.

2.2. Research questions

To fully understand how we can provide digital citizenship education we have formulated the following research questions to which answers are sought: What goals do teachers set for digital citizenship education? Are there differences in handling the content related to digital citizenship according to the year of publication for the analyzed studies? Which defining aspects of digital citizenship is determined by the cultural background? What differences are considering the students' age in teaching digital citizenship education? How are learning experiences in primary education organized concerning the development of digital citizenship skills? As a result of these research questions, the study contributes to the operationalization of this theoretical concept, aiming at the organization of the systematic review.

2.3. Search procedures

The systematic review included articles published between 2010-2022 in peer-reviewed journals. We used the following databases: ERIC, JSTOR, Science Direct (Elsevier), Central Eastern European Online Library (CEEOL), and Directory of Open Access Journal (DOAJ). The keywords we used in the search for articles were: "digital citizenship", "education" and "elementary school".

2.4. Eligibility criteria

To answer the research questions, we used the following criteria related to digital citizenship:

a. Report on the practical implementation of digital citizenship content in the classroom.

b. Educational practices at the primary school level.

c. Languages of publication to be English and Romanian.

d. Year of publication to be after 2010.

The following types of studies have been excluded:

a. Theoretical studies.

b. Research carried out at secondary, high, and university levels.

c. Articles that are written in languages other than English and Romanian.

d. Research done earlier than 2010.

2.5. Search and screening process

During an initial search, we found 293 studies. After excluding duplicates, a total of 250 studies remained. After analysis of titles and abstracts we extracted 64; this process was carried out by two researchers. After reading all the articles, we excluded 25 from the analysis due to the treatment of the issue of digital citizenship strictly at a theoretical level. As a result, we included 39 studies in the review (**Figure 1**).

