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DIGITAL COMPETENCE IN THE USE OF ICT IN PRIMARY SCHOOL STUDENTS: A CASE STUDY AT SAINT PAUL EDUCATIONAL INSTITUTION, CARICE, HAITI

COMPETENCIA DIGITAL EN EL USO DE LAS TIC EN ALUMNOS DE EDUCACIÓN PRIMARIA: UN ESTUDIO DE CASO EN LA INSTITUCIÓN EDUCATIVA SAINT PAUL, CARICE, HAITÍ

Jean Rolex
Universidad Internacional Iberoamericana, Puerto Rico
[jean.rolex@doctorado.unini.edu.mx] [https://orcid.org/0000-0003-0167-2581]
Antonio Gavira Narváez
Universidad de Córdoba, Spain
[antonio.gavira@uco.es] [https://orcid.org/0000-0002-5389-8315]

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ABSTRACT

This study investigated the digital competence of primary school students at the "Saint Paul" Educational Institution in Carice, Haiti, acknowledging the crucial need to address challenges posed by the information society. Employing a quantitative approach, the research involved 233 participants, aged 6 to 14, with an average age of 10. Data was gathered through surveys utilizing a Likert scale-based questionnaire, adapted from Tourón et al.'s (2018) Digital Competence Questionnaire for Teachers, alongside competence assessments. The findings revealed that a significant 85% of students possessed poor ICT skills, indicating inadequate digital competence within the institution. Consequently, the study highlights the urgent need to enhance digital skills and promote effective ICT utilization to better navigate the demands of the information society.

Palabras clave:
competencia digital, tecnología de la información y la comunicación, sociedad de la información.

RESUMEN

Este trabajo presenta los resultados de una investigación sobre la competencia digital en el uso de las Tecnologías de la Información y la Comunicación (TIC) por un grupo de estudiantes de Educación Primaria de la Institución Educativa "Saint Paul" de Carice, Haití, ante la premura de enfrentar adecuadamente los desafíos de la sociedad de la información. El estudio aplica un enfoque cuantitativo considerado como el más apropiado dada la naturaleza y las circunstancias de la investigación. La muestra utilizada incluyó a 233 participantes, con una edad promedio de 10 años (rango de 6 a 14 años). Las herramientas empleadas para recopilar los datos incluyeron una encuesta, cuyo cuestionario está basado en la escala Likert y las evaluaciones de competencias. El cuestionario fue adaptado del Cuestionario de Competencia Digital Docente (CDD) creado por Tourón et al. (2018), con el objetivo de describir una visión general de la competencia digital mediante el uso de las TIC.

	Los resultados mostraron que el 85% de los estudiantes tiene pocas habilidades para usar las TIC. Estos hallazgos indican que la competencia digital de los estudiantes de esta institución es inadecuada, siendo necesario promover en esta institución y en todas las instituciones de educación primaria una mejora de las habilidades digitales y del uso de las TIC para abordar con mayor efectividad los desafíos existentes en la sociedad de la información.

Introduction

Today, digital literacy is a fundamental skill necessary for individuals to effectively navigate both their broader social lives and their work (INTEF, 2024). Therefore, this competency must be developed as part of the educational phase known as lifelong learning, since digital literacy is addressed through comprehensive strategies and is an essential factor in an increasingly technological and digitally active society (UNESCO, 2021). Having digital literacy means being able to make optimal use of the technological tools necessary to participate effectively in the knowledge economy and 21st-century society (Rodríguez-García, Martínez Heredia, and Raso Sánchez, 2017). For this reason, digital literacy—defined as a set of skills, knowledge, and attitudes needed to use ICT effectively—has become a cross-cutting component of students' comprehensive education (UNESCO, 2021). Therefore, it is essential that young people learn this skill from an early age (Cabero, Vázquez, López, and Jaén, 2020).

Several recent studies show that children have only a very basic level of digital competence in ICT, even when engaging in activities that would classify them as "digital natives" (Pech, González, and Herrera, 2020). Haiti is no exception in this regard, as digital literacy in primary education in that country is at a very early stage of development (ITU, 2020).

