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# Evaluation of academic performance through the application of ICT in teaching and learning processes

## Evaluación del rendimiento académico aplicando las TIC en los procesos de enseñanza y aprendizaje

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### Abstract

The present study aimed to evaluate academic performance through the use of ICT in the teaching and learning processes of the subject Geography, History, and Citizenship. A quantitative approach was adopted, with a descriptive level and field design. The data collection technique was the survey, using a questionnaire applied to two populations: the first composed of 65 students, and the second of two subject facilitators. The results showed that the integration of ICT significantly enhances academic performance. However, it is recommended that teachers have access to the necessary resources and training to select the most appropriate strategies according to the characteristics of their groups. Likewise, it is essential that students receive both training and adequate tools to manage information and communication technologies effectively, in order to optimize the teaching and learning process and achieve better academic outcomes.

**Keywords:** Academic performance, Information systems, Teaching methods, Learning processes.

### Resumen

El presente estudio tuvo como objetivo evaluar el rendimiento académico mediante la aplicación de las TIC en los procesos de enseñanza y aprendizaje en la asignatura Geografía, Historia y Ciudadanía. Se adoptó un enfoque cuantitativo, con nivel descriptivo y diseño de campo. La técnica de recolección de datos fue la encuesta, utilizando como instrumento un cuestionario aplicado a dos poblaciones: la primera conformada por 65 estudiantes, y la segunda por dos facilitadores del área. Los resultados permitieron concluir que la incorporación de las TIC favorece significativamente el rendimiento académico. Sin embargo, se recomienda que los docentes dispongan de los recursos y capacitación necesarios para seleccionar las estrategias más adecuadas según las características del grupo. Asimismo, se resalta la importancia de que los estudiantes reciban formación y equipamiento para el uso efectivo de las tecnologías de información y comunicación, a fin de optimizar el proceso de enseñanza y aprendizaje.

**Palabras clave:** Rendimiento académico, Sistemas de información, Métodos de enseñanza, Procesos de aprendizaje.



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## Introduction

Assessment as a continuous process properly addresses any educational process, provided the individual is aware of the objectives they intend to assess at specific times and of both the internal and external environment. Assessment must be a reflective framework that allows for the optimization and improvement of educational and teaching-learning processes. Students require dynamic processes, which necessitates the inclusion of strategies tailored to their needs, without forgetting that the teacher's priority is to teach with perseverance and provide students with conceptual, attitudinal, and procedural skills.

Today's demands are shaped by the vast amount of information existing in the world; what matters is understanding this information. Information and communication technology (ICT) has facilitated teaching and learning processes through technological resources that aid in understanding the thematic structures involved in a specific area of study. For this research, the focus is on Geography, History, and Citizenship. However, the current context requires technological tools to develop assessment strategies that foster meaningful learning.

Now, History, Geography, and Citizenship, whether national or global, is certainly an extensive field of study with a deeply traditionalist approach to teaching and learning. It is often viewed as a discipline with very few strategies for engagement, and in certain aspects, it involves the memorization of dates, events, structures, designs, and norms, with very little interpretation, leading to significant issues in student performance.



Faced with this, another reality is the great disinterest among students toward Geography, History, and Citizenship, seen as a tedious area that does not respond to current reality. It is perceived as limited to books, written exams, and endless lectures, condemned to not breaking its mold and drifting further away from innovation and alignment with the reality of new generations of students.

This study on the evaluation of academic performance contributes to teaching and learning processes by recognizing the teaching of strategies through ICT. It is vitally important that both teachers and students are aware of technological assessment resources and know how to develop them, considering that all resources used must always be adapted to learning needs, teaching purposes, and the specific context. Currently, students respond to and use ICT in their daily lives as the primary means for developing their daily, school, personal, and other activities. So, why not harness this tool for teaching and learning processes, specifically in the field of Geography, History, and Citizenship?

Therefore, the following objectives were developed: to diagnose the use of ICT in the teaching and learning processes of 4th-year high school students in the field of Geography, History, and Citizenship; to determine the appropriate ICT for teaching and learning processes in this field; and to specify the impact generated by the use of ICT in teaching and learning processes on the academic performance of students in Geography, History, and Citizenship.



Global-scale changes, a product of globalization, have made education, throughout history, the most suitable process and the guiding axis for all social development and renewal. It is the foundation for the formation and preparation of the human resources necessary for a well-rounded individual. Through the educational process, fundamental values and the preservation of cultural and civic identity are transmitted. This continues to position the school as the place for acquiring and disseminating relevant knowledge and as the means for multiplying productive capacities.

