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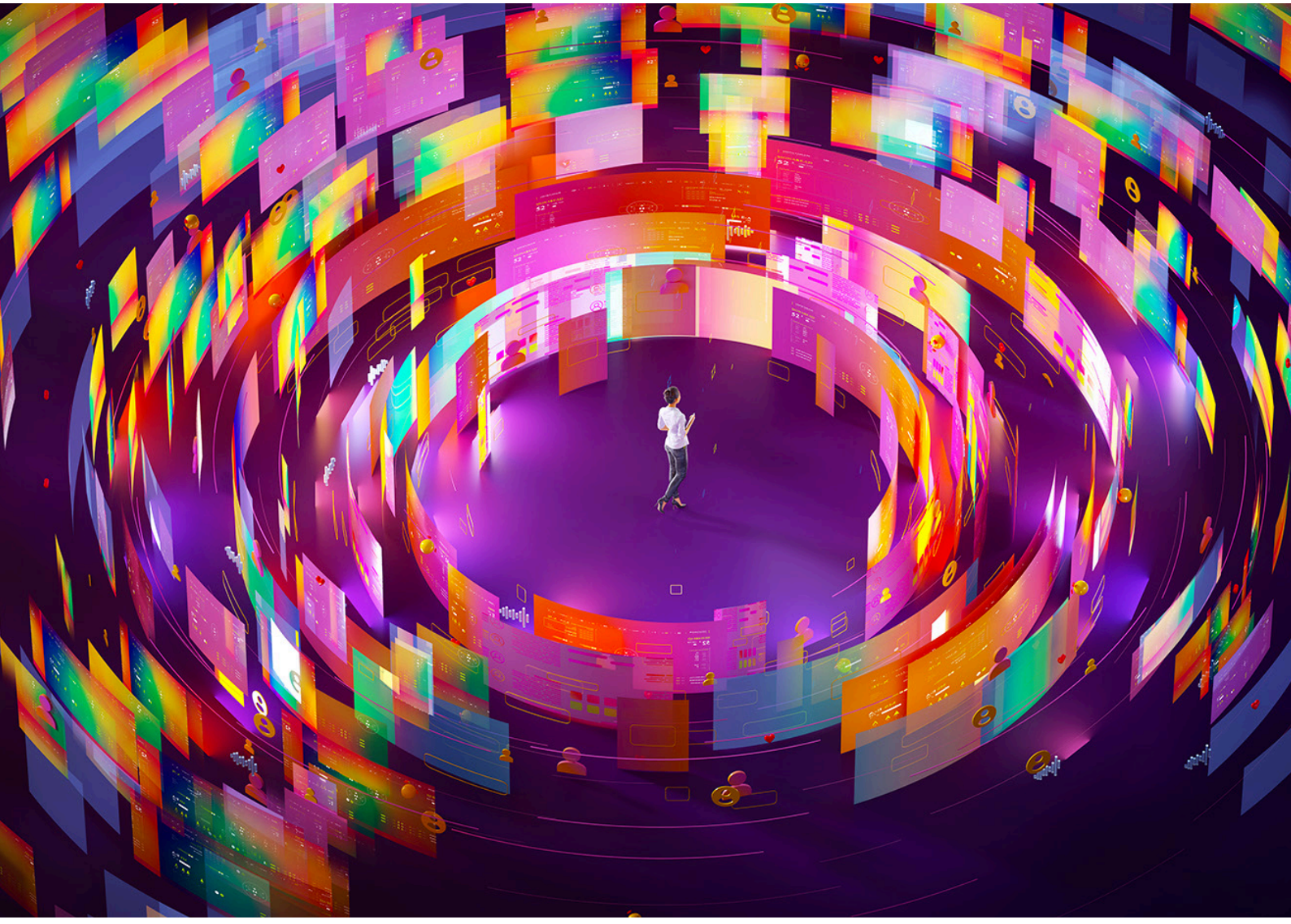

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SUMARIO / SUMMARY / RESUMO

Editorial

Online devices, media, and platforms are increasingly prevalent in daily life, influencing multiple aspects of our routines. In this context, questions arise about how digital and media dynamics affect families, students, teachers, and small businesses. This issue of MLS Communication Journal brings together research that examines these new challenges from various perspectives, aiming to understand how communication influences the construction of relationships, learning, and social practices today.

The first article, "Family Communication and Parental Norms Regulating the Use of Mobile Devices by Minors," by María Lidia Platas Ferreiro, Pablo César Muñoz Carril, Inés Mosquera Bargiela (University of Santiago de Compostela), and Ángel Puentes Puente (Pontifical Catholic University Madre y Maestra), analyzes the influence of mobile devices on family communication and the socialization of children aged 3 to 12. Based on a quantitative study of 1,694 families in Lugo, Spain, the results show that smartphones are the predominant device and that most families establish rules for their use, such as prohibitions during meals or bedtime. The study highlights the importance of parental guidance and supervision, as well as the need for responsible technology use to improve communication and family well-being.

The second publication, "Teacher Training in Media Literacy: Design and Validation of a MOOC with Bubuskiski," by Luis Marcelo López Saldías (University of Huelva), presents an innovative proposal for training primary school teachers in media literacy through a MOOC designed and implemented using the Bubuskiski audiovisual project. The study, based on a methodological design and validation model, demonstrates the course's relevance, with a high rating of 85.7% for the alignment between learning objectives and modular structure. The potential of MOOCs as a tool for teacher professional development in media literacy is thus evident.

The third study, "Combining ChatGPT in Project-Based Learning (PBL) for Teaching Scientific Research at the Postgraduate Level in Bolivia" by Orlando E. Valdez-López (Technical University of Oruro), explores the integration of Generative Artificial Intelligence, specifically ChatGPT, with the Project-Based Learning methodology. The study proposes a pedagogical model of co-construction of knowledge in which ChatGPT acts as a supportive tutor and co-creation tool, freeing students from the cognitive burden of mechanical tasks. The results anticipate improvements in student autonomy, the strengthening of complex thinking, and higher rates of research project completion, offering recommendations for the ethical and effective adoption of these tools in postgraduate contexts.

For his part, Jonathan Andres Serrano Florez (Universidad Internacional Iberoamericana), with his contribution "Systems for the Strategic Management of Sales Information: A Case Study of the Cocoa Production Sector in Colombia," addresses the digitization of processes in a cocoa-producing SME. The research combines qualitative and quantitative methodologies to develop a web prototype

that optimizes sales management and profitability. Key results include a reduction in registration errors, efficient report generation, and information centralization. The study highlights that simple technological solutions adapted to the rural environment can strengthen the operational efficiency and autonomy of small businesses.

Finally, the article "Evaluation of Podcasting as an Independent and Unique Communication Medium Compared to Traditional Radio," by Alejandro M. Sanz Láriz and Carlos E. Uc Ríos (Universidad Internacional Iberoamericana), examines the role of independent podcasting in relation to traditional radio broadcasting. Through qualitative analysis, the study identifies significant differences in thematic flexibility, economic investment, and audience interaction, highlighting its capacity to democratize content creation and address alternative topics.