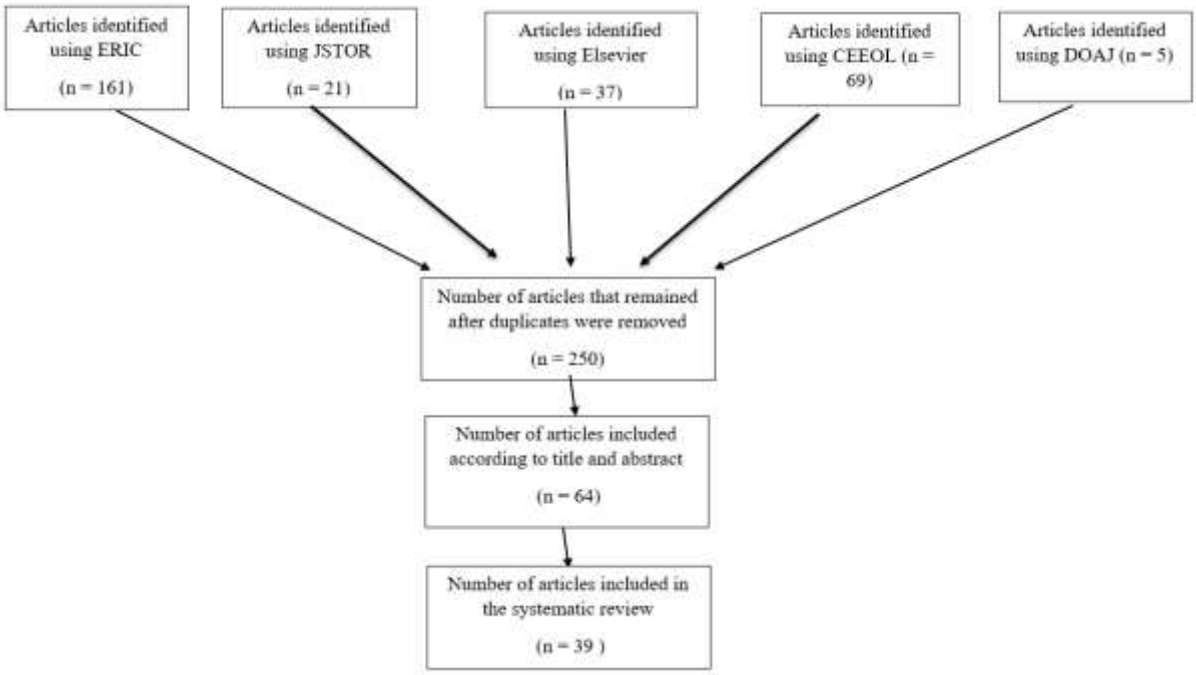

Figure 1. *Selection procedure for articles included in the systematic review*

2.6. Coding and data extraction

We followed the steps described by Newman and Gough (2020) for the systematic review: research question and conceptual framework, selection criteria and search strategy, study selection, and coding strategy. Due to the focus of this review on describing implementation practices, the quality assessment of each study is briefly highlighted. Therefore, the data assessment process has not been conducted. Finally, the results, discussion, and conclusions have been reported.

2.7. Agreement between researchers

We carried out from a dual perspective the scheme and coding, with two specialists involved in data collection and analysis. Thus, the steps we carried were as follows: in the first stage a single researcher named the categories based on theoretical models of digital citizenship; this phase was followed by the study of selected articles by the two researchers; lastly, the first researcher reviewed the double analysis to verify the coding categories and to formulate the research conclusions. We carried out this process considering the agreement between the specialists.

2.8. The importance of the theoretical model of digital citizenship in the coding process

The theoretical model developed by Ribble (2015) provided the guiding directions in selecting categories of educational interventions in the digital citizenship plan. The nine dimensions explained by Ribble show the necessary competencies that Internet users need to have for the favorable development of future society. The nine categories corresponding to the dimensions Ribble (2015) identified are digital access, digital etiquette, digital legislation, digital communication, digital literacy, digital commerce, digital rights and responsibilities, digital safety and security, and digital health and well-being (**Figure 2**).

Digital access is about distributing digital tools equally to all virtual users and digital commerce refers to the purchase of goods or services in the virtual environment. Digital communication is the electronic exchange of information and digital etiquette aims to develop a sense of citizenship and empathy when using digital devices. Digital literacy of online users refers to the development of skills to understand and use technology correctly. Digital health aims to ensure optimal physical and psychological health.

Figure 2. *Ribble's theoretical model of digital citizenship (2015)*

Digital justice aims to ensure that online activity is governed by rules and laws that are tailored to each problem in the digital world. Digital security is about security measures in digital contexts. The rights and responsibilities that users have online are freedoms they can enjoy in cyberspace, such as freedom of expression, participation in various activities, but also obligations to others (Ribble, 2015).

Figure 3. *The five components of DigComp 2.1 (Carretero et al., 2017)*

The second theoretical model on which the systematic review was built is the one developed by Carretero et al. (2017) entitled DigComp 2.1 which is well-known and implemented in the European space (**Figure 3**).

In this respect, five areas of digital competencies are defined as follows: information and digital literacy, which refers to the search, filtering, analysis, and evaluation of information and digital content; communication and collaboration, which aims at interaction, sharing, active citizenship, collaboration and communication through digital tools; digital content creation, which aims at developing, integrating and reconstructing digital content, i.e. programming; digital safety which is concerned with the protection of devices, personal data, personal well-being, health, and the environment; problem-solving which is the dimension aimed at technical problem-solving activities, identification of technological needs, creative use of digital technology, and identification of gaps in the development of digital competencies.

The two models of digital citizenship are the theoretical basis that guided the selection process for a conclusive systematic review that faithfully reflects the educational practices in the school. In this way, the quality of the approach initiated was ensured by connecting it to the current literature.

3. Results

In this section, we have made a foray into the literature on digital citizenship and the implementation of specific content in educational contexts. Starting from the questions launched at the beginning of the collection and analysis of the elaborated research we aimed at identifying specific educational practices of digital citizenship, taking into account the coding system developed on theoretical grounds. After preliminary analysis, we noticed that most of the studies dealing with this issue have participants as university students, future practitioners in the field of educational sciences, and to a certain extent, high school and secondary school students. Thus, we note that there are a small number of studies that include elementary school students to investigate educational practices specific to digital citizenship. The majority of studies involve participants from the perspective of identifying their perceptions of certain fundamental concepts specific to digital citizenship and less on the practical dimension. Therefore, for these reasons, we selected 39 studies for review to identify at a practical level how specific digital citizenship content is covered in primary school. Based on the information collected, we arrived at the statement of several dimensions, in line with the two theoretical models developed by Ribble (2015) and Carretero et al. (2017). We grouped the 39 studies according to the main categories, resulting in six dimensions given by information recurrence (**Figure 4**).