Education is viewed from an elementary perspective, as affirmed by Ibarra (2012). Although education is an essential and permanent element of individual and social life, it has not always been conducted in the same way. Instead, it has varied according to the needs and aspirations of each people and each era. For example, Socrates conversed with his disciples about the need to travel to increase their body of knowledge. Thus, education and its style varied according to the different cultures of peoples and evolved at the same pace as human thought.

There have been many changes that the educational process has undergone over time, which leads one to believe that the development of societies, at different stages and moments in human history, has always been notably centered on education, as the vehicle guaranteeing the transmission of knowledge.

The various definitions of information and communication technologies encompass a very broad and variable concept, referring to a range of services, applications, and technologies. These use various types of electronic equipment (hardware) and software programs (software), primarily employed for communication through networks. Regarding ICT, Cebreiro (2007) indicates that they "revolve around four basic media: computing, microelectronics, multimedia, and telecommunications" (p.163). Most importantly, they operate in an interactive and interconnected manner, enabling the creation of new communicative realities and enhancing those that can exist in isolation.

In these various definitions, there is some agreement in considering technologies as technical instruments that revolve around information or its transmission. That is, they are implicitly seen as means for carrying out the communication process.

The teaching profession requires mastery of a series of elements and procedures belonging to the diversity formed by the school context. Among these is the didactic axis, which consists of planning and the assessment of learning, as well as the teaching strategies that allow for the completion of the two aforementioned procedures.



These statements highlight the importance of didactic strategies in the educational endeavor. Didactic strategies consist of the affective, cognitive, and procedural processes that enable the student to construct learning and allow the teacher to carry out instruction. Consequently, it is affirmed that didactic strategies are fundamentally deliberate procedures by the teaching or learning entity, with defined intentions and motivations. This entails a diversity of differing definitions where the complexity of their elements has diversified, depending on subjectivity, available resources, and the specific context in which didactic actions occur.

The diversity in the use and definition of the elements of a didactic strategy by the teaching staff transforms, in most cases, into a complication at the time of its design and subsequent implementation. In this regard, Díaz and Hernández (2003) note: "Didactic strategies are the procedures that the teaching agent uses in a reflective and flexible manner to promote the achievement of meaningful learning in students" (p.70). Likewise, they are defined as the means or resources to provide pedagogical assistance to students. This type of strategy in current teaching practice must focus on breaking away from traditional teaching, giving way to teaching and learning processes that achieve the formation of an autonomous, critical student, capable of transforming their reality—that is, nurturing through education a dynamic being.

Teaching strategies are defined, according to Díaz and Hernández (2003), as "the procedures or resources used by teaching agents to promote meaningful learning." Various teaching strategies can

be included before (pre-instructional), during (co-instructional), or after (post-instructional) specific curricular content, whether in a text or in the dynamics of teaching work. In this sense, Díaz and Hernández (2003):

- *Pre-instructional strategies* generally prepare and alert the student regarding what and how they are going to learn (activation of relevant prior knowledge and experiences) and allow them to situate themselves in the appropriate learning context. Some typical pre-instructional strategies are: objectives and the advance organizer.
- *Co-instructional strategies* support curricular content during the teaching process itself or the reading of instructional texts. They cover functions such as: detection of main information; conceptualization of content; delimitation of the organization, structure, and interrelationships among said contents; and maintenance of attention and motivation. Strategies such as the following can be included here: illustrations, semantic networks, concept maps, and analogies, among others.
- *Post-instructional strategies* are presented after the content to be learned and allow the student to form a synthetic, integrative, and even critical view of the material. In other cases, they allow students to assess their own learning. Some of the most recognized post-instructional strategies are: embedded questions, final summaries, semantic networks, and concept maps.

Another valuable classification by Díaz and Hernández (2003) can be developed based on the cognitive processes that strategies use to promote better learning. Thus, a second classification is proposed, which is briefly described below.



- *Strategies for activating (or generating) prior knowledge and establishing appropriate expectations in students:* These are strategies aimed at activating students' prior knowledge or even generating it when it does not exist. In this group, we can also include those strategies that focus on clarifying the educational intentions that the teacher aims to achieve by the end of the cycle or educational situation.