A recent assessment of digital skills indicated that the level of digital proficiency in Haiti is low at all educational levels, both in content creation and problem-solving. According to Estrada (2020), this situation affects students' learning. This reality is evident among the students at the "Saint Paul" school in Carice, who, despite being familiar with technology, are not making the most of ICT in their educational process.

The main objective of this study is to quantitatively describe the level of digital competence in the use of ICT among students at "Saint Paul" Elementary School. To achieve this goal, the following specific objectives are established:

- To assess the digital literacy of students and teachers in the educational context and the implementation of local education policy related to the integration of ICTs in the institution.
- Identify the types of digital competencies students possess and link them to theoretical constructs such as DIGCOMP.
- Assess how often and in what ways students use ICT in their daily lives, both at school and outside of school.
- Assess students' views on the order in which they should develop their digital competence and the obstacles they face along the way.
- Analyze how the use of technological tools is intertwined with the level of proficiency in digital skills across different areas, such as information retrieval, content creation, and communication.

This study not only identifies the strengths and weaknesses in the digital competencies of students in Carice, Haiti, but also makes practical recommendations to enrich and improve the integration of ICT into the school curriculum (UNESCO, 2023). It also highlights the importance of an education system that effectively addresses the challenges and opportunities of the 21st century as we prepare our students for an increasingly digitized and globalized world. The "Saint Paul" Educational Institution serves as a prime example of how digital competence can be positively linked to the academic and personal performance of elementary school students.

Digital competence, one of the eight competencies identified in the 21st-century approach to holistic education, includes technical, computer, content creation, media, communication, problem-solving, strategic, and ethical decision-making skills and

attitudes (Díaz-Arce and Loyola-Illescas, 2021). This set of skills fosters a critical and confident attitude toward the use of ICT in everyday life (Cabero-Almenara and Palacios-Rodríguez, 2020).

Digital literacy is related to the use of ICT, as it encompasses the skills needed to use these technologies effectively and safely (Caccuri, 2018). In this way, it paves the way for the optimal use of ICT in all aspects of life and work, as well as in learning activities (Guitert and Romeu, 2022). In today's rapidly evolving technological landscape, this skill enhances the ability to adapt to emerging technologies and environments (García-Ruiz and Pérez-Escoda, 2020).

Adequate digital literacy is also necessary to protect oneself from online threats, such as identity theft and cyberattacks (Granda Asencio and Carbay Cajamarca, 2021). It also promotes the creative and productive use of technological tools, which is essential for the holistic development of the individual (Cabero; Vázquez; López and Jaén, 2020; García-Valcárcel, 2016).

Currently, ICT is beginning to be studied and applied in the field of early childhood education. However, although there is international research on this topic, studies on the use of ICT in early childhood education are lacking in Haiti. This is despite the fact that such educational innovations have been described as beneficial (Bullón-Solís, 2022; Quispe Atoccsa, 2020; Flores Coapaza, 2020), as they lead to improved academic performance, greater motivation, and the development of healthy habits.

Recent information from UNESCO on the potential of digital technologies to transform education—by improving the quality and relevance of learning, increasing inclusion, and facilitating efficient educational management—highlights this trend. Technology has the potential to transform education and make it better, but for its implementation to be successful, it must be equitable, sustainable, and student-centered (UNESCO, 2024).

Many studies support the inclusion of ICT in the elementary school curriculum (Sánchez-Vera, 2021). The National Institute of Educational Technologies and Teacher Training (INTEF, 2024) emphasizes that digital literacy should be introduced at an early age, with a focus on the careful use of new technologies and human development. Similarly, several studies have demonstrated the beneficial effects of using ICT in early childhood education, particularly with regard to children's cognitive and socio-emotional development (UNESCO, 2021).

