

## Educational use of connectivity in childhood and adolescence: a systematic literature review

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### KEYWORDS

Training  
Internet  
Children  
Teenagers  
Benefits

### ABSTRACT

Internet connectivity during childhood and adolescence entails risks and opportunities in several vital areas. Specifically, this work focuses on identifying lines of research and intervention to take advantage of the digital connectivity of minors in the educational context. To this end, a systematic review of the literature based on the PRISMA method and the Web of Science and Scopus databases is proposed for the search and selection of articles. This study focuses on five key fields: historical trajectory, research methodology, findings, implications for research and educational practice, and future lines of research. Of the 68 papers analyzed, it can be observed that: (1) they have recently increased their publication; (2) qualitative approaches predominate, evaluating the effects of educational interventions, mainly on children and young people in Europe and at the Primary and Secondary Education levels; (3) it is concluded that the environments where children's digital connectivity has had a positive impact include improved learning and academic performance, digital inclusion and accessibility, digital creation and production, collaborative learning, and media and digital education; (4) it suggests fostering media literacy and digital competence education from an early age to prevent risks and take advantage of opportunities; and (5) it encourages exploring new areas to optimize the use of digital connectivity among children. This review reveals the areas digital connectivity has had a positive impact on children's education.

## Aprovechamiento educativo de la conectividad en infancia y adolescencia: una revisión sistemática de literatura

### PALABRAS CLAVE

Formación  
Internet  
Niños  
Adolescentes  
Beneficios

### RESUMEN

La conexión a internet durante la infancia y la adolescencia conlleva riesgos y oportunidades en diversos ámbitos vitales. Concretamente, este trabajo se centra en identificar líneas de investigación e intervención para un aprovechamiento de la conectividad digital de los menores en el contexto educativo. Para ello se plantea una revisión sistemática de la literatura basada en el método PRISMA y en las bases de datos Web of Science y Scopus para la búsqueda y la selección de artículos. Este estudio se centra en cinco ámbitos clave: evolución temporal, metodología de la investigación, hallazgos obtenidos, implicaciones para la investigación y práctica educativa, y líneas futuras de investigación. De los 68 trabajos analizados, se observa que: (1) han incrementado su publicación recientemente; (2) predominan los enfoques cualitativos, evaluando los efectos de las intervenciones educativas, principalmente en infantes y jóvenes de Europa y de los niveles de Educación Primaria y Secundaria; (3) se concluye que los entornos donde la conectividad digital de los infantes ha tenido un impacto positivo incluyen mejora del aprendizaje y rendimiento académico, inclusión y accesibilidad digital, creación y producción digital, aprendizaje colaborativo y educación mediática y digital; (4) se sugiere fomentar la educación en alfabetización mediática y competencia digital desde temprana edad para prevenir riesgos y aprovechar oportunidades; y, (5) se alienta a explorar nuevas áreas para optimizar el uso de la conectividad digital entre los infantes. Esta revisión revela las áreas donde la conectividad digital ha tenido un impacto positivo en la educación de los menores.

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Cite this article as: Buenestado-Fernández, M., García-Ruiz, R., Jiménez-Iglesias, E., & Jorge, A. (2023). Educational use of connectivity in childhood and adolescence: a systematic literature review. *Psychology, Society & Education*, 15(3), 19-30. <https://doi.org/10.21071/psye.v15i3.16092>

Received: 17 May 2023. First review: 6 September 2023. Accepted: 11 October 2023.

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ISSN 1989-709X | © 2023. Psy, Soc & Educ.



In 2003, the first literature reviews on the use of technology in childhood and adolescence began to be carried out, showing how this was limited exclusively to computers, considered only as complementary tools in education (Stephen & Plowman, 2003). Subsequently, the digital transformation of educational centers has led to an effective integration of technology (Timotheou et al., 2022). This refers not only to the incorporation of technological devices and internet connectivity in the classroom but also to the implementation of a learner-centered pedagogical approach that harnesses the potential of technology to enhance learning and skill development (Vidal-Hall et al., 2020). Even though digital connectivity has significantly improved the way students learn and collaborate, there is still a digital divide, especially in remote or low-resource areas (Kalolo, 2019). This means that equal educational opportunities have yet to be guaranteed.