In this regard, Díaz and Hernández (2003) state the following: A learning strategy "is a procedure (a set of steps and skills) that a student acquires and employs in a traditional manner as a flexible instrument for meaningful learning and for solving academic problems and demands" (p.70). This means that the specific objectives of any teaching strategy can consist of affecting the way new knowledge is selected, acquired, organized, or integrated, or even modifying the learner's affective or motivational state, so that they learn curricular and extracurricular content more effectively.

The classification of learning strategies is a difficult task, given that different authors have approached them from a variety of perspectives. In this regard, Pozo (1990) points out: "Learning strategies can be classified according to how general or specific they are, the domain of knowledge to which they are applied, the type of learning they promote, the type of particular techniques they combine..." (p.16).

## Methodology

The research was framed within the positivist paradigm, understood as the search for causes in social phenomena through systematic observation, the correlation of variables, and the formulation of generalizations (Arias, 2012). This approach allowed for the evaluation of academic performance based on the incorporation of Information and Communication Technologies (ICT) in the teaching and learning processes in the area of Geography, History, and Citizenship.

According to the nature of the problem and the stated objectives, a descriptive research level was defined, whose purpose is to collect and analyze information to identify characteristics, dimensions, and key aspects of the phenomenon (Hernández et al., 2006). In this sense, the study sought to describe the use and perception of ICT as a pedagogical resource in the subject.

The research design was a field study, as data were collected directly in the context where the events occur, without manipulation of variables (Palella and Martins, 2010). Data collection was carried out at the selected educational institution during April 2023, through the application of surveys.

The population consisted of 4th-year high school students (section A = 33 students and section B = 32 students), with a total of 65 enrolled students according to data provided by the institution's administration and the two facilitators responsible for the subject. The definition of the population followed Malhotra's criteria (2016). Regarding the sample, intentional sampling (Sabino, 2010) was used, taking the entire population: 65 students and 2 teachers (a census sample). This decision allowed for the coverage of all relevant analysis units for the study's objectives.

**Table 1**

**Population A and B according to Malhotra**

| Criterion | Population A | Population B |
|---|---|---|
| Element | Educations institution | Educations institution |
| Unidad muestral | Institución educativa | Geography, history, and citizenship facilitators / instructors |
| Scope | 4th-year students A and B | Municipio San Cristóbal |
| Time | April 2023 | April 2023 |

*Source:* Lobo and Di Tillio (2023).



The data collection technique used was the survey, understood as a systematic search for information through questions directed at participants (Vidal, 2001). As an instrument, structured questionnaires were applied, defined as a system of logical and coherent questions that facilitate obtaining data from primary sources (García, 2004). Two instruments were developed: Questionnaire A, aimed at students, and Questionnaire B, administered to facilitators. Both questionnaires were standardized, with closed-ended questions inquiring about the use, acceptance, and perceived impact of ICT in teaching and learning processes.

## Results

### Regarding students

Students believe that the study methods used for teaching and learning processes in the area of Geography, History, and Citizenship do not benefit academic performance. This was observed in the academic results obtained during the first term of the 2022-2023 academic period, from October to December 2022, where the average score for the curricular unit was 13.14 points on a scale of 1 to 20. All students believe that the area of Geography, History, and Citizenship has become tedious when developing the programmatic content. According to the instrument's results, this likely generated low motivation and, consequently, affected academic performance.

In line with this, a higher proportion, specifically 48 participants representing 74%, consider that the strategy currently applied to the teaching process does not adapt to their needs. On the contrary, te-

chnological advancement has notably influenced the educational process. Students' current needs are oriented towards the secure use of technology; they prefer to interact with technological tools, software, among others. It is notably affirmed that the strategies currently used by facilitators in the area of Geography, History, and Citizenship are not adapted to the current context. Just as globalization advances at paradigmatic levels, the strategies applied in the teaching process must change. In the current context, Information and Communication Technologies are a viable alternative.

## Regarding Teachers

Although teachers show willingness to apply and develop teaching and learning strategies, they have not been trained to implement them in the learning environment. However, they consider it interesting to improve the training process by using new technological learning methods. Meaningful learning is a study variable that must be acquired by students in such a way that they do not forget the knowledge required for subsequent academic periods. Therefore, all facilitators affirm that through technologies, participants can achieve meaningful learning.

The findings also argue that students are currently not motivated by the strategies used in the area of Geography, History, and Citizenship. Therefore, the variable of tedium is related to students' low motivation to carry out the different assessment strategies employed in the area.