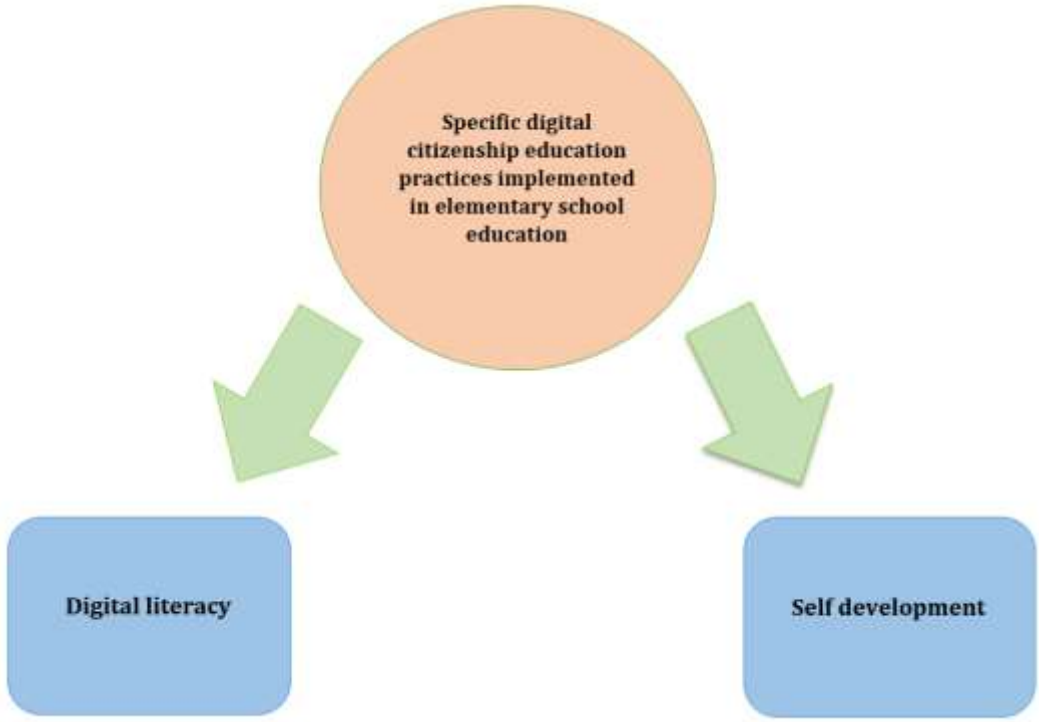

Figure 4. *Directions for implementing specific digital citizenship contents identified in the analyzed studies*

3.1. Digital citizenship-global perspectives on how to teach specific content

Most of the analyzed articles reflect the multidimensional perspective of digital citizenship, focusing in particular on digital literacy and the practical action of cyber-citizenship. Most studies focus on the development of digital competencies and facilitation of digital learning (e.g. Anderson, 2018; Rambouseka, Štípeka & Wildová, 2014; Gezer & Anilan, 2021; Vartiainen, Toivonen, Jormanainen, Kahila, Tedre & Valtonen, 2021), given that the participant groups are aged between 8 and 11. Rambouseka, Štípeka, and Vaňková (2016) wanted to carry out through their research approach a thorough analysis of the digital literacy level of young learners to make improvements in terms of the national curriculum, the instructional-educational process, and organizational aspects. All these contributions aimed to support pupils in developing the digital skills needed by the present and future society. On the other hand, Quadros-Flores, Ramos Gonçalves and Ramos (2022) initiated an approach where they wanted to explore the involvement of students in the creation of online educational content by activating previously acquired knowledge through collaborative learning in digital lessons. The results showed that the conscious and active participation of students in the process of creating online educational content stimulates the articulation of knowledge in an inclusive education for all children. This is achieved by activating prior knowledge, thus helping students to develop positively, both cognitively and emotionally (Quadros-

