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Methodologies supported by ICTs that enhance Reading and Writing Competencies in Universities in Colombia

Metodologías apoyadas en TIC que potencializan las Competencias Lecto-Escriturales en las Universidades en Colombia

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ABSTRACT

Introduction: this study assesses how ICT-supported pedagogical activities impact literacy competencies in higher education, focusing on their potential to enhance educational quality in Colombia.

Methodology: a mixed-methods descriptive design was implemented with 147 first-semester students from a university in Bogotá. Data collection included structured interviews, questionnaires, and diagnostic assessments (pre- and post-intervention), analyzing variables such as lexical mastery, textual comprehension, and inferential production.

Results: average test scores increased, demonstrating progress in active vocabulary expansion, the transition from literal to interpretive/propositional comprehension (35% of cases) , and the development of skills to hierarchize ideas, analyze discourses, and formulate text-based hypotheses.

Discussion: the findings align with prior research on ICT as a facilitator of complex cognitive processes in literacy. However, the limited sample from a single institutional context restricts the generalizability of results.

Conclusion: strategic ICT integration proved effective in advancing literacy competencies in higher education. Replicating the model across diverse settings is recommended, prioritizing teacher training in digital activity design and equitable access to technological resources.

Keywords: higher education, reading, skills, teaching methods, writing.

RESUMEN

Introducción: este estudio evalúa el impacto de las actividades pedagógicas con apoyo de las TIC en las competencias de lectoescritura en la educación superior, centrándose en su potencial para mejorar la calidad educativa en Colombia.

Metodología: se implementó un diseño descriptivo de métodos mixtos con 147 estudiantes de primer semestre de una universidad de Bogotá. La recolección de datos incluyó entrevistas estructuradas, cuestionarios y evaluaciones diagnósticas (pre y postintervención), analizando variables como el dominio léxico, la comprensión textual y la producción inferencial.

Resultados: los puntajes promedio de las pruebas aumentaron, lo que demuestra un progreso en la expansión activa del vocabulario, la transición de la comprensión literal a la interpretativa/proposicional (35% de los casos) y el desarrollo de habilidades para jerarquizar ideas, analizar discursos y formular hipótesis basadas en textos.

Discusión: los hallazgos coinciden con investigaciones previas sobre las TIC como facilitadoras de procesos cognitivos complejos en lectoescritura. Sin embargo, la muestra limitada de un solo contexto institucional restringe la generalización de los resultados.

Conclusión: la integración estratégica de las TIC demostró ser eficaz para el avance de las competencias de lectoescritura en la educación superior. Se recomienda replicar el modelo en diversos entornos, priorizando la capacitación docente en el diseño de actividades digitales y el acceso equitativo a los recursos tecnológicos.

Palabras clave: competencias, educación superior, escritura, estrategia de enseñanza, lectura.

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INTRODUCTION

Literacy skills are considered essential for academic success and are conceived as a vehicle for personal expression. Furthermore, these skills are fundamental in the processes of thinking, learning, and generating and disseminating new knowledge (de-la-Peña & Luque-Rojas, 2021). While Information and Communication Technologies (ICTs) actively contribute to the acquisition of new knowledge, the teacher-tutor transforms their role as a transmitter of content and progressively establishes themselves as advisors who guide the process and allow them to reflect on the practices, spaces, and times they employ in teaching (Adtani et al., 2023; Hernandez-Amoros & Martinez-Ruiz, 2024).

Furthermore, the need to increase and generate knowledge is one of the most positive features of the phenomenon of globalization and ICTs. In this sense, new technological developments play a relevant role as they enable innovative ways of creating, transmitting, and transforming knowledge, curricula, and pedagogical methods (Abedi, 2024).