In this sense, prestigious organizations such as UNESCO (2021) propose, within the framework of the evolution of the right to education, that the digitization of education should be based on two aspects: the reduction of the digital divide to increase learning opportunities and protection in cyberspace. Despite this, the study of digital connectivity among children and adolescents has focused more on the risks it may entail and how to prevent them than on the opportunities it offers, as evidenced by the study by Orben (2020), which analyses 80 systematic reviews and meta-analyses. This is due to several factors, among which stand out: (1) the concerns of teachers, families and experts about digital security and access to inappropriate content, online harassment, or scams (Romera et al., 2021); (2) the negative impact on the well-being of children and adolescents as a consequence of misuse of technology and contact with dangerous people online (Van Endert, 2021); and (3) the lack of understanding of the educational opportunities that technology offers (Ihmeideh & Alkhawaldeh, 2017).

At the same time, digital connectivity has significantly transformed the world of education and opened new opportunities for students. Previous research has pointed out some of its educational benefits, including (1) access to a wealth of information, as well as educational resources and materials (Salmerón et al., 2018); (2) the personalization of learning through online educational tools and platforms, where the educational process can be tailored to the needs of each student and offer individualized feedback and support (Panjaburee et al., 2022); (3) the improvement of collaboration between students and faculty and among students themselves, through online educational tools and platforms that have made it possible to collaborate on projects, discuss ideas, and use resources more easily and efficiently; (4) the development of interactive learning through the creation of interactive educational resources such as educational videos, simulations, or online games, in which students can be actively involved (Sahronih et al., 2019); (5) fostering creativity and content creation through blogs, videos, or podcasts (Marsh et al., 2018); and (6) the creation of a more inclusive and equitable learning environment, providing access to those who, due to geography, economic status, or functional diversity, might face limitations (García-Hernández et al., 2023;

Parmigiani et al., 2021). Therefore, digital transformation is a process that can significantly improve the quality and equity of education, but requires careful planning, investment in resources and adequate teacher training (Fernández-Batanero et al., 2022).

The paradigm of research on digital connectivity in the education of childhood and adolescence is another critical issue. The review by Miller et al. (2017), based on the methodologies used in studies on student use of technologies, concludes that most focus on cross-sectional and mixed designs are limited to homogeneous samples, and do not include vulnerable groups. Other reviews on digital connectivity in children and adolescents suggest future lines of research. Specifically, Belo et al. (2016) propose studying the role of teachers and the impact on learning if the activities are digital or not, and Mantilla and Edwards (2019) suggest studying effective strategies for teaching digital skills and how to involve families in this process.

This systematic literature review aims to conduct a thorough analysis of educational contexts that have optimized the use of digital connectivity, with particular emphasis on those scenarios that have shown a positive impact on children. This study facilitates the identification and replication of strategies to enhance the quality and effectiveness of teaching in the digital era. It highlights the relevance of focusing on situations that have positively impacted the child and youth population, given their high vulnerability to influences and the dependence of their future on the quality of education they currently receive.

## Method

This study presents findings from a systematic literature review based on the PRISMA 2020 standards (Preferred Reporting Items for Systematic Reviews and Meta Analyses). This updated guide provides the phases to answer specific research questions and guide the review process, including identification of information sources, eligibility criteria, search strategies, study selection, data analysis, and systematization of findings (Sánchez-Serrano et al., 2022). The objective is to review the scientific literature on the use of digital connectivity in the education of children and adolescents concerning five areas of research: (1) temporal evolution, (2) research methods, (3) results obtained, (4) implications for research and educational practice, and (5) future lines of research. Together, these five areas provide a complete and in-depth view of this subject of study, from its progress over time and its methodological foundations to its practical applications and prospects.

### *Phase 1: Research questions*

In the first phase, research questions related to these five areas were posed, as shown in Table 1.

### *Phase 2: Sources of information and eligibility criteria*

We have selected those articles that address the use of digital connectivity in the education of people up to 18 years of age,

**Table 1***Research questions associated with the areas raised*

Research areas	Research questions
Area 1	<p>Q1. How are the articles published between 2013 and March 2023 distributed?</p> <p>Q2. What type of research designs (quantitative, qualitative, mixed) are most used?</p> <p>Q3. How many studies are based on evaluating the effects of a particular educational intervention?</p> <p>Q4. At what educational stage (early childhood, primary, secondary, post-secondary) do you focus your studies the most?</p>
Area 2	<p>Q5. Are there studies that include children and adolescents belonging to groups in vulnerable situations?</p> <p>Q6. If the answer to the previous question is yes, to which groups in situations of vulnerability do these children and adolescents belong (disability, ethnic-cultural minorities, socioeconomic disadvantage, rural areas, etc.)?</p> <p>Q7. To which country or countries do the children in the studies belong?</p>
Area 3	Q8. What results are obtained from these studies?
Area 4	Q9. What recommendations for research and practice do the studies reflect?
Area 5	Q10. What future lines of research do the studies suggest?