Flores, Ramos Gonçalves & Ramos, 2022). Gaps acquired in distance learning can be remedied by using digital tools as shown in a study by Ökördi and Molnár (2022). Their research focused on the development of mathematical skills of students with learning difficulties, i.e. exploring the options, benefits, and limitations of an online game-based intervention. The results showed that the use of digital media reduced the learning gaps accumulated during distance learning, without additional effort by the teacher, which is essential for the success of the proposed educational program (Ökördi & Molnár, 2022).

3.2. Teaching methods and learning tasks specific to digital citizenship

Following the systematic analysis of the literature articles exploring practices related to digital citizenship in elementary school students, we have noticed that there are two directions of implementation of specific content: one pragmatic, focused on the benefits of learning through online media and environments, and the other educational, with a profound impact on the personal development of young students through digital tools (**Table**)

Table

The systematisation of the analyzed studies, according to the digital citizenship education in elementary school

Digital literacy through interdisciplinarity		**Self-Development**	
Integrated subjects	Author and year of publication	Topics	Author and year of publication
DC and language skills	• Chiarelli, Szabo & Williams, 2015 • Rambouseka, Štípeka & Vaňková, 2016 • YamaÇ & Ulusoy, 2016 • Anderson, 2018 • Özhek & Girli, 2017 • Kloos, Sliemers, Cartwright, Mano & Stage, 2019 • Kim, Asher, Burkhauser, Mesite & Leyva, 2019 • Bratitsis & Mantellou, 2020 • Hazar, 2020 • Gezer & Anilan, 2021 • Sahin & Özenç, 2021 • Samosa, Vicente, Rapada, Javier & Lansangan, 2021 • Graça, Quadro-Flores & Ramos, 2022	DC and Metacognition	• Nieto-Márquez, Baldominos & Pérez-Nieto, 2020
		DC and Inclusive Education	• Hongngam, Donnaya Iniumpa & Kallaya Chanapai, 2022
		DC and Cognitive Competencies	• Davidsen & Christiansen, 2014 • Rambouseka, Štípeka & Wildová, 2015 • Jenson, Castell, Fraser, Muehrer, Ryerson McLaughlin-Jenkins, 2016 • Zafiropoulou & Darra, 2019 • Chen, Wang, Chen, Chen & Lin, 2020 • Dovigo, 2021 • Vartiainen, Toivonen, Iormanainen, Kahila, Tedre & Valtonen, 2021 • Kurniawati, Kartowagiran, Wuryandani, Retnawati & Herwin, 2022 • Quadros-Flores, Ramos Gonçalves & Ramos, 2022
DC and Mathematics and Sciences	• Kacprowski & Raimondi, 2014 • Lai, 2016 • Higgins, Crowford, Huscroft-D'Angelo, Horney, 2016 • Thangamani & Fu, 2019 • Kor, 2019 • Lozada-Yánez, La-Serna-Palomino & Molina-Granja, 2019 • Anderson-Pence, Tygret & Crocker, 2020 • Kurvinen, Kaila, Laakso & Salakoski, 2020 • Ökördi & Molnár, 2022	DC and Problem-Based Learning	• KAÇAN & KAÇAN, 2022
DC and Tehnological Education	• Saarinen, Seitamaa-Hakkarainen & Hakkarainen, 2016	DC and School Behaviuour	• Ejsing-Duun & Helle Marie Skovbjerg, 2016 • Karalar & Sidekli, 2017 • Azis & Ahmad, 2022
DC and Music	• Germeroth, Kelleman & Spartz, 2018		