But there are still questions about how to ensure its proper implementation. Some studies warn of the risks and adverse effects that the inappropriate use of ICT can have on children's cognitive, linguistic, and socio-emotional development (Cabrero Sancho, 2023). This suggests the need to avoid excessive use of these technologies among children, ensuring that, whenever possible, the benefits outweigh the risks and that digital literacy is established as early as possible (Brussa, 2024). These findings also indicate that more research is needed to understand the role of ICT in elementary education, as there is a clear lack of robust studies on the implementation of ICT at this educational level (Baeza-González, Lázaro-Cantabrana, and Sanromà-Giménez, 2022). These authors also note that most of these studies rely on self-assessment by students, which can lead to biased evaluations.

In addition, the quality of digital training for teachers also has a major impact on how effective ICT is for children. Although, according to UNICEF (2017), young people today are familiar with and have access to technology from an early age, they need the support of educators to develop essential digital skills, such as critically searching for information, thinking critically, and communicating effectively in digital contexts

(Martínez Piñeiro, Vila Couñago, and Gewerc Barujel, 2018). Therefore, national education systems must create fully digital learning environments at the school level to make the most of ICT (Fraga-Varela and Alonso-Ferreiro, 2019). For example, the phenomenon of play forms the basis of pedagogical methodologies for students, as it enables children to learn more effectively and focuses on their holistic development (Lamrani and Abdelwahed, 2020).

Most studies conclude that there is a need to integrate ICT into primary education. Several countries have already incorporated educational games and technology-based learning tools to strengthen and promote learning (Ojeda, Herrera, Mediavilla, and Álvarez, 2020). In light of these studies, it is essential that all schools promote digital literacy and the development of skills for the critical and creative use of ICTs, thereby innovating teaching and learning processes and fostering collaborative work (Anampa-Pillacca, 2021). At present, there are no national studies on digital literacy in elementary education in Haiti. The country's current sociopolitical situation appears to be hindering the implementation of such studies. At the same time, this presents an opportunity to experiment there with far-reaching innovations that will help contextualize projects aimed at improving the quality of education.

However, the introduction of Information and Communication Technologies (ICT) in the educational context is a complex process and is still the subject of extensive debate. In many schools around the world, this process has greatly transformed educational practices, but in places like Haiti, most children are not receiving an education in this area—not even enough to graduate. The goal of working to help schoolchildren in Haiti acquire these skills is to enable them to use ICT in a humane, ethical, socially responsible, and environmentally friendly manner—beyond simply mastering technical skills.

Carice, the city where this research is being conducted, has obvious problems with its education system. One of the main drawbacks stems from the extent of school privatization. Currently, approximately 90% of schools are privately owned and administered by religious organizations (World Bank, 2015). This situation has contributed to unequal access to education, which has been particularly detrimental to vulnerable communities (Bonhomme, 2015). Educational segregation and low-quality education have resulted from privatization.

Environmental factors, such as natural disasters, and social and political factors, such as corruption, violence, and instability, have also had a significant impact on school attendance and the safety of both students and educators in Carice. As recently as 2024, the persistent climate of violence plaguing Haiti has led to the closure of numerous schools, as well as a substantial decline in school enrollment in the region. In addition, the financial vulnerability of many parents prevents them from being able to afford their children's educational expenses. In Carice, then, education is a privilege that only the economically privileged can afford. Amid these challenges, the “Saint Paul” Educational Institution, run by the Oblate Missionaries, stands out for its continued efforts to help students and provide them with an education, even in the face of various difficulties.

Method

Design

The study design employed a quantitative research approach to describe digital competence in the use of information and communication technologies (ICT) among elementary school students at Saint Paul School. The objectives of this quantitative study are:

1. Assess students' level of digital literacy.

2. Analyze how often they use ICT in their daily activities.
3. Identify the factors that influence the use of technological devices and the Internet.
4. Conduct descriptive research and use various data collection tools.