This issue invites reflection on the role of communication as a tool for understanding, improvement, and social transformation in an increasingly interconnected and digital world. Through this research, the relevance of conscious, inclusive communication practices capable of responding to contemporary challenges in a creative and ethical manner is reaffirmed.

Dra. Mónica Bonilla del Río
Editora Jefe / Editor in chief / Editora Chefe

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COMBINATION OF CHATGPT IN PROJECT-BASED LEARNING (PBL) FOR TEACHING SCIENTIFIC RESEARCH IN GRADUATE STUDIES IN BOLIVIA

Combinación de chatgpt en el aprendizaje basado en proyectos (abp) para la enseñanza de la investigación científica en el posgrado de Bolivia

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ABSTRACT

This study addresses this issue by analyzing the synergistic integration of Project-Based Learning (PBL) methodology with the capabilities of Generative Artificial Intelligence (GAI), specifically ChatGPT. The goal is to develop a viable and sustainable theoretical strategy to improve the teaching of scientific research at this educational level. Through a hermeneutic-documentary methodological approach, the Bolivian context was analyzed (modular model, digital gap, "everything but thesis" syndrome) and the proposal was based on the Paradigm of the Integrals of Knowledge. The results present a pedagogical model of co-construction of knowledge, where ChatGPT acts as a supportive tutor and co-creation tool, alleviating cognitive load in mechanical tasks and allowing the graduate student to focus on critical analysis and methodological decision-making. A pilot application is designed that outlines roles, resources, and ethical considerations, anticipating a significant increase in the graduate student's autonomy, the strengthening of complex thinking, and, consequently, an improvement in the completion rates of research projects and theses. The article concludes with recommendations for institutional adoption and faculty training in the ethical and effective management of these disruptive tools.

Palabras clave:
Aprendizaje Basado en Proyectos, ChatGPT, Inteligencia Artificial, Investigación Científica, Integralidad Cognitiva.

RESUMEN

Este estudio aborda esta problemática mediante el análisis de la integración sinérgica de la metodología de Aprendizaje Basado en Proyectos (ABP) con las capacidades de la Inteligencia Artificial Generativa (IAG), específicamente ChatGPT. El objetivo es desarrollar una estrategia teórica viable y sostenible para mejorar la enseñanza de la investigación científica en este nivel educativo. Mediante un enfoque metodológico hermenéutico-documental, se diagnosticó el contexto boliviano (modelo modular, brecha digital, síndrome "todo menos tesis") y se fundamentó la propuesta en el Paradigma de las Integralidades del Conocimiento. Los resultados presentan un modelo pedagógico de co-construcción del conocimiento, donde ChatGPT funge como un tutor

asistencial y herramienta de co-creación, liberando la carga cognitiva en tareas mecánicas y permitiendo al estudiante de posgrado focalizarse en el análisis crítico y la toma de decisiones metodológicas. Se diseña una aplicación piloto que detalla roles, recursos y consideraciones éticas, anticipando un incremento significativo en la autonomía del posgraduante, el fortalecimiento del pensamiento complejo y, consecuentemente, una mejora en las tasas de culminación de proyectos de investigación y tesis. El artículo concluye con recomendaciones para la adopción institucional y la capacitación docente en la gestión ética y efectiva de estas herramientas disruptivas.

Introduction

In the era of digital transformation, higher education faces the challenge of incorporating innovative methodologies and technological tools to improve the quality of learning. One of these methodologies is Project Based Learning, which actively involves students in the planning, execution and presentation of projects that address real problems or authentic challenges of the immediate environment.

In parallel, the rapid evolution of Artificial Intelligence (AI) has given rise to advanced tools such as ChatGPT, a generative language model capable of holding conversations and generating coherent textual content. Leading international universities are already exploring the integration of advanced Chat Bots in their academic activities. For example, Arizona State University's (ASU) experience has incorporated ChatGPT to personalize higher education, fostering creativity and improving student outcomes while emphasizing responsible use of technology (OpenAI, 2024). This demonstrates the potential of AI to transform higher education at the undergraduate and graduate levels, making it more personalized and inclusive of teaching in the university community.

In Bolivia, the postgraduate level is in a process of consolidation and faces specific challenges. The teaching of scientific research in graduate programs has traditionally followed conventional educational models, with emphasis on theoretical classes and final works such as thesis reports, which students have difficulty in concluding. According to studies on Bolivian postgraduate education, these programs have historically favored professional training over research, which has led to low rates of thesis completion (Mayorga Lazcano, et al., 2024). The need for innovation in graduate digital pedagogical strategies is urgent in the country to train competent researchers and reduce attrition. Most diploma programs in Bolivia only require monographs to obtain the degree.

Scientific research training in Bolivian graduate programs faces several structural problems. First, traditional-classical teaching methods have focused on the transmission of theoretical content and courses, with little active student participation in real research projects. This prevalent "scholastic" approach is characterized by being content-centered, with itinerant teachers, and the priority on covering costs, leaving the research component in the background, somehow lagging behind. As a result, many master's students complete the theoretical part of the curriculum but fail to complete the thesis or final research paper, falling into the "everything but thesis" syndrome.

In the case of Bolivia, the incursion or access to digital and artificial technologies is scarce because of the costs involved in their use, and because of the obstacles to the purchase of these technologies, in public educational institutions access is more reduced, compared to the private system. According to Caballero-Calle (2024) in Bolivian universities the absence of a Knowledge Management Unit (KMU) and the lack of integration of advanced technologies such as artificial intelligence (AI) have limited their ability to effectively manage knowledge. This deficiency not only affects the organization and dissemination of knowledge, but also prevents its emancipation, an essential process for knowledge to be accessible and useful to more people and communities.

Several graduate programs in Bolivia hire teachers by module or course, without a permanent teaching staff dedicated to guiding students in their projects. This hinders the continuous monitoring of the student's progress and the creation of an academic research community, depriving the student of the necessary support to overcome obstacles during research, due to the constant changes in the teaching staff. Additionally, the professionalizing orientation over the research orientation, identified since the late beginnings of the Bolivian postgraduate program in the 1980s, means that traditionally

less emphasis has been placed on developing high-level research competencies (Mayorga Lazcano, et al., 2024).

In addition to the pedagogical limitations, there are important technological and digital skills gaps in the national context. The COVID-19 pandemic highlighted the structural weaknesses of Bolivian university institutions, as well as their educational actors, in the adoption and effective use of virtual platforms and digital tools. In an analysis conducted in the post-pandemic period, it was identified that both teachers and graduate students had significant deficiencies in digital competencies; in addition, academic content was not adequately adapted to virtual environments, and there were widespread difficulties in accessing and using educational technologies (Arenas Martínez, 2025). Although connectivity has shown progress, with 66% of the Bolivian population as Internet users at the beginning of 2023 (Kemp, 2023), inequalities persist in access to quality broadband services, particularly in rural areas and areas far from urban centers.

The central problem identified in this analysis refers to how to improve the teaching of scientific research in graduate programs in Bolivia, overcoming the traditional model of passive, behaviorist teaching and, at the same time, facing the technological limitations present in many Bolivian institutions. This requires a comprehensive pedagogical approach that actively engages students in real research projects throughout their training, and incorporates the use of artificial intelligence-based digital tools, such as ChatGPT, to provide additional resources and support.