The use of technology from a pragmatic perspective follows the need of young learners to be supported in the process of developing specific skills, but also to increase motivation for learning. The theorizations of digital citizenship underpinning these studies emphasize the need for the Internet user to be able to learn with online tools. The focus is on dimensions of the fundamental concepts such as digital communication, digital literacy mentioned by Ribble (2015), and communication and collaboration, i.e. digital content creation, mentioned by Carretero et al. (2017). Content specific to digital citizenship is approached from an interdisciplinary perspective, through elements specific to mathematics, science, language and communication, visual arts, and music. The teaching-learning methods that facilitate the development of digital citizenship skills are exercise, project-based learning, or problem-solving. Higgins, Crawford, Huscroft-D'Angelo, and Horney (2016) wanted to investigate through their study how digital tools can influence mathematical reasoning in a non-formal online course entitled "Math Learning Companion". Thus, primary school students in two private schools were assessed in terms of mathematical reasoning, both at the beginning moment and after the intervention. The results showed an overall change in mathematical reasoning during the intervention, requiring individualization of the proposed learning program (Higgins, Crawford, Huscroft-D'Angelo & Horney, 2016). The development of literacy skills through educational software packages was the topic of research by Şahin and Özenç (2021). Thus, through qualitative methods, they collected data on the usefulness of online educational materials for promoting and developing reading-writing skills. Based on the information collected, it was noted that educational software packages for students provide an advantage in differentiated teaching, thus minimizing differences between students, helping them to be more motivated, and allowing them to apply what they have learned, stimulating them multisensory (Şahin and Özenç, 2021). Unique research that aimed at exploring the benefits of digital portfolios in technology education was conducted by Saarinen, Seitamaa-Hakkarainen, and Hakkarainen (2016). They investigated the experiences that elementary school students have when using digital tools to make collections of activity products. Based on interviews conducted with third graders, they arrived at results that demonstrated the usefulness of iPads and Book Creator in making portfolios. The sooner they are used in educational practice, the more they become an integral part of a natural instructional-educational process. Their value in terms of organizing information, teacher-pupil relations, and assessing pupils' final products is obvious. This method and the digital tools used offer a balance between design presentation and the possibility of process evaluation. The students' experiences collected during the research are relevant and useful for improving educational practices (Saarinen, Seitamaa-Hakkarainen & Hakkarainen, 2016). One study focused on the development of reading skills through music and digital tools (Germeroth, Kelleman &

Spartz, 2018). Researchers measured the effectiveness of using a platform called “Lyrics to Learn” to support students in reading fluently with technology and music authoring.

The second perspective towards the personal development of learners through digital tools is reflected in several research studies included in the systematic review. Rambouseka, Štípeka, and Vaňková (2016) looked for identifying the specific content of digital literacy education promoted at the primary and secondary school levels. Thus, this investigation aimed to improve the curriculum, the instructional-educational process, and the elements of institutional management in the direction of digital literacy of primary and secondary school students. In the same direction, the research conducted by Chiarelli, Szabo, and Williams (2015) followed the dynamics of the school group by using a popular educational platform, namely "Class Dojo". It facilitates the realization of student class management by creating avatars, and virtual images of each child in the class. In this way, schoolchildren receive feedback in an online format, making them more motivated to improve their behavior and at the same time interact effectively within the group. The results of research on a group of primary school pupils showed that the use of the “Class Dojo” platform has positive effects on pupils' behavior and helps them to be more aware of their behavior. The use of this resource supported the students in orienting their behavior towards working efficiently in groups, but also during the reading moments organized in class (Chiarelli, Szabo & Williams, 2015).

In a study that focused on the effects of touchscreens on collaborative learning, Davidsen and Christiansen (2014) collected important data to measure this relationship. Based on the multimodal interaction of 8 to 9-year-olds, they concluded that children use hand movements to control access to the online environment, to construct and solve a problem, and to demonstrate or imitate behaviors. Another aspect highlighted in Davidsen and Christiansen's (2014) study concerns how young learners develop behaviors in the digital environment. Metacognition was the central concept from a theoretical point of view in the study conducted by Nieto-Márquez, Baldominos, and Pérez-Nieto (2020). Given the important relationship between the latter and the prediction, i.e. improving students' academic performance, the investigation was carried out on a group of 130 primary school students aged 8 years to measure the implications of using the "Smile and Learn" platform in identifying metacognitive effects. Using the instrument entitled Junior Metacognitive Awareness (Jr. MAI), an external assessment of students' metacognition was carried out, and the results showed a positive relationship between digital exercises with immediate feedback, logical processes, and metacognition (Nieto-Márquez, Baldominos and Pérez-Nieto, 2020). In a case study with 34 primary school students, the subjects' explanations of learning mediated by digital devices were analyzed. The qualitative analysis brought to light aspects concerning how the students' ideas generated the possibility of facial, vocal, or gesture recognition to solve everyday