Participants

The study population consisted of all elementary school students at the "Saint Paul" School located in Carice. To determine the sample size, we used a comprehensive list of students enrolled during the 2023–2024 school year, which yielded a total of 588 students, with a gender breakdown of 302 males and 286 females. The participants' ages ranged from 6 to 14 years old. This information was provided by the institution's director, Fr. Wilson Exantus, OMI. A simple random sample of 233 students was selected to ensure that the sample was representative of the population; the sample size was calculated based on a 95% confidence level and a 5% margin of error.

Variables and Instruments

The variables considered in this study are digital competence and the use of ICT. Given the quantitative nature of the methodological approach, established tools and techniques for data collection and organization were used in this study. Priority was given to a data collection method based on administering surveys to students, addressing the aspects relevant to the study. To this end, a questionnaire consisting of 26 items on a Likert scale was used, supplemented by competency tests as assessment tools. The questionnaire was chosen because of its ability to provide an overview of students' digital competence in the use of ICT, offering concrete and quantifiable data for analysis. The survey instrument used was an adaptation of the Teacher Digital Competence Questionnaire (CDD) developed by Tourón et al. (2018). The questionnaire included multiple-choice questions, which made it possible to:

1. To facilitate data entry and coding.
2. Reduce ambiguity in the responses provided by participants.
3. Improve the comparability of respondents' answers.

In addition, tests and assessments were used to measure the overall objective of the study. In this regard, the students' ability to use ICT in the educational process was assessed through a questionnaire, which made it possible to determine the level of digital competence among elementary school students at the "Saint Paul" School in Carice.

Procedure

An informed consent form was presented to the participants. Afterward, following a detailed explanation of the various aspects of consent, they were given the questionnaire. Participants were assured that their participation was entirely voluntary and that the confidentiality of the data collected would be maintained at all times, with the data being used exclusively for the purposes of the study in question. It was emphasized that participation was optional and that they were free to withdraw at any time without any consequences. The researcher, who is the author of this article, was solely responsible for receiving the data collection instruments. All questionnaires were coded prior to analysis, using the following nomenclature: RJ1, RJ2, RJ3, etc. Data collection took place between January and May 2024, with the assistance of Mr. Lauradin Casseus, a computer science professor at the institution. To collect the data, a questionnaire using a Likert scale was administered, consisting of 26 closed-ended questions, all of which were directly related to the students' digital competence in the use of ICT. Prior to its implementation, experts in the field were consulted to assess the clarity

and relevance of the questionnaire's questions. The content validity of the instrument was assessed based on the judgment of three experts.

Data Analysis

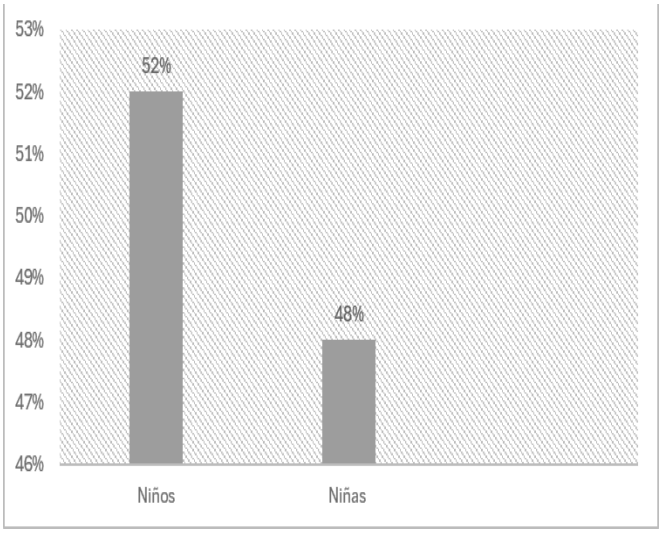
To analyze the study results, we used Excel version 21.0 for Windows (Statistics and Solution Service Product). The numerical data obtained were analyzed thoroughly, and their meanings and implications were discussed in the context of the research. This phase of the process was also devoted to data cleaning, ensuring that there were no errors that could compromise the validity of the findings. In addition, commonly used statistical packages for textual analysis were employed and integrated into the computational tools used in this research. Specifically, EXCEL 21 software was used to calculate descriptive statistics.