Similarly, it is important for faculty at Higher Education Institutions (HEIs) to be at the forefront of their knowledge of ICT technologies. As evidenced in the literature, these technologies are tools that facilitate the development of learning activities and the efficient and effective achievement of the stated objectives. Therefore, as training guides, faculty must leverage these tools through learning activities, including ICTs, that empower students in their teaching-learning process. This integration process must occur in order to promote inclusive education, with learning environments that facilitate the development of reading and writing skills, access to culture, the formation of values, and the collaborative construction of knowledge (Haleem et al., 2022; Hanaysha et al., 2023).

This is why this article seeks to answer the following question: To what extent does the development of learning activities, using ICT as a support, contribute to improving students' reading and writing skills in a Higher Education Institution in Bogota, Colombia? Likewise, we sought to identify some of the necessary guidelines for using and accepting ICT tools in classrooms. The ultimate purpose of this experience was to help improve first-semester university students' reading and writing skills by triangulating previous experiences in the literature (Sayaf et al., 2021).

State of the art and literature review

The development of competencies in higher education in Colombia was used as a reference for developing the theoretical framework. Similarly, the concepts of reading and writing competencies were also considered as defined by the Organization for Economic Cooperation and Development (OECD) and the Ministry of National Education (MEN). This decision was made because the academic performance of Colombian students in reading and writing competencies is measured according to the criteria established by these two organizations, as well as the various strategies and studies conducted by the Colombian government to pursue academic quality in the country.

Finally, the learning activities were designed to describe and document a teaching-learning experience, as mentioned in the specialized literature (Becerra et al., 2022; Murcia Rodríguez, 2025). The stated objectives must be achieved efficiently and effectively to facilitate the development of learning activities. Therefore, teachers were represented as leaders of the training process and managers of technological mediation in personal, group, and axiological development.

Strengthening reading and writing skills by implementing ICT-supported strategies in formal education

Given the low literacy skills achieved by Colombian students on the international PISA and Saber state tests, the Colombian government has sought to structure effective educational approaches that can address the shortcomings and inaccuracies present in the Colombian pedagogical-educational system (Sáenz-Castro et al., 2021). To this end, strategies, reforms, and curricular guidelines have been implemented to develop and improve reading and writing skills among students in formal education (Salazar Rua, 2023). These resources are promulgated within the autonomy of educational institutions. However, it is important to highlight that although the National Government has implemented various combined actions and campaigns, the results indicate that a significant percentage of students at different Higher Education Institutions (HEIs) have difficulty understanding texts (Bolaños et al., 2020; Estrada Arango & Afanador Ortiz, 2021). According to these data, the reading level remains at a literal level, suggesting that the critical reading levels expected of students who are about to become professionals have not been achieved.

Similarly, the development of literacy skills allows for observing and monitoring the learning necessary to assess

academic performance, making it of fundamental importance in university education. A similar situation occurs with the production of written texts, where a large portion of students have difficulty communicating ideas through this medium, are unfamiliar with the genres and conventions of academic writing, and lack coherence and cohesion in the presentation of ideas. Along these same lines, there is a marked tendency toward writing that is limited to the textual presentation of the texts they read without proposing a critical assessment of them (Grieve et al., 2021). As a result of these shortcomings, reading and writing skills are considered essential for the improvement of cognitive processes, and their need for them becomes evident when students enter university.

The acquisition and advancement of these skills allows for the advancement and improvement of other, more complex skills, such as the development of critical thinking. Literacy is a cross-cutting issue in all areas of knowledge. Failure to understand and develop academic content often leads to postponing studies and dropping out of school, given that many university activities include writing reports and essays, which involve reading and writing comprehension (Molnár & Kocsis, 2024).

According to the OECD, reading literacy can be understood as the ability of individuals to engage with written text, allowing them to understand, use, and reflect on the content (Rojas-Torres et al., 2021). Furthermore, through this skill, individuals can achieve their goals, contribute to their personal development, and engage productively in society. Another approach views reading comprehension as a complex skill comprised of diverse thought processes such as decoding, extraction, interpretation, and evaluation of prior references to give shape and meaning to information (Bruggink et al., 2022). Writing competence, on the other hand, is understood as the ability to express ideas through written symbols. Furthermore, this process is assumed to be subject to spelling canons, rules of unity and cohesion, proper punctuation marks, and the purpose of fulfilling a specific and communicative function (Teng et al., 2022; Woods et al., 2023).