problems. The results of the study indicated that the apps developed represent a promising start for the understanding of primary school students of the principles of digital device-mediated learning and the role they play in everyday life. The findings of the study focused on the need to support future generations to become online content creators in an era of digitization (Vartiainen, Toivonen, Jormanainen, Kahila, Tedre & Valtonen, 2021). Thus, these studies show the multiple valences of using digital devices and tools in creating the digital citizens of the future.

3.3. Dimensions of digital citizenship included in empirical research

Most of the articles included in the systematic review focus on the direction of digital literacy described by Ribble (2015) or Carretero et al. (2017), the two concepts being treated similarly by the theorists. While some of the studies included in the review have the main goal to measure the implications of the use of digital tools in developing specific skills and improving school performance (Thangamani, 2019; Lozada-Yánez, La-Serna-Palomino & Molina-Granja, 2019; Hazar, 2020; Bratitsis & Mantellou, 2020; Kurvinen, Kaila, Laakso & Salakoski, 2020), others aim to identify the effects of virtual environments on the personality and behaviors of young learners (Davidsen & Christiansen, 2014; Rambousek, Štípek, Vaňková, 2016; Wildová, Vartiainen, Toivonen, Jormanainen, Kahila, Tedre & Valtonen, 2021; Nieto-Márquez, Baldominos & Pérez-Nieto, 2020; Azis & Ahmad, 2022; Kacan & Kacan, 2022).

The second dimension theorized by Ribble (2015) and Carretero et al. (2017) entitled digital communication, i.e. communication and collaboration is targeted by several studies aiming to identify the valences of digital media in promoting effective relationships between all educational actors (Chiarelli, Szabo & Williams, 2015; Ejsing-Duun & Skovbjerg, 2016; Graça, Quadro-Flores & Ramos, 2022). Another dimension of digital citizenship targeted in the reviewed studies is problem-solving (Carretero et al., 2017), reflected in several articles included in the review (Davidsen & Christiansen, 2014; Lai, 2016; Vartiainen, Toivonen, Jormanainen, Kahila, Tedre, Valtonen, 2021; Kacan & Kacan, 2022). Content creation (Carretero et al., 2017) is an area pursued to a small extent in the articles selected for analysis, with a few by Ejsing-Duun and Skovbjerg (2016) and Vartiainen, Toivonen, Jormanainen, Kahila, Tedre, and Valtonen (2021).

Dimensions such as digital access, digital etiquette, digital legislation, digital commerce, digital rights and responsibilities, digital safety and security, and digital health and well-being theorized by Ribble (2015) or digital safety defined by Carretero et al. (2017) were not identified in any of the studies included in the review. This could be explained by the fact that the groups of participants were made up of young schoolchildren, which did not allow digital content to be addressed.

3.4. Interdisciplinary Perspectives for studying digital citizenship

Most of the reviewed studies present the approach of language and communication contents alongside those specific to digital citizenship (Anderson, 2018; Germeroth, Kelleman & Spartz, 2018; Hazar, 2020; Gezer & Anilan, 2021; Şahin & Gül Özenç, 2021). On the other hand, the integration of mathematics-specific content alongside digital content is the second trend noted in the studies reviewed (Higgins, Crawford, Huscroft-D'Angelo & Horney, 2016; Anderson-Pence, Tygret & Crocker, 2020; Kurvinen, Kaila, Laakso, Salakoski, 2020; Ökördi & Molnár, 2022). This can be explained by the fact that the general trend at early school age is to develop literacy and numeracy skills, which are essential for the harmonious development of the pupil. In addition, one study has focused on the implications of digital tools in the development of manual skills through the use of digital portfolios and apps facilitating the creation of e-books (Saarinen, Seitamaa-Hakkarainen & Hakkarainen, 2016), and another on the development of artistic skills in music (Germeroth, Kelleman & Spartz, 2018).