Results

Following a rigorous analysis of the collected data, which included critical validation and cleaning phases, the quantitative results obtained are presented below. These findings, derived from a comprehensive statistical analysis, provide essential numerical insights that not only reveal the key trends and patterns identified in the study but also establish a solid empirical foundation for drawing robust conclusions and making informed decisions. The presentation of this data aims to provide an accurate and objective understanding of the relationships and magnitudes observed, serving as a foundation for future interpretations and discussions.

Figure 1

Study participants

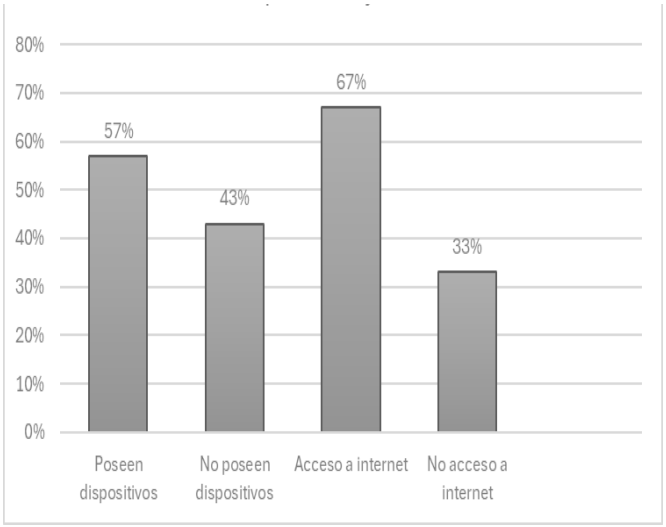


Note. Figure I shows the students who participated in the study.

Figure 1 shows the 233 participants in the study, all of whom are elementary school students (grades 1 through 5). Of this total, 121 (52%) were boys and 112 (48%) were girls. Their ages ranged from 6 to 14. All participants are students at the "Saint Paul" School in Carice.

Figure 2

Possession of Devices and Internet Access

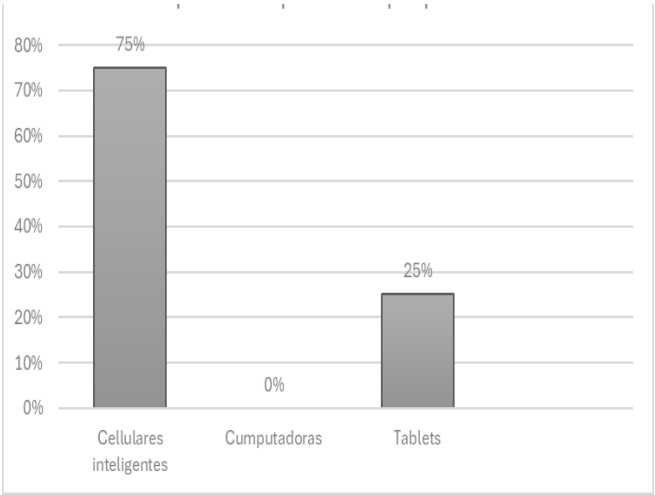


Note. Figure 2 shows students' device ownership and internet access.

According to Figure 2, 67% of the total population has Internet access, which indicates a very high penetration rate. However, 33% of people do not have access. This is how potential digital divides emerge and become apparent. In addition, 57% of those surveyed own technological devices. However, 43% do not have access to them. Therefore, this is also a potential barrier to using digital services or online products.