since these children and adolescents are the main educational agents in the study of this impact. To find them, exhaustive searches were carried out in Web of Science (WoS) and Scopus. The search parameters were adjusted to include only articles containing the corresponding descriptors in the title, abstract, keywords, and that were available in open access article format in English and/or Spanish, in Educational Sciences and Psychology in WoS or Social Sciences in Scopus. These areas were selected because they concentrate studies on this field of interest.

The search focused on studies published between 2013 and the first three months of 2023. This nearly ten-year time frame allows us to reveal advances in digital education, gain an up-to-date understanding of the field of study, identify new research trends, and manage an adequate volume of literature for a comprehensive analysis.

#### *Phase 3: Search strategies*

The most common keywords in the scientific literature on the topic in question were identified using the UNESCO Thesaurus. Applying these keywords and different Boolean operators, the following search equation was established in the databases: (“opportunity\*” OR “positive impact” OR “digital connection” OR “Internet” OR “digital competence\*”) AND (“kid\*” OR “young” OR “adolescent\*” OR “preschool” OR “childhood education” OR “primary education” OR “secondary education”).

#### *Phase 4: Selection process*

First, a total of 580 articles were identified using the search equation in both databases. After applying the eligibility criteria, the sample was reduced to 249 articles. Then 86 duplicates were detected between the two databases, reducing the sample to 163 articles. We proceeded to read the title and abstract, and

if necessary the full article, to determine whether they were related to the subject of the review and to apply the exclusion criteria shown in Figure 1.

## Results

The results of the systematic literature review are presented according to the areas identified and the research questions posed in each of them. This section cites the studies from the systematic literature review included in Annex 1.

#### *Research area 1. Temporal evolution*

In response to Q1, studies on the use of digital connectivity in the education of children and adolescents have increased in recent years, as can be seen in Figure 2. The highest number of studies is reached in 2020.

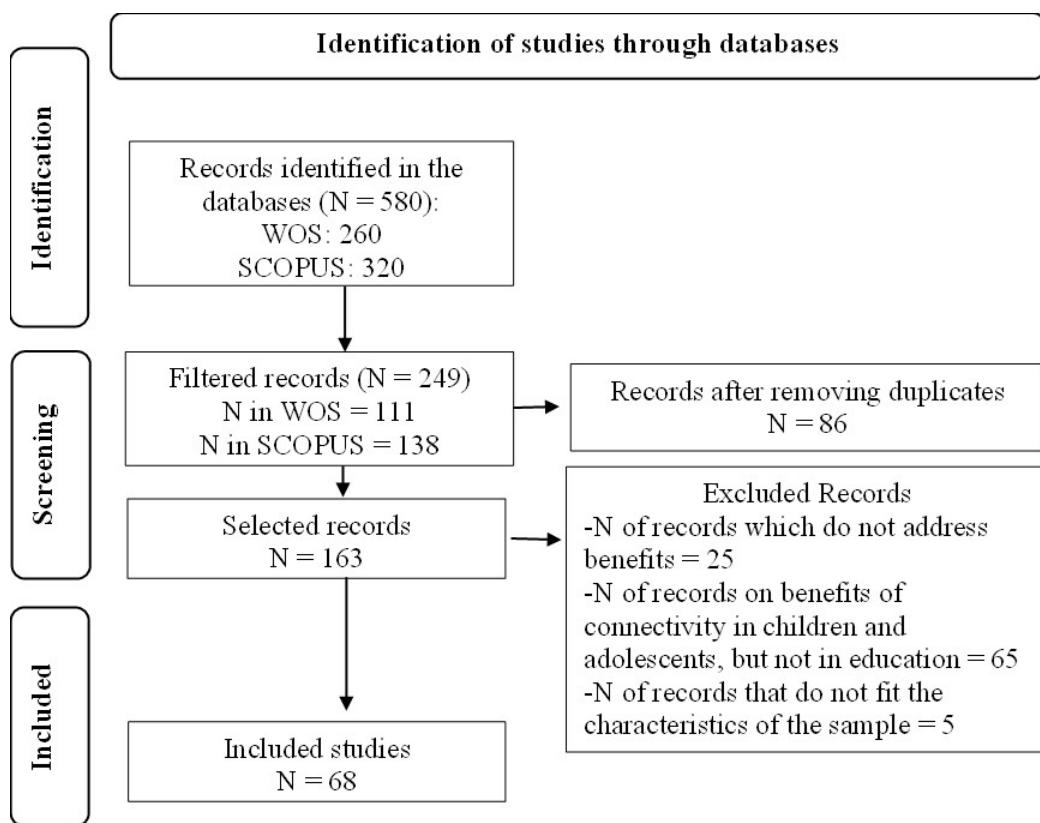
#### *Research area 2. Research methods*

