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Artículo de Investigación

The TIC and its relationship to literacy in the learning process.

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Abstract

The present article provides a synthesis of the significant results of the research that analyzed ICT and its relationship with literacy in the learning process of secondary education students. The objective of our research was to analyze the relationship between Information and Communication Technologies (ICT) and literacy in the learning process of students from secondary education institutions. To this end, a research design with a quantitative approach was planned, using a survey method with a descriptive cross-sectional design and a non-random convenience sample from two first-year secondary school groups from institutions in the central and Pocitos areas of Aguascalientes. Data collection was carried out through the application of a self-administered questionnaire to students enrolled in regular secondary education. Through the analysis and discussion of the data, it was identified that ICT plays an important role in their education, as it helps them achieve better academic results. From this, it can be inferred that ICT has a direct relationship with literacy in the learning process of secondary school students. However, less than 50% of the population regularly analyzes the information obtained through ICT, rarely interprets it, regularly applies it, and never uses it ethically and legally.

Keywords: Literacy, Information and Communication Technologies (ICT), Learning.

Resumen

El presente artículo ofrece una síntesis de los resultados significativos de la investigación que analizó las Tecnologías de la Información y la Comunicación (TIC) y su relación con la alfabetización en el proceso de aprendizaje de estudiantes de educación secundaria. El objetivo de la investigación fue analizar la relación entre las TIC y la alfabetización en el proceso de aprendizaje de estudiantes de instituciones de educación secundaria. Para ello, se diseñó una investigación con enfoque cuantitativo, utilizando el método de encuesta con un diseño descriptivo de corte transversal y una muestra no probabilística por conveniencia conformada por dos grupos de primer año de secundaria de instituciones ubicadas en las zonas centro y Pocitos de Aguascalientes. La recolección de datos se realizó mediante la aplicación de un cuestionario autoadministrado a estudiantes inscritos en educación secundaria regular. A través del análisis y discusión de los datos, se identificó que las TIC desempeñan un papel importante en su educación, ya que contribuyen a la obtención de mejores resultados académicos. A partir de ello, se puede inferir que las TIC tienen una relación directa con la alfabetización en el proceso de aprendizaje de los estudiantes de secundaria. Sin embargo, menos del 50% de la población analiza regularmente la información obtenida a través de las TIC, rara vez la interpreta, la aplica de manera regular y nunca la utiliza de forma ética y legal.

Palabras clave: Alfabetización, Tecnologías de la Información y la Comunicación (TIC), Aprendizaje.

1. INTRODUCTION

The technological revolution of the 20th century brings changes to society, and in recent years, the way humans communicate, interact, and socialize with others is affected by Information and Communication Technologies (ICT).

With these societal changes, Cabero (1996) states, "the most exciting aspect of the ICT sector is the social alterations it will bring. The most striking will be the shaping of a new society."

In the formation of this new society, Gómez (2010) mentions that a new form of culture has emerged, the screen culture. Prensky (2001) classifies ICT users into two groups: those who are fully immersed in this environment and become permanent users, known as digital natives, and a second group adapting to this technological reality, called digital immigrants.

As society evolves and incorporates ICT, Castro & Campo (2008) comment that these technologies are seen as essential levers for the development of nations, as their mere incorporation into education is considered a significant step toward social well-being.

Bartolomé (1997) explains that with the incorporation of ICT into education, a new vision of knowledge and learning emerges, affecting the roles of institutions, teachers, and students.

Considering the opportunities for change in the educational process with the integration of ICT, Gil (2010) describes that future research will focus on institutions such as the European Union or the Organisation for Economic Co-operation and Development (OECD), which are centered on developing and using digital technologies to improve education.

Thus, this research analyzed the relationship between ICT and literacy in the learning process. Specifically, it focused on how secondary school students use the information obtained from ICT in their learning to generate knowledge.