Figure 3

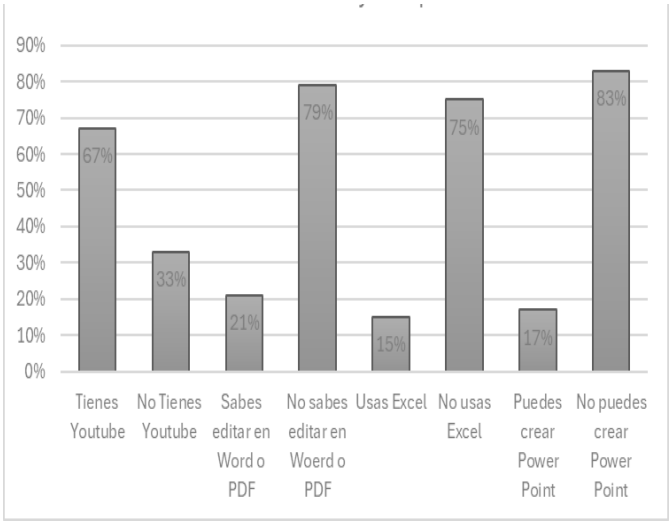
Types of devices they have



Note. Figure 3 shows what devices the students own.

According to Figure 3, 75% of students own a smartphone. No students have computers, while only 25% have tablets. When comparing this to global trends, it is clear that the smartphone penetration rate among young Haitians is similar to that in other places. However, there is a significant gap: Many students do not have access to all the technological tools they need for their education.

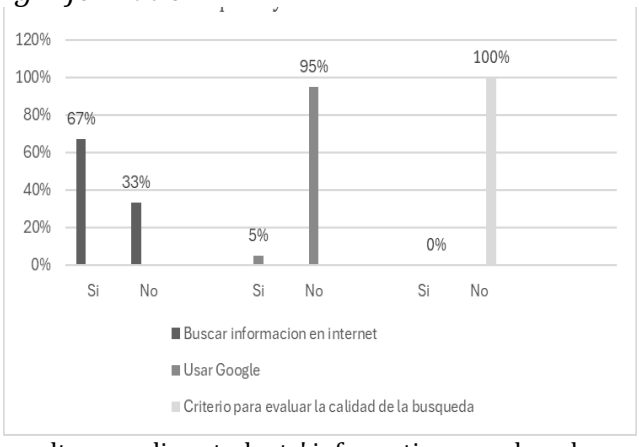
Figure 4
Using Apps and Tools



Note. Figure 4 details students' use of applications and tools.

Figure 4 clearly shows that students do not know how to use PowerPoint (83%), identify exactly what is wrong with Excel (75%), or edit documents in Word or PDF (79%). However, YouTube is widely used. 67% of students are already familiar with this website. This indicates that today's Haitian youth need to raise awareness about how to consume online content. The results show an urgent need to strengthen the digital skills of students at Saint Paul School in Carice.

Figure 5
Searching for and Using Information

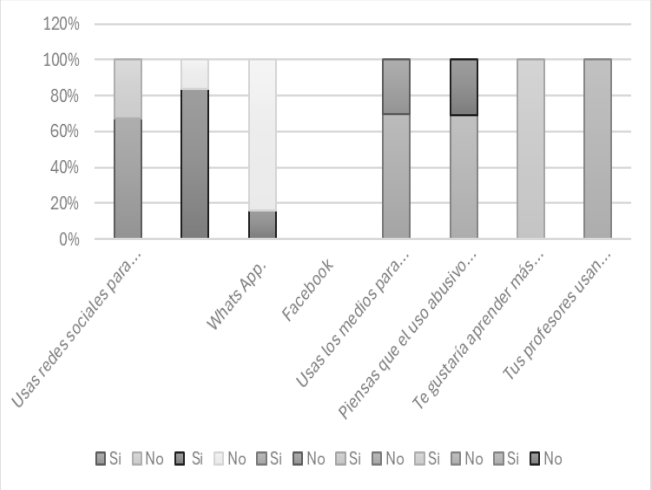


Note. Figure 5 shows the results regarding students' information search and use.

Figure 5 shows that 67% of students search for information online, while 33% do not use the Internet. Only 5% use Google, which indicates that it is not the primary search engine. None of the students use any criteria to evaluate the quality of the information. Although many people look for information online, it is necessary to teach them how to evaluate its quality and use other tools for finding information.