The research design of the analyzed works (Q2) was, to a greater extent, qualitative, with 45.5% of the cases (Dominingo-Coscollada et al. 2018; Suparmi et al., 2020) and, to a lesser extent, quantitative, with 30.8% (Chou, 2017; Lin et al., 2017) and mixed, with 24% (Cohen Zilka, 2016; Gabarda et al., 2017). In response to Q3, most studies were based on evaluating the effects of an educational intervention, with 73.5% (Holguín-Álvarez et al., 2022; Leung et al., 2020).

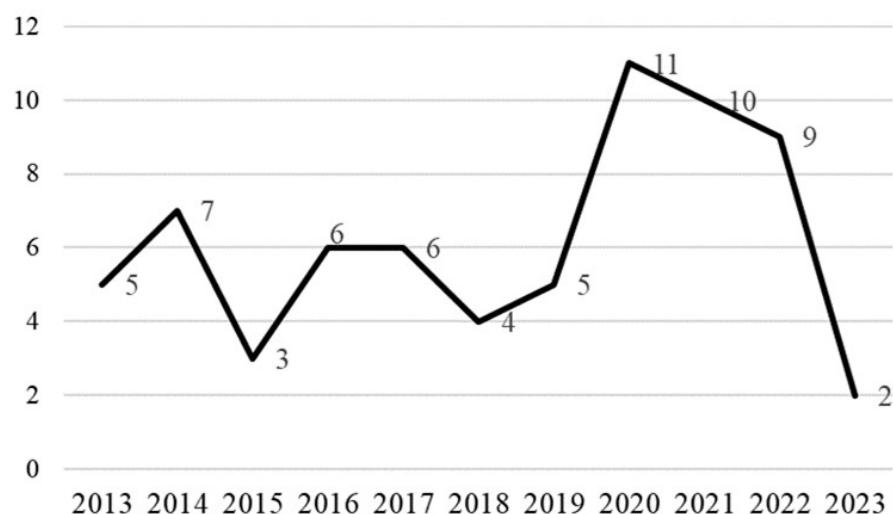
Regarding the educational stage to which the participating children and adolescents belong (Q4), the number of studies in each of them is as follows: Early Childhood<sub>0-5 years</sub> = 4 (Hollenstein et al., 2022; Vogt & Hollenstein, 2021); Primary<sub>6-11 years</sub> = 21 (Dunn & Sweeney, 2018; Kumpulainen et al., 2020); Secondary<sub>12-15 years</sub> = 20 (Gil Quintana & Osuna-Acebo, 2020; Yu et al., 2021); Postsecondary<sub>16-17 years</sub> = 5 (Mantilla Guiza & Negre Bennásar, 2021; Neagu et al., 2021); and various educational

**Figure 1**

Flowchart of the study selection procedure according to PRISMA

**Figure 2**

Temporal distribution of the analyzed articles



stages = 18 (Goodyear & Quennerstedt, 2020; Yelland, 2018). Consequently, the stages in which most studies concentrate are Primary and Secondary Education.

On the other hand, children and adolescents belonging to a vulnerable group (Q5) were considered in 36.7% of the cases. In response to Q6, these groups are functional diversity (Cranmer, 2020), ethnic-cultural diversity (Santos et al., 2015), high abilities (Suparmi et al., 2020), socioeconomic disadvantage (Cohen Zilka, 2016), rural areas (Ramoroka, 2014), underage women (Rillero et al., 2020), and intersectionality or various groups (Tuluk & Yurdugül, 2020).