## Regarding teaching and learning strategies

Table 2 below shows the ICT resources most commonly used in education, along with their functionality in relation to the defined assessment strategy. Following a documentary review of various sources presenting ICT resources, the most suitable ones for the teaching and learning processes of 4th-year high school students in the field of Geography, History, and Citizenship were determined.



Tabla 2

**Herramientas TIC`s empleadas con frecuencia en la educación**

| ICT Tool | Strategy to be used |
|---|---|
| Google Apps for education | Create work environments (concept maps, mind maps, outlines, among others). |
| Edmodo | |
| Goconqr | |
| Padlet | Debates, communication, and collaboration. |
| Prezi | |
| Popplet | |
| Glogster | |
| Kahoot | Interactive games. |
| Moodle | Virtual classrooms. |
| Camtasia | Screen recordings, presentations. |
| Wix | Websites. |

*Note:* Belloch (2018).

Regarding the impact of ICT on academic performance the planning developed during the first academic term of the 2022-2023 school year shows only traditional assessment strategies, such as written tests, presentations, and essays assigned without implementing information and communication technology tools. For the first assessment, a workshop in the learning environment, students brought support material on the thematic unit of Gran Colombia corresponding to the History subject. Subsequently, the facilitator assigned a series of questions to be answered based on the researched support material.

For the assessment strategy of the second thematic unit, corresponding to Venezuela's economic structure from 1830-1870 in the History subject, a presentation was conducted using a sheet of bond paper as a visual aid. For the third thematic unit, Venezuela's social structure from 1830-1870 in the History subject, an individual written test was administered with true/false questions, multiple-choice, and open-ended response items. Finally, for the last thematic unit on the abolition of slavery, an essay was assigned in the learning environment. The facilitator provided the title, and participants began writing according to the given instructions.

In comparison with the planning for the first term, during the second term, to assess the first thematic unit, Venezuelan Political Process 1870-1899 for the History subject, a video was produced using the technological tool Camtasia. Each participant created a series of slides in Microsoft PowerPoint, then recorded an explanation of the assigned content. Upon completion, they uploaded the videos to the corresponding YouTube channel and shared the link via email to 4toañoghc@gmail.com, provided by the teacher.

Regarding the second thematic unit, "Venezuelan Economic Structure 1870-1899" in the History subject, they developed a presentation using the Prezi program and submitted it similarly via email. For the third and fourth thematic units, titled Governments of Cipriano Castro and Juan Vicente Gómez and Venezuelan Economic and Social Structure between 1899-1935 for the History subject, they used the GoConqr program to create a concept map and a mind map.



The results obtained regarding the academic performance of the 4th-year high school students in the first two academic terms are presented in the following table.

**Table 3**

**Academic performance of 4th-year high school students**

| Section | Average in the subject area for the first term | Average in the subject area for the second term |
|---|---|---|
| A | 12,18 points | 14,63 points |
| B | 14,10 points | 14,23 points |
| General | 13,14 points | 14,43 points |

*Note:* Data provided by the evaluation coordination department.

An increase in academic performance is observed for each of the 4th-year high school sections, as well as in the overall index. Furthermore, the number and proportion of passing students increases from one term to the next. This positive outcome contributes to the comprehensive development of the student,

teaching them to use technological tools within the current context and meeting their needs. It reduces tedium, and students become motivated to complete the applied assessment strategies.

## Discussion

The study's results revealed that the majority of students had not used information and communication technologies in their learning processes, although they showed a high willingness to integrate them into the classroom. This finding aligns with what was noted by Belloch (2018), who states that the use of ICT creates more motivating and engaging learning environments, reducing the tedium associated with traditional strategies.

On the other hand, it was observed that teachers maintained conventional methodologies, which limited the pedagogical use of ICT. This situation reflects the gap between the potential of technology and teaching practices, which is consistent with what was highlighted by Cebreiro (2007), who points out that ICT implementation requires not only infrastructure but also teacher training to design effective strategies.

The increase in academic averages obtained after the incorporation of digital resources corroborated the assertion by Díaz and Hernández (2003), who emphasize that innovative didactic strategies stimulate meaningful learning. Likewise, it was confirmed that students felt more motivated and engaged, reinforcing what was proposed by Pozo (1990) regarding the importance of strategies that develop student autonomy and participation.