The other studies reviewed cover various aspects of the effects of digital tools and devices in the development of behaviors, metacognition, and the types of choices Internet users make (Nieto-Márquez, Baldominos & Pérez-Nieto, 2020; Vartiainen, Toivonen, Jormanainen, Kahila, Tedre & Valtonen, 2021; Kurniawati, Kartowagiran, Wuryandani, Retnawati, & Herwin 2022). This highlights the interest in intensively leveraging digital tools and media for general literacy among primary school students, including digital literacy.

3.5. Quantitative and qualitative methods used in empirical research

The studies included in the analysis present both quantitative and qualitative methods of data collection in varying proportions. Only thirteen of the analyzed research papers gather information through qualitative methods, which is explained by the fact that the latter is time and energy-consuming (Ejsing-Duun & Skovbjerg, 2016; Koç, 2019; Graça, Quadro-Flores & Ramos, 2022). The volume of information is large, thus additional effort is required to analyze it. On the other hand, the use of questionnaires and experiments based on digitally mediated educational interventions is noted (Rambousek, Štípek, Vaňková, 2016; Zafiropoulou & Maria Darra, 2019; Kacan & Kacan, 2022). In this way, the effects of digitally mediated intervention on the development of specific digital citizenship skills in primary school students are measured. Thus, the use of quantitative methods in the studies included in the review follows the general trend from empirical research, including those for early school age.

3.6. Differences by year of publication

In terms of the time criterion, we observed differences in handling the content related to digital citizenship. While in the past times the review publications follow the relationship between the use of digital devices and the development of student's skills and competencies (Davidsen & Christiansen, 2014; Lai, 2016; Özbek & Girli, 2017; Karalar & Sidekli, 2017), the most recent studies investigate the implications in virtual learning and literacy of young learners through the use of various digital platforms and applications (Azis & Ahmad, 2022; Graça, Quadro-Flores & Ramos, 2022). The transformations in the usage of digital devices by children are well represented. Tablets and iPods are digital media whose effects are analyzed in early research (2016, Lai; Karalar & Sidekli, 2017; Özbek & Girli, 2017), while in more recent research the effects of their use are not a declared goal, given that they are no longer so widely used by pupils. The focus is now on the software component, i.e. the platforms and interactive applications accessed by young learners in developing digital skills and learning capacity (Kacan & Kacan, 2022; Kurniawati, Kartowagiran, Wuryandani, Retnawati, & Herwin, 2022; Quadros-Flores, Ramos Gonçalves & Ramos, 2022). Thus, time has shaped how digital devices are used by students and the research interests of theorists in the field.

3.7. Defining aspects determined by the cultural background

Most of the research illustrated in the articles included in the study was undertaken in Europe. Thus, twenty-four investigations had participants represented by European students and teachers, ten were represented by the American population and only five were of Asian origin. This may have economic, cultural, or political reasons, or may be explained by the selection procedures for the articles included in the analysis. Also, the creation of theoretical models was the reason for the necessity to study the multifaceted implications of digital technology in the act of learning and the forming of specific cyber citizenship behaviors. Ribble (2015) and Carretero et al. (2017) are theorists who have theorized practices in the online environment, generating eloquent benchmarks for digital citizenship with all dimensions included.

All the studies reviewed present a variety of tools, applications, and platforms, without being able to distinguish from a cultural point of view on this issue.

4. Discussions

This systematic review is an analysis of studies that focus on how specific digital citizenship content is taught in primary classrooms. To accomplish this, we selected

articles published between 2010 and 2022 that focused on different practices centered on digital citizenship training in elementary school education. Although we can notice a continuous effort to support the formation of digital competencies, we note the lack of a valid strategy for literacy and the formation of specific behaviors for young students.