The purpose of this review study is to analyze and propose a strategy for the integration of ChatGPT within the Project Based Learning (PBL) methodology, in order to improve the teaching of scientific research at the graduate level and respond to the pedagogical and technological needs of the Bolivian educational context. Within this framework, we propose to carry out a documentary diagnosis of the current state of postgraduate education in Bolivia in relation to the methodologies used for teaching research, the technological infrastructure available, the digital competencies of teachers and students, and the main academic challenges. This diagnosis will identify key strengths and weaknesses of the system.

Based on this analysis, we propose the design of a theoretical-methodological strategy for the implementation of ChatGPT-assisted PBL in graduate courses, including a detailed description of its stages, the necessary resources, the role of the educational actors, as well as the ethical and pedagogical considerations for an adequate use of artificial intelligence. In addition, the expected outcomes of this integration are anticipated, including: improved student research competencies, increased thesis or dissertation completion rates, and a more active and meaningful learning experience.

Consequently, there is an urgent pedagogical need. Traditional methodologies are not achieving optimal results in the training of researchers, which is reflected in the low completion rates of diploma monographic reports, graduate theses, and in the deficiencies in research skills of numerous graduates (Mayorga Lazcano et al., 2024). In this context, strengthening the teaching of scientific research through the use of digital tools is a priority action to raise the quality of higher education, promote the production of knowledge and train professionals capable of facing and solving complex problems in various areas of knowledge.

Theoretical Framework

Paradigm of Knowledge Integralities

The integrality of knowledge (or cognitive integrality) refers to a holistic educational approach that seeks to overcome the fragmentation of knowledge and address the formation of the university student as a whole. In academic terms, integrality implies coherently articulating the different dimensions of human development (cognitive, emotional, social, ethical, etc.) within the teaching-learning process (Green and Padilla, 2023). This paradigm is fundamental to integrate knowledge, taking into account the educational technology available to achieve significant learning on inquiry processes.

Cognitive and inquiry integralities are fundamental to the development of a triangular approach to research. Cognitive integralities are defined as the interrelation between philosophy, science and technology. The research integralities encompass theoretical, empirical and practical approaches. A structure is sought that allows for continuity in the research. The triangulation of these integrals promotes a more holistic approach (Valverde Garnica, 2023).

In the digital era, the paradigm of cognitive integrality finds new opportunities for application through learning technologies. Far from opposing technology with formative education, this approach seeks to take advantage of digital tools to enhance a holistic-holistic education. In education, the term LKT (Learning and Knowledge Technologies) is used to refer to the pedagogical use of ICT (Information and Communication Technologies) aimed at improving learning and managing knowledge in an inclusive manner.

Project Based Learning (PBL) at the Graduate Level

Project-Based Learning (PBL) is a learner-centered model that positively influences second language education by organizing learning around projects (Du & Han, 2016). In that sense, project-based learning (PBL) is inquiry-based, in which students design and execute projects that address meaningful challenges. Over time, PBL has been adapted to various educational levels, disciplines and cultural contexts, resulting in a diverse body of knowledge. Given these variations, it is crucial to systematize existing research to identify consolidated aspects and areas that require further exploration (Sánchez-García, R and Reyes-De-Cózar, 2025).

Project-based learning (PBL) in project management education enhances teamwork, critical thinking and communication skills, while fostering adaptability and real-time decision-making skills (Afzal and Tumpa, 2025), important aspects in PBL development strongly drive the linkage of theory and research practice. According to Sutarjo, et al. (2025), project-based learning with a heutagogical approach significantly improves students' critical thinking, creativity, and independent learning skills, but faces challenges such as limited technological resources and unequal access to technology.

Project-based learning in higher education improves student learning, with affective, cognitive, and behavioral outcomes measured through various methods (Guo, et al., 2020). PBL involves psycho-affective aspects when linking praxis and theory that touches the emotional part of the student when learning is meaningful.

These experiences document the benefits of using PBL, particularly in scientific research training and other disciplines. Integrating PBA in a postgraduate program encourages the training of researchers: project-based doctoral courses were designed to develop research competencies through knowledge construction processes using the scientific method, applied to problem solving in real contexts. That is, instead of just receiving theoretical classes, which enhanced their ability to design experiments, analyze data and propose innovative solutions as they will be required in their professional practice as scientists. This approach proved to be a curricular update aligned with the

competency-based training model, and its application is recommended in all subjects and educational levels due to the positive results observed (González Navarrete, 2024).

As project-based learning was initially popularized in elementary and middle school education, its principles have been successfully extended to higher education, including international master's and doctoral programs. At the graduate level, PBL is used as a strategy to bridge the gap between academic theory and professional or research practice, providing graduate students with applied learning opportunities commensurate with the demands of their specialized-professional field. Currently, PBL is a competency-based methodology used at the undergraduate level in several universities in Bolivia: UPB, UCB, UMSA, UNIFRANZ.

In Bolivia, PBL has great potential at all university levels, as stated by Lucero Vargas and Antezana Pérez (2019), PBL seeks that students leave the classroom and understand the needs of communities, especially vulnerable groups, listen to proposals for solutions, activate in him or her the ability to cooperate, motivate collaborative work and demonstrate that their academic training serves for long-term change. This overcomes the rupture between academia and social reality. The adoption of PBL in graduate programs could be an innovative step to improve the quality of education, as long as it is adapted to the characteristics of the context and the students, who are of an adult age, and the institutional reality of each university, whether public or private, is taken into account.

ChatGPT and Its Educational Potential at the Graduate Level

ChatGPT is an advanced language model (from the GPT family, for Generative Pre-trained Transformer), trained with a wide variety of texts, which allows it to generate coherent and relevant responses on a wide range of topics in various domains (Hinojosa Mamani, et al., 2024). Tools such as ChatGPT can enhance self-directed learning and the student experience when facing research papers (Galli and Kanobel, 2023), hence PBL.

Among the potentialities offered by ChatGPT in postgraduate higher education are, just to name a few: assistance in academic writing, formulation of research questions and ideas, search for sources and literature review, support in methodological design, support in data analysis, among others (OpenAI, 2023). The general trend in higher education points to the fact that AI, and ChatGPT in particular, will undoubtedly be an integral part of the educational ecosystem. As noted by Michael Crow, president of ASU, AI will continue to transform higher education by making it more diversified and present across the lifespan (OpenAI, 2024).

Preparing graduate students to intelligently use these tools can give them an important competitive advantage in their academic and professional careers, while enhancing their immediate educational process. The key will be in the strategic and thoughtful integration of ChatGPT: clearly defining when and how to use it to maximize benefits without detracting from the pedagogical objectives. The challenge is vital to integrate tools such as ChatGPT and HI (Human Intelligence) in educational processes linked to scientific research.

Moreover, ChatGPT is a valuable resource for processing academic and scientific texts, most of which are published in English. This tool can take excerpts or abstracts of *papers* and quickly translate them into Spanish-Spanish. Beyond literal translation, AI has the ability to **explain or paraphrase** complex concepts or specialized terminology, facilitating the understanding of high-level articles by students who are still developing their language proficiency. This streamlines the literature review phase, allowing

postgraduates to focus on critical content analysis rather than struggling with the language barrier (OpenAI, 2024).