However, ICTs in the educational context are presented as a support for teaching-learning techniques, not only as a means of accessing information but also as a way of constructing knowledge through the information accessed (De Oliveira et al., 2022). For this reason, the Ministry of Education (MEN) proposed a path for the country's educational development through the National Ten-Year Education Plan (PNDE). One of its goals is for all educational institutions to have flexible academic curricula that prioritize using and adopting ICTs, contributing to the development of the teaching-learning process (Jiménez-Benavides, 2023; Plazas Motta, 2023).

In this sense, ICTs enable the dissemination of information and the incorporation of new methodological processes in teaching, and they have become a vital didactic tool as a resource for classroom work (König et al., 2024). Likewise, they offer countless possibilities for strengthening teaching strategies, allowing teachers to improve their educational practices in novel, dynamic, and interactive environments that contribute to the process of knowledge acquisition and skill development by students (Jiménez-Becerra & Segovia-Cifuentes, 2020).

Once these theoretical references and the guidelines proposed by government agencies in pursuit of quality education based on the adoption of ICT tools were assessed, the need for Humanities Departments to improve students' performance levels at the educational institution was confirmed. Based on this objective, a system of strategies and activities was designed, including a research proposal on how to implement ICT-supported methodologies for developing student literacy skills, a study from which this article is derived.

The proposal focused on using ICT tools to support the strategies proposed to teachers for developing first-semester students' literacy skills in oral and written expression classes. Finally, it is pertinent to clarify that in this article, the application of ICT in learning is understood as the use made by teachers and students of the technological resources available to each university.

METHODOLOGY

The study adopted a mixed-method approach designed to gain general knowledge by administering instruments to a small number of participants. This approach sought to understand teachers' perceptions of using ICT tools to improve literacy skills (Bacon, 2020). This approach was selected because it is a study in the field of humanities that, in addition to understanding higher education phenomena, directly addresses the complex context of language-related learning (Bacon, 2020).

Regarding the context, the study investigated the integration of ICT into literacy development in four classrooms at a university in Bogotá, Colombia. Without attempting to reproduce other realities uncritically, the study sought to gain depth and contextualize the data (Lim, 2024).

Regarding the sample, four teachers participated, each with two groups of oral and written expression classes. With a confidence level of 95%, a representative sample of 147 students enrolled in the first semester of the course was taken, as shown in tables 1 and 2.

Table 1.
Students participating in the research

Teacher	Group 1	Group 2	Quantity
A	18	15	33
B	17	19	36
C	19	18	37
D	20	21	41
Total, participating students			147

Table 2.
Characteristics of the participating teachers

Teachers	Distribution	Experience	Specialization studies in the area	Length of time with the institution
Teacher A	Pedagogy and Literature	10 years	Professional, Magister, Specialist	6 years
Teacher B	Pedagogy and Literature	12 years	Doctor, Magister, professional	4 years
Teacher C	Pedagogy and Philosophy	13 years	Professional, Magister, specialist	5 years
Teacher D	Social Communication	14 years	Professional, Magister, specialist	6 years

Source: own elaboration

This research aimed to document the results obtained from the proposed learning activities used by teachers in class to support the improvement of reading and writing skills. To this end, the results of the Diagnostic Test at the end of the semester were analyzed, as well as the perceptions of teachers and students in the Oral and Written Expression course regarding the development of reading and writing skills. Therefore, the techniques used were the diagnostic test, the structured interview, and questionnaires to obtain the data.