Figure 6

Social Media, Communication, and Digital Literacy



Note. Figure 6 details the social media platforms used by students and their teachers, and how they use them.

According to Figure 6, 67% of respondents use social media to communicate. There is also a great deal of interest in learning more about digital skills. This highlights the need for programs at various educational levels.

A significant number of respondents mentioned that their teacher does not use technology in class. A large proportion (84%) said they had used WhatsApp to send documents, and 16% said they had used Facebook. WhatsApp was their preferred means of communication, so communication strategies within the school could take advantage of this platform.

Perceptions of the risks associated with the misuse of technology vary among respondents. Sixty-nine percent of them believe that excessive use of technology poses a risk to their health, while the remaining 31% believe the opposite. It is particularly noteworthy that most of the children at the Educational Center are aware of the dangers inherent in the excessive use of technology. This finding suggests the importance of implementing awareness campaigns on the responsible use of technology at various levels.

Discussion and Conclusions

An analysis of the results revealed that 85% of the students have significant gaps in their foundational knowledge of ICT. This finding highlights a lack of digital literacy that needs to be addressed in order to optimize students' future performance. This finding is consistent with previous studies (Pech, González, and Herrera, 2020; Estrada, 2020).

Sixty-seven percent of students use ICT frequently, reflecting a common trend among today's youth. However, despite this widespread use, students do not demonstrate effective mastery of these technological tools. This observation also applies to the "Saint Paul" School in Carice, where 71% of students between the ages of 9 and 14 are regular Internet users.

90% of students own a cell phone, which indicates that technology is a constant presence in their daily lives. However, their use is not always the most appropriate, since 63% of them primarily use apps for recreational purposes. We need to encourage a

balanced use of technology, incorporating activities that promote physical and mental well-being.

The survey findings suggest that the excessive use of ICT devices and the Internet among students at Saint Paul School in Carice is primarily due to their need for social interaction. Instant communication and the ability to share multimedia content are two features that are particularly appealing to them. This trend is consistent with numerous studies showing excessive use of mobile devices by children in today's schools (Zuluaga, 2023; Müller et al., 2020; Álvarez Clemente and Mamani Ccarita, 2023).

However, despite the ubiquity of these digital technologies in their daily lives, both students and teachers at our institution have only a basic level of digital skills. This limitation is particularly evident in the use of a variety of technological tools, in understanding their pedagogical application, and in taking advantage of online training courses. This finding is corroborated by other studies (Verdú-Pina, Grimalt-Álvaro, Usart, and Gisbert-Cervera, 2024; Silva, Soto, and Trillo, 2023).

In addition, there is a lack of fundamental knowledge regarding cybersecurity and the effectiveness of digital communication. Consequently, the implementation of continuing education programs designed to maintain and strengthen digital skills throughout the educational community is an urgent necessity, as recently documented by UNESCO (2023). It is crucial to offer accessible training programs to improve digital skills. It is also recommended that ICT be integrated across the academic curriculum.

Most students at the "Saint Paul" School in Carice use technology primarily as a form of entertainment. This trend reflects a disparity between theoretical knowledge of the technology and its practical application in an educational context. In this situation, many students lack the opportunities or the necessary support from teachers to develop digital skills in an academic setting. If this trend continues, it could lead to concerning consequences, such as difficulties in achieving independent learning and a lack of critical digital skills (Chacón, 2022).

The results obtained from the school's students reveal a significant digital divide among their peers, showing a particular lag in the acquisition of proficiency in basic technological tools. It is imperative to organize practical training courses with clear objectives, such as teaching students to use not only PowerPoint but also Excel and Word effectively. This training should present real challenges and enable students to apply their knowledge in various fields of study (UNESCO, 2024).

Furthermore, it is considered absolutely necessary to incorporate these tools into all subjects and to gradually foster the development of students' digital skills. To achieve equity in education, it is essential to provide the technology and resources necessary for every student to acquire these skills, regardless of their background or socioeconomic status.