To respond to Q7 and provide a comprehensive view of the research on this topic, one observes that most of the articles (92%) refer to studies in which the participants are children and adolescents from a single country. Only in five studies are more than one country involved, notably that of Ranieri and Fabbro (2016), in which children and adolescents from seven European countries participate. In total, 78 countries are represented, as can be seen in Figure 3. In 54.4% of the studies, the participants are children and adolescents from European countries (Dias-Fonseca & Potter, 2016; Dunn & Sweeney, 2018), while in 19.1% belong to Asian countries (Lee, 2017; Leung et al., 2020), 13.2% to American countries (Armijo-Cabrera & Rojas, 2020; Jackson, 2022), 4.4% to African countries (Abimbola, 2013; Ramoroka, 2014), and only 2.8% to Oceania (McLean et al., 2016; Yelland, 2018). Within European countries, Spain is the country that reaches the highest number, with 11 published studies (Cuervo-Sánchez et al., 2022; Domingo-Coscollada et al., 2018). There are also studies that include countries from more than one continent, such as America and Africa (Rillero et al., 2020) and America and Europe (Tuzel and Hobbs, 2017).

### Research area 3. Results obtained

The results obtained in the studies on the use of digital connectivity in the education of children and adolescents (Q8) have

been distributed into six categories in relation to their use and these, in turn, according to whether there was a specific intervention to carry out the research.

#### 1. Learning and improvement related to learning and improvement of specific subjects

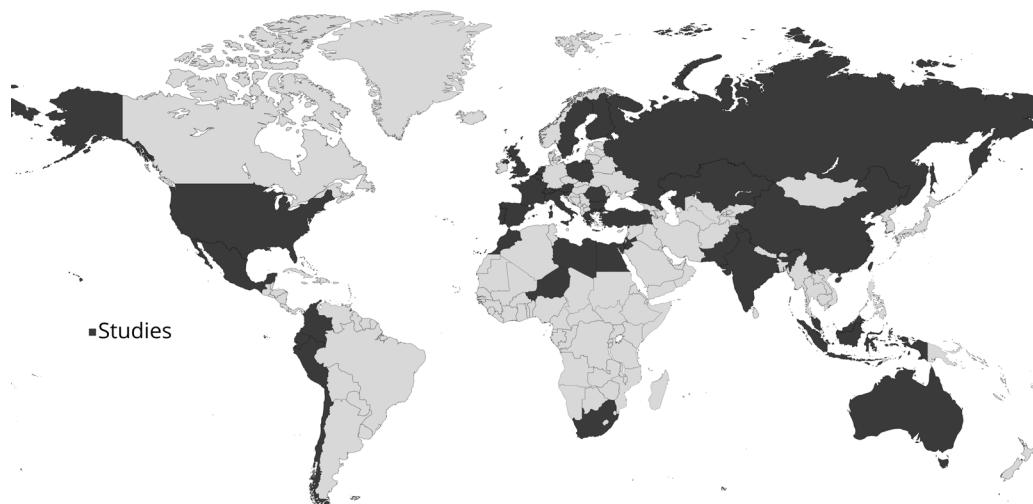
The studies that highlight the benefits of connectivity in relation to the improvement of learning of subjects included in school curricula and learning in general, in which no specific intervention was carried out, emphasize that using of digital technologies and resources in the classroom favors both learning and digital competence. The study by García-Martín and García-Martín (2022) indicates that students perceive that this use supports their learning, although they are also aware that it can be distracting. Although González Vidal (2021) demonstrates the benefits of connectivity for academic performance in vulnerable students, Armijo-Cabrera and Rojas (2020) recommend that their exposure to the internet should be moderate and controlled by adults.

The appropriate use of social networks is beneficial since it increases students' informal learning and improves their motivation and digital competence, according to Gil Quintana and Osuna-Acebo (2020), Oliveira and Dias (2014) and Panskyi et al. (2021). Regarding the development of digital competence, Mantilla Guiza et al. (2021) show that it improves with the development of computational thinking and consequently improves the students' problem-solving ability.