However, the teachers' lack of proficiency in handling technological tools constitutes a significant limitation. This finding relates to what was presented by Ibarra (2012), who argues that changes in education require overcoming methodological inertia and embracing innovation as a central axis in pedagogical practice. The willingness shown by teachers to receive training, nevertheless, constitutes an opportunity to transform teaching and learning processes in this disciplinary field.

Consequently, the research provided evidence that the use of ICT contributes to improving the quality of learning, provided there is coherence between didactics and the use of technological resources. Furthermore, the results suggest that the inclusion of virtual environments, applications, and educational software not only elevates academic performance but also fosters digital competencies essential in today's society.

Finally, it should be noted that this study was limited to a small population of students and teachers at a single educational institution, which restricts the generalization of the results. Future research could expand the sample and explore comparisons between different institutions or curricular areas, thereby strengthening the external validity of the findings.

## Conclusions

The educational endeavor influences all facets of life; it constitutes an essential activity in the formation of the individual within the school environment and is oriented towards a fundamental benefit: meaningful learning. Education must be appreciated in all its breadth, opening doors to the world of information and new ICT trends in a globalized context.

Currently, the strategies employed in the area of Geography, History, and Citizenship are not entirely adequate for the educational process. Traditional methods persist, generating tedium and low motivation among students, while teachers lack technological resources for planning ICT-based lessons,

limiting the learning that students require for their comprehensive development as future professionals. Hence, the concern of this research arises: to assess academic performance, identify deficiencies, and propose opportunities for improvement in teaching and learning processes through innovative tools.

The study focused on 4th-year high school students, diagnosing the use of ICT as a study method and as a teaching strategy in planning. Since cognitive processes lead to the development of skills and the acquisition of new knowledge, it is expected that students achieve more meaningful learning and master various strategies.

By recognizing the student's inclination towards using ICT, the teacher must assume that planning based on these technologies improves teaching and academic performance. The inclusion of applications, software, and online resources represents an advantage, as it allows young people to select and combine strategies that enhance their own cognitive process.

The teacher's work, although often conditioned by policies, guidelines, and regulations, requires will, enthusiasm, and creativity to design innovative proposals that strengthen autonomous learning, without neglecting pedagogical support. Thus, the student will face the world with appropriate and meaningful resources, valuing the classroom not only as a space for content but for formative experiences, where the relationships between geography, history, and citizenship become an enriching, aesthetic, and transformative process.



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| **Author** | **Roles performed** |
| MEDTC | Conceptualization, Data Curation, Formal Analysis, Writing – Original Draft. |
| LALC | Conceptualization, Data Curation, Project Administration. |

## Referencias

Arias, F. (2012). *El proyecto de investigación: Introducción a la metodología científica.* 5.ª ed. Episteme.

Belloch, C. (2018). *Las tecnologías de información y comunicación en el aprendizaje.* Club Universitario España. https://medac.es/articulos-educacion-infantil/las-herramientas-tic-en-la-educacion/

Cebreiro, J. (2007). *Metodología de la investigación.* Editorial Club Universitario España. https://books.google.co.ve/books?isbn=8484546160

Díaz, F. y Hernández, G. (2003). *Estrategias docentes para un aprendizaje significativo: Una interpretación constructivista.* McGraw-Hill.

García, M. (2004). *El cuestionario: Recomendaciones metodológicas para el diseño de cuestionarios.* Limusa.

Hernández, R., Fernández, C. yBaptista, P. (2006). *Metodología de la investigación.* 4.ª ed.. McGraw-Hill.

Ibarra, Y. (2012). Juran y la calidad por el diseño. Madrid: Díaz de Santos. http://books.google.co.ve/books?isbn=8479782153

Malhotra, N. (2016). *Investigación de mercados: Un enfoque aplicado.* (4.ª ed.). Pearson Educación.

Palella, S. y Martins, F. (2010). *Metodología de la investigación cuantitativa.* Elizcom.

Pozo, I. 1990 Estrategias de aprendizaje. En Coll, C., A. Marchesi y J. Palacios (Comps.) *Desarrollo psicológico y educación. II.* Psicología de la Educación. Alianza.

Sabino, C. (2010). *El proceso de investigación.* (9.ª ed.). Panapo.

Silva, L. (2006). *Juicio de expertos en investigación educativa.* Universidad Central de Venezuela.

Vidal, C. (2001). *Manual de trabajo de campo en la encuesta.* Trotta.



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