Method

The hermeneutic method is used in the interpretative study of documents to understand the coherence and meaning of several analyzed documents, based on the contrast of several digital sources, repositories, personal databases and OpenAI artificial intelligence, in convergence with the paradigm of cognitive integralities.

For this reason, the present research falls within the framework of qualitative research, with a documentary-projective design. The qualitative approach is suitable, since the primary objective is not the measurement of variables, but the deep understanding and systematic interpretation of a complex educational phenomenon: the integration of artificial intelligence in the teaching of scientific research. The projective nature of the study lies in the fact that, based on the diagnostic analysis, a viable methodological model (ABP+ChatGPT strategy) is structured and proposed for future action in the Bolivian postgraduate context.

In order to achieve the objective, the hermeneutic method was used, which is fundamental for the interpretative study of documents. The hermeneutic procedure allowed transcending the superficial description of the texts, focusing on understanding the internal coherence and deep meaning of the analyzed documents, particularly those referring to the foundations of Project Based Learning, the philosophy of the Bolivian postgraduate program and the pedagogical implications of AI.

The method was applied based on the contrast of digital sources (repositories, academic databases, institutional reports) and the artificial intelligence of OpenAI (ChatGPT), in an exercise of documentary triangulation. This contrast was carried out under the perspective of the Paradigm of the Integralities of Knowledge, in this way, the hermeneutic method not only allowed the interpretation of the current reality, but also laid the foundations for the proposed methodological prospective.

For the application of the hermeneutic method, the following techniques were used:

Digital documentary review was the primary data collection technique. This procedure was applied systematically for the contextualization of the phenomenon and the construction of the theoretical framework. Three main types of documents were collected and examined:

Regulatory and Institutional Documents: Bolivian graduate regulations, university policies on research and teacher training.

Academic Literature on Pedagogy: Indexed articles, theses and books on Project Based Learning (PBL) and its implementation experiences in higher education.

Specific Literature on Educational Technology: Documents and papers on the application, potential and ethics of Generative Artificial Intelligence (AI) in higher education contexts, including direct sources on OpenAI technology (ChatGPT).

The information obtained was processed using the Contrasted Content Analysis technique. This procedure was not limited to coding themes, but involved:

Critical Diagnosis: Identification of the problematic categories of the postgraduate program (low terminal efficiency, traditional methods, technological gap).

Theoretical Convergence: Articulation of the benefits of PBL with the functionality of ChatGPT as a complementary and not a substitute resource.

Contrast with Professional Experiences: The documentary findings were weighed against previous professional experiences in graduate management and teaching.

This contrasted analysis made it possible to interpret the pedagogical and technological feasibility of the integration (PBL+ChatGPT) and, consequently, to project plausible alternatives for future implementation for pilot applications in the Bolivian context. The concreteness of the foresight was manifested in the detailed design of the steps of the proposed Implementation Strategy.

Results

Academic and Pedagogical Context

The higher education system in Bolivia is made up of autonomous public universities, private universities and indigenous universities. All of them are supervised by the Executive Committee of the Bolivian University (CEUB), in the case of public universities, and by the Ministry of Education, in the case of private universities. Historically, the offer of postgraduate programs (master's and doctoral degrees) in Bolivia emerged late compared to other countries. It was not until the 1980s that the first formal master's degree programs were initiated, and the first national doctorate was established in the late 1990s (Mayorga Lazcano, 2024). During the following decades, there was an accelerated growth in the creation of programs, especially master's degrees oriented to professionalization, often without an equivalent development of research culture, although plausible in their constitution.

This rapid growth, coupled with little previous experience, resulted in the "traditional school" model mentioned above, characterized by a focus on theoretical classes and student-financed graduate programs. Currently, the majority of master's degree students in Bolivia are practicing professionals seeking to improve their credentials or specialize. They are usually taken in weekend or modular modalities, which presents pedagogical challenges (short time of exclusive dedication to study, intensive sessions). In addition, several programs hire teachers per module, sometimes from other cities or abroad, which, although enriching with their international experience, sometimes complicates continuity in research mentoring due to their very busy tasks.

Culturally, it can be said that Bolivian university pedagogy has traditionally been magisterial and vertical. However, in recent years, higher education reform efforts have promoted active methodologies. For example, some universities have implemented university teacher training courses that include PBL, collaborative learning and the use of ICT in education. Thus, although not yet a majority, there is a growing understanding among Bolivian academics that there is a need to move from teacher-centered to student-centered teaching, integrating technology as an important tool of the 21st century.

An important aspect of the academic context is multilingualism and interculturalism. Although most graduate programs are taught in Spanish-Spanish, Bolivia is a multicultural country where some students may be native speakers of Aymara, Quechua, Guarani or another language. In addition, comprehension of English texts is variable, graduate students have difficulties with scientific literature in English, since the high impact journals in the current Scopus and WOS networks are English-language versed. This is relevant for the use of ChatGPT, since this tool could help translate or explain texts in English, and could also provide information in Spanish that the student would otherwise not easily access. The ABP+ChatGPT approach can therefore help bridge the language gap by assisting in the translation and localization of content.

Technological Context

In terms of infrastructure, Bolivia has made progress in connectivity, but still faces challenges. As mentioned, about two-thirds of the population has access to the Internet, with a higher concentration in urban areas. According to Kemp (2023), the main public universities (UMSA, UMSS, UAGRM) have data networks on their campuses and internet rooms, although speed and stability vary. Recent data indicates that the median mobile connection speed is low (~10 Mbps) and fixed is moderate (~25 Mbps), which may impact the experience with web-intensive applications such as ChatGPT. However, most urban campuses can support their use, especially during off-peak hours. This is a major constraint that must be overcome, in addition to access to technologies due to the high cost.

An internal technological challenge for the institutions is the availability of equipment. Not all classrooms are equipped with computers; several graduate programs operate under the traditional classroom modality. To implement this proposal, universities may need to enable computer classrooms or mobile labs (*laptops/tablets*) for classroom use. Alternatively, rely on the "let each student use his or her device" policy. Given that the graduate population tends to be composed of professionals, it is likely that a good portion will have laptops; however, 100% should not be assumed, and alternatives should be provided for those who do not.

Another factor is access to virtual platforms and software. Many Bolivian universities adopted virtual environments (such as Moodle) especially after the pandemic, and became familiar with videoconferencing (Zoom, Google Meet). This increase in digital literacy during 2020-2021 may be a plus point for now introducing ChatGPT, as both teachers and students had to adapt to new tools in that period. However, the development of media literacy and, therefore, media competence in Bolivia is precarious, so a study conducted in Bolivia and Ecuador highlights that "media and information competencies play a fundamental role in our times, because they help us to manage information correctly, allowing us autonomy as individuals and solid democracies as a society" (Loaiza Lima, et al., 2025, p. 52).