The diagnostic test was designed by the coordinator of the Humanities Department to measure students' performance in reading and writing skills and to work on improving the results of the SABER PRO state tests. This test was administered at the beginning of the semester to identify the basic reading and writing skills with which students enter the institution. At the end of the semester, the test is repeated to measure the achievements obtained with the learning activities implemented by the professors proposed by the Department of Humanities. The test consists of six (6) parts corresponding to the following criteria, as shown in table 3:

Table 3.
Evaluation criteria for the Humanities Department Diagnostic Test

No. exercises	Score for each exercise	Maximum score	Difficulty level	Item character
20	0.5	10	Low	Grammar
10	1.0	10	Low-medium	Syntax
10	2.0	20	Medium	Coherence and cohesion, paragraph structure
20	3.0	60	Medium	Reading comprehension
5	6.0	30	Medium-high	Argumentative and propositional reading
10				

Source: own elaboration

RESULTS AND DISCUSSION

Use and implementation of ICT in the classroom to develop reading and writing skills

The strategy analysis revealed a broad set of resources, nuanced by using different thinking processes in response to various activities. Furthermore, the progressive nature of the methodologies, their varied objectives, and the potential for integrating ICTs as mediators were evident. Each teacher participating in the project employed the following methodologies in their lesson plans (table 4).

Table 4.
Methodologies used by teachers in the project

Methodology	**Activities carried out by the students**		
Reading Comprehension.	Summary	Analysis	Underline
Research Report.	Essay	Diagram	Reading Comprehension
Comprehension, information recognition, vocabulary, and critical thinking skills.	Concept Map	Analysis	Synopsis Table
Reading and analysis to construct an essay.	Mind Map	Comprehension and Reading	Writing
Book.	Reading Report	Writting	Essay

Source: own elaboration

In this way, each participating teacher established different activities within their lesson plans, such as the following: the use of narrative and expository texts, information recognition, vocabulary, and critical thinking skills, reading and analysis to construct an essay, reading, and reading comprehension, and a poetry contest. Finally, it is vital to note that work was done on recognizing genre types (narrative, epistolary, lyrical, expository) per the Humanities Department's guidelines to encourage a love of reading and stimulate the imagination. Thus, the design and implementation of the classes sought to actively foster reading and writing skills and develop students' critical-reflective thinking as a path toward human self-realization (table 5).

Table 5.
Methodologies used by teachers in the project

Activity	**Question**	**Objectives**	**Development of competencies and achievements**	**Result**
Reading of one of the proposed books	What was the purpose of the selected text?	Increase vocabulary and enhance the love of reading.	Develop analytical skills. Improve argumentative and oral skills. Develop listening skills.	Promote commitment to self-regulated learning and the use of new tools.
	What skills did they develop by reading the text?	To introduce students to literature as a means of generating critical thinking.	Enhance writing skills. Create discussion environments, recognize and validate others' points of view.	Expand individual knowledge, in accordance with one's own itineraries and with or without guidance.

Source: own elaboration

Regarding the activity's output and evaluation, the teachers analyzed the students' results through the creation of summaries and conceptual maps. Activities involving printed texts, such as writing, crossing out, and highlighting key points from the reading, were also used. During these sessions, students' reading interpretation and analysis skills were assessed, the results of which are presented below.

Teacher A

The class was observed with the plan that established the approach to using narrative texts. This activity took

place in the classroom, where the students were explained the activity and the reading comprehension skills following the seminal proposal of Henao Álvarez (2002). Two texts were used, one narrative and the other expository.

Teacher A analyzed the students' results by creating summaries and a conceptual map during the same session of the oral and written expression class. In this regard, the teacher confirmed that the students demonstrated adequate reading comprehension and that their analysis was structured, which helped them extract the most relevant words and complete the proposed exercise. Furthermore, the students showed interest in the type of reading, and their achievements were reflected in their grades for the activity.