The objective of their article is to analyze the relationship between Information and Communication Technologies (ICT) and literacy in the learning process of students in secondary education institutions. Their research question guiding this study is as follows: What is the relationship between Information and Communication Technologies (ICT) and literacy in the learning process of secondary education students?. They consider that Information and Communication Technologies (ICT) have a relationship with literacy in the learning process of secondary education students.

2. DEVELOPMENT

Information and Communication Technologies (ICT)

Information and Communication Technologies (ICT) are defined by Duncombe and Heeks (1999) as the set of processes and products derived from new tools (hardware and software), communication supports, and channels related to the digitalized storage, processing, and transmission of information.

Cabero (2000) states, "ICT refers to a series of new media such as hypertexts, multimedia, the Internet, virtual reality, or satellite television, highlighting their interactive nature in telecommunications, computing, and audiovisuals, and their hybridization, such as multimedia."

In this research, ICT refers to computers, as described by Duncombe and Heeks, responsible for processing and storing information, and by Cabero, emphasizing interactivity, virtual reality, and the internet.

Information and Communication Technologies (ICT) in Mexico

Regarding the advancements in ICT, the study analyzed the number of computers in Mexico, growth rates, computer users, and how they are used.

According to data from the National Population Council (CONAPO), Mexico has 23,484,752 households. Cross-referencing this data with the National Institute of Geography and Statistics (INEGI), in 2009, 7.5 million households owned a computer, and by 2010, this number grew to 8.4 million, showing a 13.2% growth rate. However, only 6.3 million households had internet access.

In 2009, there were 34.7 million computer users, and by 2010, this figure rose to 38.9 million, with 32.8 million of them using the internet. The primary uses for computers and the internet are to obtain information, communicate, and support education/training.

Given this significant growth in ICT, it is essential to conduct a pedagogical review. As Gil (2010) notes, digital media increasingly influence the behavior, learning, and values of children. Understanding these learning processes and closing gaps to provide access in educational institutions would be crucial.

National Policy, Education, and Information and Communication Technologies (ICT)

The Political Constitution of the United Mexican States, in its Chapter I on human rights and individual guarantees, Article 3 states, "The State will ensure the guarantee of quality education so that materials, educational methods, organization, and educational infrastructure guarantee the maximum learning achievement of the students."

In line with this state policy, each government generates a National Development Plan that outlines the path for Mexicans to achieve the country's maximum potential. For this purpose, the plan from 2013–2018 is taken, which establishes five goals; for the purposes of the current research, only the second goal, "Inclusive Mexico," and the third goal, "Mexico with Quality Education," are considered.

In the previously selected goals, the Government of the Republic, through the National Development Plan (2013/2018), designs a series of strategies. For the present research, only three strategies are taken into account:

- Strategy 3.1.2 Modernize the infrastructure and equipment of educational centers.

- Strategy 3.1.3 Ensure that curricula and study programs are relevant and contribute to students successfully advancing in their educational trajectory while developing meaningful learning and skills that will serve them throughout their lives.
- Strategy 3.1.4 Promote the incorporation of new information and communication technologies (ICT) in the teaching and learning process.

Aligned with national policy, the Government of the State of Aguascalientes outlines a Six-Year Government Plan (2010/2016), which has six general strategies; for the purposes of this research, only the fifth strategy, "Quality Education," is considered, and the relevant objectives are:

- Promote quality education as a basic principle for economic growth and social well-being.
- Promote the integration of Information and Communication Technologies (ICT) at all educational levels.

Based on the established objectives, the goals to be achieved in the Six-Year Government Plan (2010/2016) are:

- Equip schools with computer labs.
- Provide schools with internet connectivity.

In the Sectoral Education Plan (2010/2016), under the Coverage and Quality Program, the Educational Technology Program promotes quality education through the integration of Information and Communication Technologies (ICT) as learning tools and didactic resources in basic education; there are still 200 institutions that need to be equipped. However, it is fixed in its strategy 2.1.7 to equip secondary schools with computers and internet.