Most of the studies found collected data after carrying out an intervention in the classroom that required digital technologies and resources. These studies highlight that the appropriate use of technologies in educational environments improves learning and students' own digital competence (García-Valcárcel et al., 2016; Magis-Weinberg et al., 2023), in addition to creativity (Sclater & Lally, 2014), due in part to the greater motivation of the students (Clarke & Abbott, 2016; Leinonen & Sintonen,

**Figure 3**

*Countries of study participants*



*Note.* Created with mapchart.net.

2014; Lin et al., 2017). Similarly, it was found that interventions in which social networks were used improved student learning in relation to health care, supporting habits such as sports or healthy eating (Goodyear et al., 2019; Goodyear & Quenners- tedt, 2020). Even Badshah et al. (2021) demonstrated that the academic use of social networks by the entire educational community (students, teachers, and families) not only increases the academic performance of students, but also reduces school absenteeism.

Other results derived from the use of technologies in the classroom highlight the improvement of teacher-student communication and the promotion of student participation in activities (Santos Júnior et al., 2020), the interest in learning (Lee, 2017), or the improvement of writing skills (Dunn & Sweeney, 2018). As a nuance, Yelland (2018) states that using technologies in the classroom by itself does not improve learning and that their use should complement traditional methodologies. It was found to be equally beneficial for the learning of students belonging to vulnerable groups, such as students with high abilities (Abakumova et al., 2019), students living in rural areas (Ramo roka, 2014), visually impaired (Cranmer, 2019), or with limited economic resources (Solórzano Alcívar et al., 2022).

Some of the analyzed articles place value on the appropriate use of technology and connectivity to improve academic performance in curricular subjects such as English (Abimbola, 2013; García-Valcárcel et al., 2016; Toleuzhan et al., 20223), History (Kotsira et al., 2021), Biology (Rillero et al., 2020), Mathematics (Al-Mashaqbeh, 2016; Hrastinski & Stenbom, 2013; Hol guin-Alvarez et al., 2022; Tuluk & Yurdugül, 2020), Science (Chou, 2017), Language (Santos Júnior et al., 2020), Music (Romero Martínez & Vela Barranco, 2014), or STEAM competencies from Primary Education (Kumpulainen et al., 2020).

## *2. Advantages of connectivity to digital inclusion and accessibility and the fight against exclusion or digital divide*

Children and young people's connectivity is analyzed in several studies that report advantages to overcoming challenges of digital exclusion, reducing the digital divide and promoting inclusion in the digital sphere. In the studies in which there was no specific intervention in the classroom, it was found that students belonging to disadvantaged groups who have the opportunity to use the internet appropriately overcome barriers related to digital exclusion (Álvarez-Guerrero et al. 2021; Neagu et al., 2021; Pathak-Shelat & DeShano, 2014; Simões et al., 2013) significantly when taking advantage of the possibility to communicate with others afforded by social media (Vasco-González et al., 2021).

These benefits that allow the digital inclusion of children and young people have also been found in research comprising classroom interventions. Cohen Zilka (2016) concluded that connectivity originating from the classroom reduces the digital divide for youngsters. Wong and Kemp (2018) also verified that this connectivity supported by teachers can reduce the digital gender gap.

## *3. Advantages of digital creation and production*

The papers we analyzed that looked at the possibilities of creating and producing their own digital content conclude that it has multiple benefits for children. All of the papers in this sub-section carried out a classroom intervention in which the students had digital resources for their own creation. The improved expansion of children's creativity was evident in different educational stages in the work of Suparmi et al. (2020).

Specifically, interventions that proposed the design of collaborative video games in the classroom found improvements in children's digital competences (Laakso et al., 2021), in raising awareness about social and social justice issues (Jackson, 2022), and in creativity and critical thinking (Behnamnia et al., 2020; Leung et al., 2020). Advantages were also found in creating digital applications (Hollenstein et al., 2022) and group blogs (Goedhart et al., 2022).

The experiments based on the Do-it-Yourself (DIY) culture collaboratively using digital resources stand out among the studies in this sub-section. This type of experiment improved the digital competence, creativity, and self-regulation of the students (Domingo-Coscollada et al., 2018); and Kumpulainen and Kajamaa (2020) claim that the use of "maker spaces" acts as a privileged space to create and develop the interest, collaboration, and empowerment of students.