Regarding ChatGPT itself, its use requires circumventing the restriction that officially OpenAI did not initially offer open access from all countries (although Bolivia can now access ChatGPT). There is also the issue of cost: the free version of ChatGPT has limitations (especially if it is based on GPT-3.5, which may be sufficient, but has less capacity than GPT-4). A paid version (ChatGPT Plus) could improve responses and allow for a greater volume of queries, but would imply a monthly cost of US$20 per account (OpenAI, 2023), however, currently from Bolivia the bank must be requested to open the payment each month (this is a limitation that must be overcome). A contextual solution could be for the university to purchase one or more managed Plus accounts and students access through them at defined times, or to explore the OpenAI API for integration into an

internal system with shared costs. Moreover, ChatGPT-5 already exists, which is a more advanced model, not to mention the ChatGPT-5.1 model. These are technical details to be resolved, but not insurmountable, since the amounts are relatively low compared to other educational investments. It is recognized that accessibility to this resource is still limited.

In terms of policy, to date there are no known specific regulations in Bolivia that limit the use of AIs in education, except for delinquent purchases of AIs with Bolivian banks (probably due to the scarcity of dollars in circulation). This provides a space of freedom to innovate, as long as it is done responsibly. It is foreseeable that guidelines or regulations will be developed in the future, so pioneering experiences (such as the one proposed) could inform regulators on best practices and responsible use considerations to take into account. It is a matter of ethics and conceiving AI tools as resources.

Academic and Attitudinal Considerations

A final contextual element is the attitude of the academic community toward changes such as this use of technology. The introduction of PBL plus ChatGPT represents a twofold idea (methodological and technological). Both enthusiasts and skeptics are to be expected. Some academics may question whether the use of ChatGPT could undermine academic rigor or encourage the "law of least effort" in students or other "anything but theses". Some, on the other hand, will view with optimism the possibility of modernizing teaching and making it more attractive to the new generations; we must use what is within our reach with creativity, a rationale put forward by my own experience at the undergraduate level, which can be applied to the graduate level.

To increase acceptability, it is key to frame the initiative not as a replacement for teachers or serious research, but as a support to achieve educational objectives. It is possible, for example, to present evidence (as in this paper) that PBL improves competencies and that ChatGPT, when used well, improves performance. Also, involving teachers from the design stage, addressing their doubts and showing tangible results after a pilot will help to gain confidence.

From the students' side, several will probably be motivated to use a novel technology in class. Since some may already use it on their own, bringing it into the formal, teacher-oriented setting may even be a relief (less personal ethical conflict). However, we will have to work on instilling responsibility: make them understand that AI is a tool, not a substitute for their learning. Here the Bolivian context could be fertile, since most graduate students have a genuine interest in learning (given the sacrifice involved in studying and working at the same time), so they will appreciate improving their skills, as long as they see that the tool really contributes to them and that the project is useful beyond just "passing the module".

In conclusion, the Bolivian context presents significant challenges, but also favorable conditions for this proposal. Challenges include: variable infrastructure, ingrained pedagogical habits and limited prior graduate PBL experience. The enabling conditions include: a critical mass of teachers and students with greater digital proficiency (Digital Competence-IA), recognition of the need to improve the quality of graduate programs, and a growing interest in aligning with international education standards. This contextual review analysis reinforces that the proposal should be implemented in a pilot, adaptive and participatory manner, from an integral cognitive approach, involving the educational community in its detailed design and adjusting it according to the realities of each university institution.

ABP and ChatGPT Integration

The integration of ChatGPT in Project-Based Learning (PBL) for the teaching of graduate scientific research (Open AI, 2025) aims to achieve a series of positive results, both immediate and in the medium term, in the training of students and in the educational dynamics. The following is a list of the main results expected in the:

- Improvement of students' research skills: By learning research "by doing" through real projects, and with the support of ChatGPT to reinforce knowledge and suggest resources, students are expected to gain a more solid understanding of the scientific research process. This includes formulating clear research questions, designing appropriate methodologies, handling data skillfully, and discussing results with a theoretical foundation. For example, at the conclusion of the course/project, students should be able to pose a relevant research problem and structure a coherent methodological proposal much better than at the beginning, thus evidencing the learning achieved.
- Increase in the completion rate of theses and dissertations: A critical objective is to reduce dropout or stagnation in the thesis phase of graduate studies. With the experience accumulated in the PBA project (which could be a preliminary thesis project developed with intensive and sustained support from the beginning of the program until the last module), students will have advanced much of the research work, mitigating the "everything but thesis" syndrome. The use of ChatGPT will have helped to overcome obstacles (the no time factor) that often delay completion. In the pilot groups, a significantly higher percentage of students would be expected to present and defend their theses within the established deadlines, without delays or dropouts, compared to previous groups or courses without this methodology.
- Development of transversal (soft) skills: PBL and AI-enhanced teamwork will foster in students skills such as effective collaboration (coordinating in teams and also with an AI "agent"), communication (presenting and discussing ideas in various formats), self-learning and adaptation (learning to use new tools on their own, becoming digitally literate). The ability to learn how to learn will also be strengthened, as interacting with ChatGPT requires formulating good questions, critically analyzing answers and seeking additional information when something is found to be missing or unreliable, contrasting.
- Increased motivation and engagement with the graduate program: Students are expected to find the learning experience more interesting and relevant. Working on solving a genuine problem and using a modern tool like ChatGPT can increase your enthusiasm. Indicators of this would be higher attendance to classes/workshops, active participation in discussions and lower dropout rate during the development of the course. In student satisfaction surveys, it is expected that they will rate the methodology positively (although they may also point out challenges).
- Measurable improvement in academic performance: In addition to practical skills, improvement could be observed in grades or other evaluation instruments. For example, if a test of theoretical and practical knowledge of methodology is administered at the beginning and at the end, a significant increase in post-intervention scores would be expected, greater than the typical increase with a traditional class. This would validate that the ABP + ChatGPT combination not only pleases, but teaches effectively.

- Empowerment of the teaching role and teaching efficiency: Although it might be thought that AI detracts from the teacher's role, in reality teachers are expected to benefit from the tool to optimize their work. They will be able to spend less time on routine aspects (such as correcting basic writing or repeating theoretical explanations that Chat Bot can give) and focus more on high-level mentoring, human customization and motivation. Teachers will also develop new skills (AI-mediated tutoring), increasing their professional profile. One expected outcome is that teachers report that, after the initial learning curve, their workload became more manageable and they gained more satisfaction from seeing better student products. The teacher is proficient in digital educational skills.
- Culture of innovation and continuous improvement: The implementation of this pilot project in one or more Bolivian institutions can generate a multiplier effect. If the results are positive, it is expected that more graduate programs will show interest in adopting similar methodologies. At the institutional level, this would contribute to a culture of educational innovation, where teaching strategies are regularly evaluated and new evidence-based practices are incorporated. It also paves the way for AI to be incorporated into other academic functions (undergraduate tutoring, library assistance, etc.) with the accumulated experience.
- Contribution to local educational research: As this is a novel initiative in Bolivia, its documented results (for example, in terms of improved indicators or qualitative experiences) may serve as a basis for publications or presentations at academic educational events. This would position the participating universities as a reference in the adoption of AI in education in the region, and would contribute to global knowledge from a Latin American perspective.