Information and Communication Technologies (ICT) and Literacy

Information and Communication Technologies (ICT) are addressed in national and state policy as a key axis to achieve “Quality Education.” The main proposed strategies for development are:

- Modernize the infrastructure and equipment of educational institutions.
- Increase the provision of computer equipment to ensure the functioning of educational institutions.
- Promote the incorporation of new information and communication technologies (ICT) in the teaching and learning process.

The mere inclusion and incorporation of Information and Communication Technologies (ICT) into the teaching and learning process is referred to by Muñoz (1998) as the age of the iconosphere and audiosphere, in which individuals are carried away by the audio and images presented without deeply analyzing the content.

Regarding the users of Information and Communication Technologies (ICT), Gómez (2010) states, "It is not unusual to see young people as both active and passive subjects of their

environment, where the former are active consumers of information, in which the object is active and the subject is passive; behaving in a behaviorist manner."

In this context, Díaz (2008) points out that the mere inclusion of Information and Communication Technologies (ICT) in education will not bring equity, quality, or innovation, making it necessary to create an active subject who possesses the competence of informational literacy, which is the ability to search for, find, evaluate, and manage digital data; using them ethically and legally.

3. METHODOLOGY

The research was conducted under a quantitative approach, as it allowed for the explanation, prediction, and control of educational phenomena according to the stated objectives. A survey method and a descriptive cross-sectional design were used.

The scope of the study was descriptive since it measured the performance of secondary education students with Information and Communication Technologies (ICT) and analyzed the relationship between ICT and literacy in the learning process of secondary education students.

The selected universe for the research was the capital municipality of Aguascalientes state, which had nine basic education coordinations and a total population of 45,012 students enrolled in regular secondary education. Two institutions were chosen as the elements of analysis for convenience: Colegio Pascal A.C. from the central coordination and Colegio Paulo Freire from the Pocitos coordination.

Colegio Pascal A.C. attended 17 first-year secondary students and had eleven classrooms, a computer lab with internet access, and was staffed by sixteen teachers and one director. Colegio Paulo Freire attended 13 first-year secondary students, had six classrooms, a computer lab with internet access, and was staffed by nine teachers and one director. This resulted in an analysis unit of 30 students, from which a sample was calculated with a confidence level of 90% and a margin of error of 10%, yielding a sample size of 21 students.

For data collection, a survey was employed, and a measurement instrument called a questionnaire was developed. This questionnaire was comprised of twelve dimensions of the independent variable, called Information and Communication Technologies (ICT), and five dimensions of the dependent variable, learning, resulting in a total of 92 items.

The questionnaire included preliminary instructions emphasizing its anonymous nature. The items were divided into three groups: items 1 to 4 for sociodemographic data, items 6 to 65 for general information on the use of Information and Communication Technologies (ICT), and items 66 to 92 for specific information on the use of ICT in their learning.

Once the instrument was developed, it was sent to a group of experts for validation, and a reliability test (Cronbach's Alpha) was conducted, yielding a score of .968, which was considered reliable.

Subsequently, the questionnaire was administered to the selected sample at both institutions, and for data analysis, the statistical software SPSS 21 for Windows was utilized. Descriptive statistics, such as frequencies and percentages, were calculated for each item.

4. RESULTS

This section presents the data from the descriptive analysis of the research conducted, in which the main elements are identified.

Table 1. Importance of ICT in Academic Training

Opinion on ICT in Academic Training	***Percentage (%)***	***Number of Students (n = 21)***
Regularly important	*42.%*	*9*
Almost always important	37%	8
Always important	21%	4

Note: *Own elaboration*

42% of the students consider that Information and Communication Technologies (ICT) are regularly an important element for academic training, 37% almost always, and 21% always.

Table 2. Frequency of Assistance from ICT in Information Search

Frequency of Assistance from ICT in Information Search	**Percentage (%)**	**Number of Students (n = 21)**
Always	47%	10
Almost always	32%	7
Almost never	16%	3
Regularly	5%	1

Note: *Own elaboration*

Considering that 47.4% of the students find that Information and Communication Technologies (ICT) always help them in their information search, 31.6% almost always, 15.8% almost never, and 5.3% regularly.