## *4. Advantages for the development of collaboration skills*

Several studies identified significant advantages from digital connectivity in promoting skills related to collaboration. All had carried out a classroom intervention and reported improvements in communication, collaborative work skills (Santos Júnior et al., 2020), and shared responsibility in learning (Sjöberg & Brooks, 2020). In studies comprising playing a collaborative online game, Shiue and Hsu (2017), Vogt and Hollenstein (2021), and Khouna et al. (2019) found that collaboration and communication, creativity, critical thinking, motivation, and commitment in learning improved.

## *5. Advantages resulting from the participation in specific media and digital education programs*

Training programs focused on leveraging connectivity among children are addressed in the part of the analyzed research, highlighting multiple advantages. Wernholm and Reneland-Forsman (2019) suggest that programs focused on the appropriate use of social media favor the construction of their digital identity.

All the studies included in this category that carried out an educational intervention agree in putting forward a firm commitment to the inclusion of these programs (Cuervo-Sánchez et al., 2022; Dias-Fonseca & Potter, 2016; Martens & Hobbs, 2015; Rillero et al., 2020; Tuzel & Hobbs, 2017), reporting improvement in the students' intercultural communication, in their civic engagement (Hobbs et al., 2013), in the empowerment of vulnerable young people (Santos et al., 2015), in preventing the inco

rect influence of the media on teenagers' identities (McLean et al., 2016), or in the development of skills to prevent and fight online discrimination (Ranieri & Fabbro, 2016). However, it must be considered that the authors emphasize the need for teacher training in this area for the programs to be effective.

#### 6. Advantages of connectivity in emergencies (pandemic)

The closure of educational centers because of the COVID-19 pandemic led to new forms of online learning, with positive effects on students, who developed their digital skills (Panskyi et al., 2021) and learning in general (Yu et al., 2021). The intervention proposed by Álvarez-Guerrero et al. (2021) allowed the continuity of learning among students with functional diversity.

#### Research area 4. Implications for educational research and practice

Responding to Q9, we found that several studies recommend taking advantage of students' critical capacity regarding the media content they consume to undertake social change through education (Espinosa-Bayal et al., 2014; Vasco-González et al., 2021), use the opportunities provided by the internet in classrooms within a training plan (Tarango Ortiz et al., 2014), and consider the positive impact of the use of social media in rural contexts or with socioeconomic disadvantage (Badshah et al., 2021).

Leinonen and Sintonen (2014) highlight the need to promote media education from an early age to prevent risks and take advantage of the opportunities of the internet, and Gabarda et al. (2017) demand specific training plans aimed at students, teachers, and families. Likewise, the potential of virtual contexts to motivate learning for both students with high abilities (Abakumova et al., 2019) and those with low academic performance (Chou, 2017) is highlighted. The possibilities of personalizing teaching-learning through individual devices are also highlighted (Al-Mashaqbeh, 2016).

There are publications that value action research to analyze student behavior (Domingo-Coscollada et al., 2018), gamification to promote pedagogical practices based on immersion for language learning (Santos Júnior et al., 2020), and videogames in general as elements of motivation (Sjöberg & Brooks, 2020; Jalal et al., 2019; Goodyear & Quennerstedt, 2020), teacher training to encourage the use of digital games (Hollestein et al., 2022), and teaching communities to exchange experiences on digital learning (Lin et al., 2017). We could find replicable contributions from pedagogical models along these lines (Cuervo-Sánchez et al., 2022).

As secondary implications, it should be noted that when researching the impact of digitalization in education, not only access should be valued, but also the actual use and literacy of students (García-Valcárcel et al., 2016; Pathak-Shelat and DeShano, 2014; Simões et al., 2013).

#### Research area 5. Future lines of research

Lastly, in answering Q10 and looking out for the potential of technologies to develop opportunities in the educational field, the analyzed papers still propose new research that gets a more profound knowledge about some of the aspects that have already begun to be explored. Thus, a deeper analysis is suggested on digital educational practices in language learning (Santos Júnior et al., 2020), the collaborative design of digital games (Laakso et al., 2021), the integration of augmented reality in education (Kotsira et al. 2021), the use of blogs as an educational tool (Romero Martínez & Vela Barranco, 2014), or game-based learning and gamification (Shiue & Hsu, 2017; Tuluk & Yurdugül, 2020).

The interest in continuing to delve into the possibilities of online assessment is highlighted (Lee, 2017), as into the development of learning opportunities in the virtual context aimed at students with functional diversity (Álvarez-Guerrero et al., 2021) or initiatives that seek to reduce the digital gender gap (Wong & Kemp, 2018) and digital exclusion (Simões et al., 2013).