Naturally, along with these expected positive outcomes, risks must be monitored and managed. Among them, one could be that some students develop an over-reliance on ChatGPT and do not strengthen certain skills (such as manual calculation or traditional bibliographic search). Therefore, cognitive comprehensiveness must prevail in all areas of knowledge and application of technologies. However, the way in which the methodology is approached - balancing tools and supervision - seeks to minimize this risk.

This does not mean that Bolivia has not made incursions into the use of digital tools and IAs, it is in full incursion of the particular teacher, or with certain institutional programs. The expected results paint an encouraging picture: more competent graduate students, more effective and updated teachers, research projects of higher quality and relevance, and ultimately, a contribution to the strengthening of the Bolivian scientific-academic system. If these results materialize, even partially, they would validate the hypothesis that the synergy between PBL and AI can be a powerful lever for change in higher education in terms of research processes. This is a prospective idea.

ABP+ChatGPT Implementation Strategy

Based on the previous theoretical approach and the diagnosis of the problem, we propose an implementation methodology that integrates Project Based Learning with the use of ChatGPT for the teaching of scientific research in graduate courses in Bolivia. This methodological proposal acts as a guiding model that institutions or teachers can adapt according to their reality. Below, based on OpenAI (2025) contrasted and curated, the key components and steps of the proposal are detailed:

A. Design of the Environment and Necessary Resources.

This phase establishes the logistical and training bases:

- *Space Selection:* Priority is given to methodology courses, thesis seminars or research workshops, where the preliminary project is traditionally developed.
- *Technological Infrastructure:* Access to broadband Internet and the ChatGPT-Plus tool (ideally through educational licenses or institutional subscriptions) should be guaranteed to avoid usage limitations.
- *Initial Training:* It is crucial to conduct practical and ethical workshops to level the digital competencies of students and teachers. Training should focus on the effectiveness of prompts, interpretation of responses, and ethical responsibility (citing sources, verification).

B. Planning the Research Project with the PBA

The project framework is defined under the PBA principles:

- *Problem Definition:* The teacher and students select a real, authentic problem relevant to the professional area (e.g., the impact of AI on learning).
- *Team building:* Collaborative teams (e.g., 3-5 students) are created to address sub-projects or specific aspects of the central theme, simulating research collaboration.
- *Elaboration of the Plan:* The teams, guided by the teacher, design their plan (objectives, methodology, chronogram). ChatGPT assists in this initial phase by generating drafts of possible research questions or suggesting methods.

C. Project Development with ChatGPT Integration (The Core).

This is the operational phase where ChatGPT acts as an assistant in the Teaching-Learning Process (PEA):

Table 1
ChatGPT assistance in research teaching-learning process

Research Activity	ChatGPT (Wizard) function	Human Function (Critical)
Bibliographic research	Summarize key theories, suggest conceptual approaches or references (check necessary).	Traditional database searching, source verification and detection of fabricated references (hallucinations).
Instrument Design	Refine questions (surveys/interviews) to avoid bias, translate instruments.	Final decision on instruments, methodological validation and adaptation to the context.
Data Collection and Analysis	Reduced role in harvesting. Assists in the preliminary interpretation of data patterns, summary of qualitative trends or explanation of basic statistical calculations.	Rigorous analysis, use of specialized *software* (e.g. MAXQDA), and contextual interpretation of findings.
Preparation of the Final Report	Assistance in improving coherence, grammar, clarity and formatting (writing assistant), exploration of ideas for discussion of implications.	Intellectual authorship, guarantee of the accuracy of the data, contrast and final decision on the academic composition of the text.
Feedback	It is used live during sessions for quick answers or suggestions on data visualization.	Human feedback, collective reflection and critical debate between teacher and peers.

D. Project evaluation and closure

Assessment is comprehensive and focuses on learning and critical competence:

- *Final Presentation:* Teams present their results and should include an internal reflection on their PBL learning experience and the use of ChatGPT (critical awareness).
- *Integral Evaluation:* A rubric is used that weighs methodological rigor, depth of analysis, originality and team performance. It is not the amount of AI use that is evaluated, but the final result and the critical-investigative degree acquired. Dishonest use of AI should have a negative influence.
- *Feedback:* Surveys and focus groups are used to gather participants' perceptions of the usefulness of ChatGPT and to improve future implementations.

E. Specific considerations for the Bolivian context

For a successful implementation in Bolivia, contextual challenges must be considered:

- *Language and Cultural Context:* Ensure optimal use of Spanish-Spanish ChatGPT and recommend including local context in *prompts* for more accurate responses.
- *Connectivity Limitations:* Schedule AI-intensive activities at times or locations with better bandwidth, alternatively, download responses in advance.
- *Dedication and Groups:* Adapt the PBL to the reality of working students (evening/weekend mode) with modular planning. ChatGPT functions as an asynchronous virtual tutor between face-to-face sessions.
- *Inter-institutional Collaboration:* It is recommended to seek alliances with the Ministry of Education or local technology companies (Entel, Tigo) to finance pilots (e.g. subsidized *ChatGPT Plus* accounts) and share resources and experiences among universities.

PBA Pilot Experience + ChatGPT

In my own experience regarding the application of PBL - Project Based Learning in real scientific research projects - even in undergraduate - in the Research Workshop IV: Latin American Theoretical Approach to Communication, of the Social Communication Sciences Career of the Technical University of Oruro, the facilitator role of the teacher focused on student learning according to the PBL, linking the use of IAs and ChatGPT was applied in the present management.

It should be noted that this experience can be considered as a pilot proposal applicable to the postgraduate level, with the necessary adaptations according to the students' educational level and previous knowledge. In this sense, the following is a systematic exposition of the process developed -from its planning to the teaching evaluation stage-, within the framework of the implementation of the Project Based Learning (PBL) approach enhanced with the use of ChatGPT as a support tool in the teaching of scientific research:

From the methodological text entitled *Investigación Para Todos: Methodological practical orientation* -authored by the person responsible for this study-, which provides structured orientations, applied examples and guided spaces for the progressive development of the research process, the research work began in March 2025. The activity was developed by teams made up of five student-researchers, who addressed issues related to the social and media reality of the Department of Oruro. The implementation of generative artificial intelligence (GAI) tools, in particular ChatGPT, strengthened several stages of the scientific process, from problem formulation to conclusion writing. The work culminated in October 2025 with the delivery of final reports, presented in scientific article format. This research was presented at the XXV Jornadas Nacionales de Jóvenes Investigadores de la Asociación Boliviana de

Investigadores de la Comunicación (ABOIC), held in the city of Sucre, Bolivia, from October 1 to 3 of the same year.

During the development of the research project, we worked with students using a PBL approach. In each class session, the teacher explained the corresponding phase of the research process, following the content of the textbook that each student had available. Subsequently, each phase or stage was articulated with the specific research topic that each group had selected.

With the purpose of enriching and optimizing the proposals, the use of ChatGPT artificial intelligence was recommended as a support tool at each stage of the process, with ethical solvency, contrastation, verification of sources and curation of the content obtained. For this purpose, a demonstrative explanation of its operation and the possibilities it offers in the construction and review of the different components of scientific research was previously carried out.