Regarding the classroom observation, it was confirmed that reading was critically important for the students to better understand the topic and be able to analyze and achieve the knowledge set forth in the objectives. Additionally, the activity helped them achieve better participation and teamwork. It should be noted that the main objective of the activity was to establish and characterize the structural organization models of hypertext and multimedia texts, which were developed based on the recommendations identified in the literature (Bourina & Dunaeva, 2021; Garito, 2025).

Teacher B

The class was observed, with the plan establishing information recognition, vocabulary, and critical thinking skills as its objectives. This activity was developed in the classroom, the students were explained the activity and the skills for the recognition of information, after which a hypertextual and multimedia text was read. The activity focused on each student's reading analysis, which generated an academic debate to reach collective conclusions. The teacher encouraged students to conduct their analyses using digital tools to strengthen their understanding.

Teacher "B" provided feedback on the students' results during the same session, finding differences in critical thinking skills among the groups created in class. Regarding his assessment of the process, the teacher stated that the difference in writing performance between groups was mediated by using hypertextual and multimedia texts compared to printed texts. Regarding the class assessment, the students were very encouraged because this activity generated competition with the other groups. Furthermore, the results were excellent in comprehension, analysis, and critical thinking, a fact reflected in the grades reported by the teacher.

According to the results reported by all teachers, particularly Teacher B, who designed an activity for comprehension of hypertextual-multimedia texts and printed texts, it was concluded that print tools are used more frequently because they motivate students to read and allow them to better highlight the main and secondary points in the text.

Consequently, it was assumed that in the activities examined, the print format led to a deeper analysis and fostered the ability to make substantiated reading critiques. The students expressed the following:

- That printed text is better because you can cross out, highlight, and search for main ideas.
- That reading in print is much better because you can analyze and understand what you read better, which allows you to better understand and complete academic work.

In conclusion, this activity achieved its objective. The objective was to characterize students' critical reading skills in hypertextual and multimedia formats, which was duly verified in previous literature (Van Der Weel & Mangen, 2022).

Teacher C

The class in which reading and analysis were required to construct an essay was observed. The session took place in the IT lab and consisted of assessing students' ability to interpret and analyze argumentative reading, seeking to foster reading and writing skills. To this end, a pedagogical proposal was designed, supported by the use of a computer using the Moodle platform for participation in the forum; students were asked to read, analyze the reading, and write an essay, following the keys offered by key studies (Chang & Lan, 2021; Romero, 2002).

At the procedural level, the instructor told his students that all they needed was to focus, analyze, and highlight important points to achieve positive results. He also emphasized that reading was important for developing other fundamental skills for their careers. Likewise, the results obtained by the students showed that they understood and analyzed the reading since they reflected in their essays what they had understood and analyzed. In this sense,

the students felt fulfilled by demonstrating the ability to interpret and analyze the reading proposed by the teacher, which can be seen in the following comments:

"If I use the virtual tools the university offers, I can better understand and analyze."
"I find it easier to understand what I read using the computer, and I've been able to do my work better."

The above demonstrated that computer use was an appropriate tool and contributed to improving the connections between students and knowledge while also sparking their interest in learning to read, understand, and analyze. Furthermore, progress was observed in students' writing skills, compared to the reading and writing difficulties identified in the diagnostic test administered by the Humanities Department to incoming students. In relative terms, the majority of students were able to improve their writing; the participating group's mastery of the tools was even evident.

Reading comprehension I

The classes of teachers "D" and "A" were observed. Teachers established reading and reading comprehension as processes to be addressed in their lesson plans. These classes were held in the computer lab by one of the teacher's "D" groups and the other with teacher "A". The activity and reading comprehension skills were explained to the students according to the guidelines of Henao Álvarez (2002). To this end, they read narrative and expository texts in hypertextual-multimedia and printed formats. The objective of the activity explained by teacher "D" was to demonstrate these students' reading comprehension levels and their preferred reading styles.