Table 3. Preferences in the Format of Information Obtained through ICT

Preference for Images vs. Text (Using ICT)	Percentage (%)	Number of Students (sample of 21)
Regularly prefer images	47.4%	10
Almost never prefer images	26.5%	6
Always prefer images	15.5%	3
Almost always prefer images	10.5%	2

Note: *Own elaboration*

From the information they obtain through the use of Information and Communication Technologies (ICT), 47.4% regularly prefer images over text, 26.5% almost never, 15.5% always, and 10.5% almost always.

Table 4. Impact of ICT on Learning

Opinion on the impact of ICT on learning	Percentage (%)	Number of students (sample of 21)
Almost always helps	57.9%	12
Always helps	21.1%	4
Regularly helps	21.1%	4

Note: *Own elaboration*

It is noted that 57.9% of students indicate that Information and Communication Technologies (ICT) almost always help them in their learning, while 21.1% say they always help and 21.1% say they help regularly.

Table 5. Activities Performed with Information Obtained through ICT.

Activity performed with information obtained (ICT)	Percentage (%)	Number of students (sample of 21)
Analyzes the information	26.3%	6
Interprets the information	42.1%	9
Applies the information	36.8%	8
Incorporates the information	42.1%	9
Creates new information	31.6%	7

Note: *Own elaboration*

The research observes that when obtaining information through Information and Communication Technologies (ICT), 26.3% of students analyze the information, 42.1% interpret it, 36.8% apply it, 42.1% incorporate it, and 31.6% create new information. Among them, only 47.4% use it ethically and 31.6% legally.

5. DISCUSSION

The research highlights the increasing relevance of Information and Communication Technologies (ICT) in the educational context. A significant percentage of students recognize the importance of ICT in their academic training, indicating that they are a crucial tool for learning. This is reflected in how ICT not only facilitates access to information but also influences the way students process and utilize that information.

It is observed that the majority of students claim that ICT helps them in their learning. This suggests that integrating ICT into the classroom can be a driving force for improving the educational experience and fostering more effective learning. Furthermore, the preference for images over text reveals a tendency towards visual learning methods, emphasizing the need to adapt pedagogical strategies to meet these preferences.

The research also demonstrates that students do not merely consume information; they actively engage in analyzing and interpreting it. However, it is concerning that only a portion of them uses the information ethically and legally. This underscores the importance of including responsible use of ICT and information literacy in education to ensure that students develop adequate competencies in information management.

In conclusion, the advancement of ICT in the educational field presents significant opportunities but also challenges. Effective incorporation of ICT requires a conscious approach that considers training students in the ethical and legal use of information, as well as developing critical skills that enable them to become active and responsible consumers of knowledge.

6. CONCLUSIONS

The results obtained in this research confirm the importance of Information and Communication Technologies (ICT) in the learning process of secondary education students. It is observed that ICT not only plays a key role in academic training but also facilitates the search for and access to information. However, the use of these tools does not always imply a complete utilization of the learning opportunities they offer. Many students do not manage to use the information obtained in a critical or ethical manner, highlighting the need to promote deeper and more sustainable informational competencies.

Although students recognize the usefulness of ICT in their learning, challenges persist regarding their ability to analyze, interpret, and apply content effectively. Furthermore, a gap in the ethical and legal use of information is observed, suggesting the need to reinforce these aspects in the educational environment. It is essential that the incorporation of ICT is accompanied by a more comprehensive development of literacy skills, allowing students not only to access information but also to use it responsibly and critically.

Finally, the finding that some students find it difficult to understand ICT or use inappropriate language when referring to it indicates an area for improvement in technological education. The teaching of ICT must progress not only in terms of access and instrumental use but also in conceptual and critical understanding, in order to maximize their positive impact on education and the development of life skills. These results open the door to future research that explores pedagogical strategies that better integrate ICT, fostering more meaningful learning and responsible use of these technologies.

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