Similarly, longitudinal studies are proposed to understand possible changes in trends (García-Martín & García-Martín, 2022) and overcome particularities linked to the pandemic (Panskyi et al., 2022) or expand work carried out in specific populations, such as first childhood (Hollenstein et al., 2022).

Likewise, some authors suggest expanding the focus of analysis to other agents within educational ecosystems. Thus, studies are proposed that include the perspective of the teachers and the management teams of the centers (García-Martín & García-Martín, 2022).

### Discussion and conclusions

This article offers a systematic review of the literature on the advantages of digital connectivity in the education of children and young people based on the analysis of 68 studies published in the last decade.

Regarding the first research area, the results show how, in recent years, studies on the use of digital connectivity in the education of children and youth have increased. This represents progress in this object of study if we remind that, at the beginning of the century, research was limited exclusively to computers, considered as secondary objects in the educational process (Stephen & Plowman, 2003) and, later, to the prevention of risks as a predominant approach (Orben, 2020).

The second area of this review focused on understanding the research methodologies deployed. The results show the prevalence of qualitative designs that seek to evaluate the effects of an educational intervention, particularly those in which the participants are European, are in the Primary and Secondary Education levels, and include vulnerable groups in a third of the cases. These findings differ from the results obtained in the review by Miller et al. (2017), which concluded that the predominant methodology is based on mixed designs and survey methods for data collection, and that the samples are homo-

geneous. However, our findings do agree with the review by Miller et al. in which learning tasks and social interactions are taken as study variables.

The third area of research addresses the central objective of this review. It is concluded that digital connectivity is beneficial for children and young people if it is linked to learning and improving the subject matters, digital inclusion and accessibility, digital creation and production, collaborative learning, and media and digital education. This finding supports previous research which demonstrated the educational use of connectivity associated with: access to educational information and resources (Salmerón et al., 2018), the personalization of learning to improve educational quality (Panjaburee et al., 2022), collaboration between students and interactive learning (Sahro-nih et al., 2019), promoting creativity and content production (Marsh et al., 2018), and creating a more inclusive and equitable learning environment (Parmigiani et al., 2021).

Per the fourth area, the studies in this review stress the need for media education and the development of critical thinking from an early age to prevent risks and leverage the opportunities of the internet. This is in line with UNESCO's strategy (2021) based on taking advantage of connectivity and risk prevention in developing of the right to education. Indeed, they emphasize the possibilities of personalizing teaching-learning through technological devices, considering different situations of vulnerability of students. All of them are implications for educational practice, which can be implemented in teaching innovations for which teachers must be trained (Fernández-Batanero et al., 2022). Implications for research are also raised, such as studying the actual use and positive impact of digital connectivity on children and young people due to media literacy.

Furthermore, the last area of research gives an account of the future lines proposed by the analyzed articles, which suggests continuing investigating educational practices to take advantage of connectivity. This is in line with the review by Belo et al. (2016), which proposes to study the impact of digital activities on learning, and with that of Matilla et al. (2019), which suggests investigating effective strategies to teach digital skills.

Regarding this study's limitations, it should be noted that only two databases were considered. Although both have broad reach and recognition in the academic community, for future research we suggest including other complementary indexing systems that may contain more articles related to this topic. In this regard, a broader comparative vision is proposed that integrates the rest of the agents of the educational community, such as teachers, management teams and families, or groups of students above 18 years old.

## Author contributions

Conceptualization: M.B.F., R.G.R.

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Writing – review & editing: M.B.F., R.G.R., E.J.I., A.J.

## Funding

This work has been funded by the Department of Universities, Equality, Culture and Sports of the Government of Cantabria, in support of the R&D project “Media and digital literacy in young people and adolescents: diagnosis and educational innovation strategies to prevent risks and promote good practices on the Internet” (2022-23).

## Declaration of interests

The authors have no conflict of interest to declare.

## Data availability statement

No research data available.

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**Aprovechamiento educativo de la conectividad en infancia y adolescencia: una revisión sistemática de literatura**

**Educational use of connectivity in childhood and adolescence: a systematic literature review**

*Psychology, Society & Education*

vol. 15, no. 3, p. 19 - 30, 2023

Universidad de Córdoba,

**ISSN:** 2171-2085

**DOI:** <https://doi.org/10.21071/psye.v15i3.16092>