This study identifies two significant limitations that affect the interpretation of its findings:

1. Methodological limitations: The lack of previous research on the digital competence of Haitian elementary school students has significantly limited the scope of our observations. The lack of benchmarks for comparison makes it difficult to generalize the results and complicates the formulation of education policies that are specific and relevant to the Haitian context.
2. Contextual limitations: The political and social instability currently affecting Haiti poses a considerable challenge to our research. Security conditions have limited our access to various towns, which has been detrimental both in terms of quality control in data collection and in terms of the potential impact these conditions may have had on the results obtained.

To foster relevant digital competencies in the use of ICT at the "Saint Paul" Elementary School in Carice, the following actions are proposed:

1. Development of a detailed development plan: The school's administration should develop a plan that sets specific goals regarding the digital content and skills that both students and teachers must acquire. Appropriate technological resources must be selected, and the plan must provide for a gradual introduction of new strategies to ensure that the entire educational community adapts to them. It is essential to seek out resources for this project within the educational community and other relevant areas, and the collaboration of recognized specialists is crucial to ensuring the initiative's success.
2. Alumni Community Participation: Your involvement is crucial to the success of this project. Through an alumni committee, both individual and group donations can be coordinated from those living in the country and those living abroad. These financial contributions will enable the institution to secure the resources needed to integrate digital skills into the curriculum.

The alumni committee, in collaboration with the school administration, can organize various fundraising activities to promote the development and integration of technology in education. These approaches could include: These approaches could include:

1. In-person events: Charity dinners, art and antique auctions, concerts, and other cultural activities organized within the community to raise awareness of the project's goals through community cohesion, thereby ensuring that development is in line with the aspirations of its members.
2. Online campaigns: Establishment of online donation platforms, virtual auctions, and various social media activities to raise funds globally among alumni and supporters of the project.
3. Commemorative products: Sale of school-branded items, such as screen-printed T-shirts, mugs, and key chains, as promotional products.
4. Strategic partnerships: Establishing partnership agreements with local and multinational companies to secure in-kind donations (technology equipment, software) and/or sponsorship for events or other public relations activities. Leveraging alumni social and professional networks is a highly promising avenue for establishing personal contact. Their social media campaigns can generate donations and volunteer participation for the project. To strengthen the academic community's digital capabilities, we suggest exploring partnerships with local schools and edtech companies. This strategy would make it possible to optimize teaching and provide a higher-quality education. Alumni and friends of the school can use their national and international contacts to spread the word about this project. Through social media platforms, for example, various stakeholders could be encouraged to participate. The establishment of strategic partnerships with institutions of higher education and educational technology research centers is primarily aimed at improving the digital skills of the educational community by providing access to high-quality training programs, cutting-edge technological resources, and the expertise of professionals in the field.

These joint efforts aim to:

1. Strengthening teachers' digital skills: Offering continuing education programs to equip teachers with the skills needed to integrate information technology-based methodologies into their teaching practices.

2. Develop educational innovation initiatives: Implementing pilot projects to adopt new teaching tools and approaches.
3. Promote collaborative networks: In order to draw on the experiences, resources, and best practices of other institutions. This cooperation agreement will facilitate the school's transition to a hybrid educational model that combines elements of traditional and online education, thereby preparing students to face the challenges of an increasingly digital world.

Future lines of research to further explore digital competence in elementary schools are as follows:

1. Computational thinking: It is necessary to investigate how early exposure to programming fosters problem-solving and critical thinking skills in students at all educational levels.
2. Development of assessment tools: There is an urgent need to develop new tools and innovative methodologies to accurately and reliably assess children's digital skills.
3. Promoting Collaboration: Strategies should be explored to enable digital platforms to facilitate collaboration among groups of students in order to improve learning outcomes.
4. The Influence of ICT on Social Relationships: It is necessary to investigate how the use of ICTs affects children's interpersonal relationships, both on an individual level and in terms of group behavior.
5. Environmental Impacts and Sustainability: The relationship between the use of ICT and environmental sustainability should be investigated, promoting conscious and sustainable digital practices.

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