4.1. Summary of results

At the end of this exploration of the practices implemented in elementary education on digital citizenship, we can formulate some general conclusions. It is worth noting that the year of publication is a determining element in the choice of research focus, with early investigations focusing on the influence of digital device use on students' behaviors and skills. The most recent studies examine the role that various digital platforms and apps play in digital literacy and learning outcomes. Given that the investigations included in the analysis had samples of students aged 8 to 11, it is notable that the definition of digital citizenship has taken a more practical form. Most of the theorizations focused on digital literacy concerning the need to form basic skills in the early years of school. In the analysis, we identified two trends in theorizations of digital citizenship: one related to the interdisciplinary manner in which specific content is introduced, and the other to personal development.

Notably, the research included only addresses some of the dimensions of digital citizenship theorized by Ribble (2015) and Carretero et al. (2017) such as digital communication, i.e. communication and collaboration, content creation, or problem-solving. Other dimensions such as digital access, digital etiquette, digital legislation, digital commerce, digital rights and responsibilities, digital safety and security, and digital health and well-being theorized by Ribble (2015) or digital safety defined by Carretero et al. (2017) are not targeted at all in the selected studies. This is important for both theorists and educational practitioners to consider. Although primary school students have limited abstraction capacities, more complex digital citizenship issues can be addressed by using appropriate teaching methods that facilitate understanding.

4.2. The limitations of the study

There are several limitations due to the specifics of the method chosen for this study. In this respect, we can say that the key concepts used represent certain barriers to the specific analysis. In addition to this, the limitation of integrating the review-only research published in English is another aspect that limits the study. The degree of subjectivity is also an aspect to consider in this discussion, taking into account the influence that each researcher has on the data they analyze. The inclusion of publications with

predominantly European and American subject groups is another limitation of the study, for which the influence of family economic status and the level of community development on the formation of specific digital citizenship skills in young schoolchildren could be considered in future research.

Most studies included in the review focused on digital literacy, digital communication, and information, but areas such as digital access, digital etiquette, digital legislation, digital commerce, digital rights and responsibilities, digital safety and security, and digital health and well-being theorized by Ribble (2015), or digital safety defined by Carretero et al. (2017) are not dimensions to be addressed in the research included in the systematic review.

Only studies that investigated classroom practices used towards the formation of specific digital citizenship skills were included in the review, an aspect that could be a limitation, to the exclusion of the theories that address the concept that underpinned our research. However, there are sustained efforts to theorize digital citizenship, especially against the background of the rapid technologization of all areas of human activity, reflected in the literature.

4.3. Practical implications

In the context of the increasing technologisation of all areas of human activity, there is a growing need for specific skills training for a responsible digital citizen. Providing content adapted to trends in a highly virtualized society is becoming a prerequisite for training generations to prepare for future changes. Thus, we note a sustained effort to theorize the concept of digital citizenship and to develop specific practices to support students, without being the aim of our research. The link between theory and application, therefore aims to formulate a curriculum adapted to the needs of today's students. This will promote the diversification of practices implemented in the classroom, towards the formation of generations of responsible digital citizens.

In this study, various practices implemented in the classroom with elementary school students have been presented, grounded in theory. Although the analysis focused on the applied-practical side, the effort of the theorists to define the concept of digital citizenship is notable. Although most of the studies analyzed were carried out in Europe and the USA, there is a general trend towards technologization and the development of new skills for students.

The studies reviewed provide models for the integration of content specific to digital citizenship through the use of interdisciplinary strategies that combine knowledge from different fields (mathematics, language and communication, and visual arts). We note links with disciplines such as mathematics, language and communication, and visual arts,

which facilitate the formation of skills for the digital citizens of the future. More complex content such as the digital footprint or digital justice is presented in an accessible form, adapted to the level of understanding of young school children. Digital citizenship education can also be achieved through lessons in a single subject. Against the background of increasing efforts to formulate a specific curriculum, learning activities could be focused in the direction of the dimensions mentioned by leading theorists (Ribble, 2015; Carretero et al., 2017). In this respect, the present study aimed to document existing practices to support the integration of specific digital citizenship content from the early years of schooling.

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