The study was organized into two groups. The first read a narrative text in printed format and an expository text in hypertextual-multimedia format, while the second reversed this distribution: they read the expository material in physical format and the narrative text in digital format. Both groups initially interacted with the print medium and subsequently with the multimodal format, following a sequence designed to test cognitive adaptability between formats.

The reading comprehension assessment was based on two closed-ended question instruments, complemented by real-time verbalization protocols, audiovisual recordings, and photographic records of the sessions. This multimodal approach allowed for the triangulation of quantitative data (ratings) with qualitative observations (interactions and spontaneous responses).

The results showed consistent academic performance: in the oral and written expression classes, 90% of students obtained grades between 4.2 and 4.4 in both formats. This similarity suggests that, under the methodological conditions implemented, the format did not cause significant variations in performance.

In analyzing these findings, the discussion on whether multimodality affects specific cognitive processes (working memory, inference) or whether its impact is influenced by variables such as previous mastery of reading and writing skills is still ongoing. The absence of pronounced gaps suggested the importance of delving deeper into contextual factors, such as instructional design or participants' technological familiarity, aspects that require further empirical testing in future replications.

Reading comprehension II

For this study, Professor "D"'s class group, which consisted of students from the Law Program, was selected. The activity was divided into two parts. In the first, familiarization exercises with computer tools were conducted, and activities for recognizing narrative, epistolary, lyrical, and expository texts were carried out. In the second, exercises were developed in which each student used their email, multimedia and printed resources, and a website. This approach allowed them to analyze, write, read, and produce texts through collaborative and individual work.

Among the results obtained at the end of the activity, the students had the opportunity to learn about and familiarize themselves with different literary genres, write poetry and stories, and recount anecdotes from their educational journey. ICT tools made the teaching processes more dynamic and encouraged participation in the virtual classroom. The activity results were reflected in the Moodle virtual platform and in the matrix represented in table 6.

Table 6.
Skills identified by teachers in students

Cognitive skills	Attitudinal skills	Motor skills
Critical Thinking.	Interest in completing tasks.	Ability to write short texts.
Basic knowledge of text writing.	Responsibility for delivering work.	Vocalization of words and sentences.
Literal and inferential levels of reading.	Ability to work as a team.	Computer skills.

Source: own elaboration

CONCLUSIONS

The comprehensive analysis of the collected data—which included initial and final assessments, questionnaires administered to teachers and students, and records of pedagogical interaction—allowed us to validate the study's central hypothesis. The results confirm that ICT-based strategies to strengthen literacy skills operate as catalysts in the teaching-learning processes, both in teaching practices and student performance.

Both teachers and students agreed that ICTs function as useful tools to energize and facilitate the teaching-learning processes in literacy. They highlighted their ability to integrate innovative teaching resources and offer methodological alternatives in academic practices.

However, a discrepancy was identified in their actual implementation. Some faculty involved in the study chose to use their materials rather than the available ICT tools. Among those who did use these technologies provided by the institution, an underutilization of their potential was observed, with them being applied partially or without exploiting their key interactive functions.

Similarly, it was evident that teachers are highly motivated and committed to continuing to incorporate ICT tools into their teaching and learning processes. This commitment was justified by the fact that teachers found in these tools potential for innovation and support for developing reading and writing skills. Furthermore, it was emphasized that these tools generate interest and strengthen student motivation, which translates into multiple benefits throughout the training process.

The research demonstrated that the effects of this technological and pedagogical intervention are progressively consolidated, reinforcing the need for sustained interactions between students, teachers, and digital tools to increase their effectiveness. These findings derive from an experience limited to a specific context: a Bogotá university where the model was implemented.

It should be noted that the results obtained are not intended to be a generalizable reference for the development of reading and writing skills through ICT. The unique nature of the institutional environment, the characteristics of the participating group, and local technological conditions require validating the model with other educational communities before extrapolating its dynamics.

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I declare that for the author there is no conflict of interest.

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It is not considered.

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