In the following session, the students presented the practical progress corresponding to the assigned stage. These products were subjected to review, feedback and contrast by the teacher, allowing for correction, improvement and advancement to the next stage of the research process.

In this way, the integration of ABP + ChatGPT favored active learning based on practice, application and continuous research. The students went through all the phases of the research process - from the formulation of the idea to the elaboration of conclusions and the construction of the final report in scientific article format - consolidating essential research and technological competencies.

Table 2

Guided steps of the research process and mediated by ChatGPT

Stage	Activity	Using ChatGPT/Book	Result
Research idea	Work in groups of 3 potential ideas according to theoretical basis	Brainstorming	An idea was chosen
State of the art	Background review of the chosen idea.	Background search	Validation of the idea
Research Project	Group work: drafting of the research topic, problem statement, formulation of objectives, others.	Refinement of approaches	Exact formulations. Final project design
Theoretical Framework (TM)	Construction of the theoretical basis: direct and indirect quotations	MT Refinement - APA 7	Accurate writing in the APA 7 system
Methodological Strategy	Selection and design: type of research, approach, method, techniques, and tools	Book	Concretization of a methodological design four: operationalization
Field Work	Information gathering: use of tools	Book	Forms, files and other records
Tabulation and analysis	Interpretation of results	Table generation and analysis	Preliminary results
Results	Writing of results	Refinement of the wording	Results achieved

Conclusions	Drafting of conclusions	Book	Conclusions
Final Report	Writing a scientific article	Refinement	Scientific articles
Disclosure	Presentation at national event	Assisted slide construction	XXV ABOIC Young Researchers' Day Exhibition

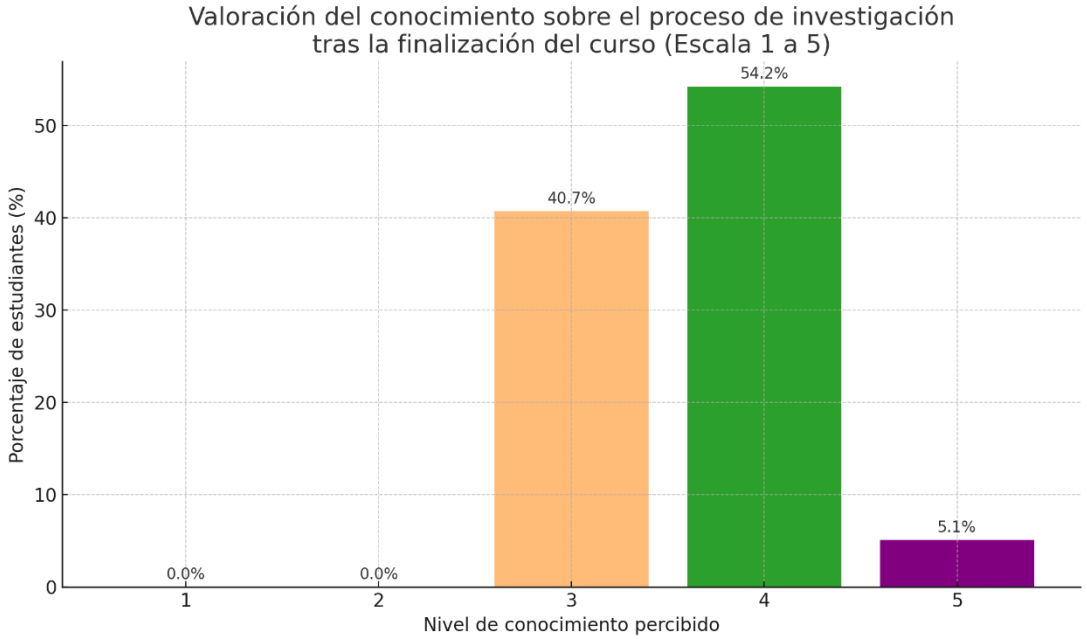
Teaching Evaluation of the Pilot Experience ABP + CHATGPT

It is important to clarify that the evaluation presented in this article is not part of the survey study conducted specifically for this research, but constitutes a reflective assessment based on the direct experience of the teacher-author in implementing the ABP methodology integrated with ChatGPT in the teaching of scientific research. This assessment was based on the interaction with students during the development of the project at the undergraduate level, and is considered a relevant contribution that could serve as a reference for future methodological applications at this educational level.

The students positively valued the methodological proposal implemented by the teacher, based on the integration of Project Based Learning (PBL) with the use of generative artificial intelligence, specifically ChatGPT, in the teaching-learning process of scientific research in the subject "Research Workshop IV": Latin American Theoretical Approach to Communication". The following are the results of a survey applied at the end of the course, which was administered through the Google Forms platform. The instrument was aimed at fourth year students of the Social Communication Sciences career, belonging to the Faculty of Law, Political and Social Sciences (FDCPS) of the Technical University of Oruro, Bolivia. For reference, some graphs illustrating the main findings are included.

Figure 1

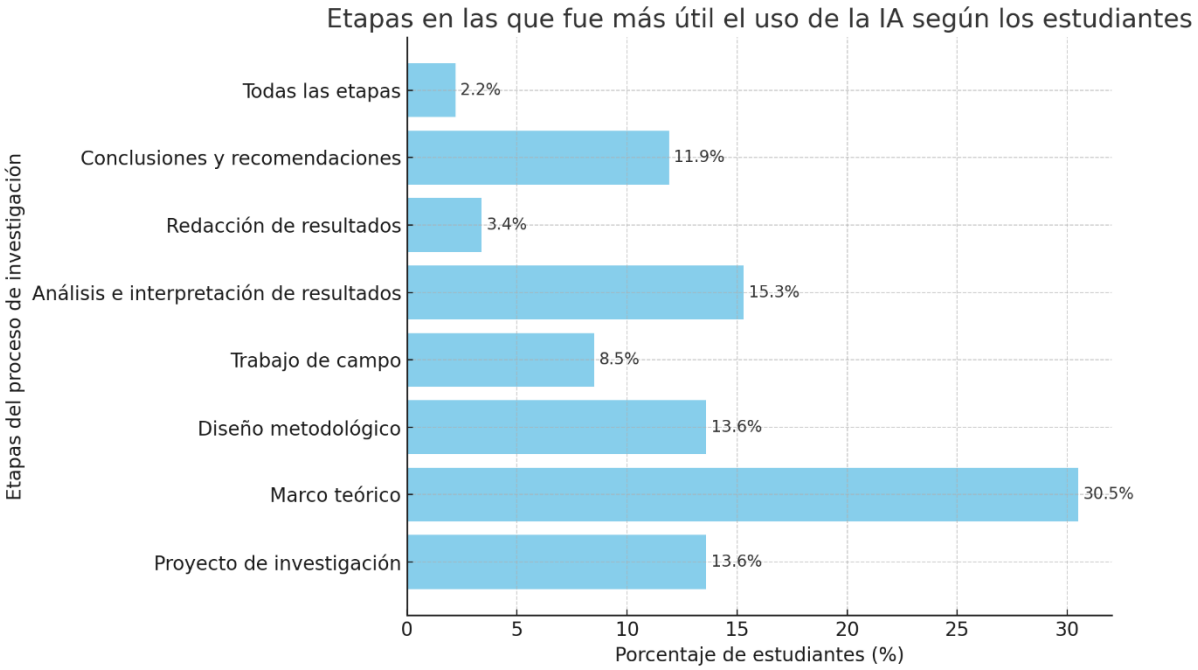
Qualification of knowledge about the research process



The graph shows the students' perception of their level of knowledge regarding the scientific research process at the end of the course. The majority (54.2%) indicated having a high level of knowledge (level 4), followed by 40.7% at an intermediate level (level 3). Only 5.1% rated themselves at the highest level (level 5), while no responses were

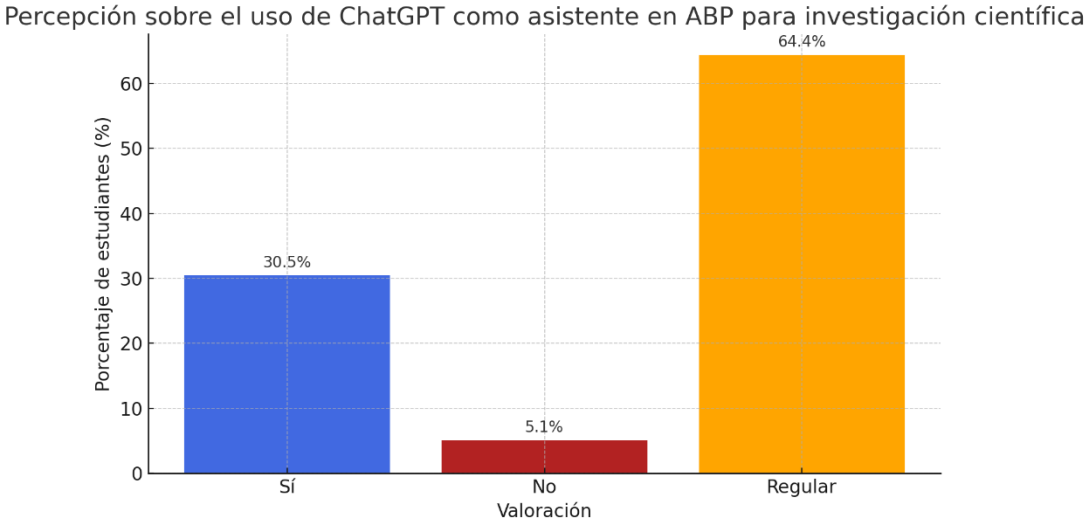
recorded at the lowest levels (1 and 2). These results reflect a positive evaluation of the training process and suggest that the PBL strategy combined with ChatGPT favored the strengthening of research competencies.

Figure 2
Usefulness of ChatGPT in scientific research phases



The graph shows that the majority of students identified the theoretical framework phase as the most useful for applying artificial intelligence, with 30.5% of responses. This is followed by the analysis and interpretation of results (15.3%), and the stages of methodological design and formulation of the research project, both with 13.6%. To a lesser extent, the use of AI was valued in conclusions, field work, writing of results and in all stages of the process. These data suggest that AI support was especially valued in phases requiring theoretical and argumentative structuring.

Figure 3
Feasibility of ChatGPT in the ABP



The graph reveals that a large majority of students consider the incorporation of ChatGPT as an assistant in scientific research processes within the project-based learning approach to be adequate or acceptable. 64.4% rated it as fair and 30.5% as adequate, indicating that more than 94% of the respondents recognize its usefulness at different levels. These results reflect a favorable assessment towards the use of artificial intelligence in academic environments, suggesting that ChatGPT can be an important complementary resource to strengthen research skills in the university context.

In the evaluation conducted by the teacher, the relevance of Project Based Learning (PBL) in combination with the use of ChatGPT as an effective pedagogical strategy for teaching scientific research methodology is highlighted. This experience especially highlights the approach to the phases of the research process that require both theoretical and practical application, placing the student at the center of the learning process. Based on the results observed, this pilot proposal could be adapted for other training contexts, such as research teaching in graduate programs, degree processes, thesis writing or monographic work.

Discussion and Conclusions

The integration of ChatGPT in the Project Based Learning methodology for the teaching of scientific research at the graduate level represents an innovative and timely proposal for the Bolivian educational context. At the same time, it contributes to national higher education with the global trends of pedagogical innovation.

In the Bolivian context, where traditional graduate training has focused on lectures, the adoption of PBL represents a paradigm shift that can help bridge the gap between theory and practice, and between training and application. Integral learning that links technology, science and epistemology, which comes from the paradigm of cognitive integrality.

In this proposal, ChatGPT acts as a virtual assistant that complements the teacher's work and empowers the student to quickly access information, improve their writing and explore ideas. A key conclusion is that ChatGPT does not replace the teacher or the student's effort, but well integrated, it multiplies the opportunities for feedback and personalized learning. Of course, this requires educating students in its critical use by verifying and contrasting information, and teachers have the role of methodological and technological facilitators, i.e., they become digitally competent in the teaching-learning of scientific research.

The contextual analysis shows that the proposal is viable in Bolivia, although with particular adaptations and considerations. Graduate institutions have increasing access to ICT with a university community that is more accustomed to digital tools. Although challenges persist in infrastructure and digital skills, these can be managed with planning: starting with pilot projects (as proposed), ensuring equitable access to technology, and providing specific training.

It also concludes that the ABP+ChatGPT synergy brings benefits beyond the immediate scope of scientific research: it prepares professionals for a work environment where collaboration with AI systems will be increasingly common. Instead of seeing AI as a threat, this proposal incorporates it as a learning ally, teaching by example how to use it responsibly. Thus, graduates will not only be more competent in research, but also more skilled in the use of advanced tools (they acquire digital competencies), which will enhance their professional competitiveness.

Institutional policies or guidelines should be developed that define the acceptable use of AI in academic activities. Also, offer workshops and courses to graduate teachers in active methodologies (PBL, problem-based learning, etc.) and in the pedagogical use of AI tools. This not only at the beginning, but on an ongoing basis, creating communities of practice where teachers exchange experiences and advice on what works best. Incentives (recognition, reduction of workload in other areas) may even be considered for teachers who lead educational innovation.

The focus must shift from being the source of all knowledge to being the guide of the learning process. In PBL, this involves allowing students to make decisions, experiment and make mistakes, intervening to guide them and providing timely feedback. With ChatGPT, it means helping students formulate good questions and reflect on the answers rather than directly giving the answer.

Keeping content up to date, ChatGPT can easily provide information, it is the teacher's responsibility to ensure that questions and tasks lead to higher cognitive levels (analysis, synthesis, evaluation) and not just recalling facts. Also, be aware of tool updates to take advantage of them in teaching.

Students should approach this methodology with an open mind, willing to take charge of their learning. They are encouraged to participate fully in project activities, as the practical experience will directly benefit them in their thesis and professional life. As for ChatGPT, students should use it as a complement and not as a substitute for their effort. That means always critically reading the responses, cross-checking them with academic materials, and never presenting an AI-generated text without substantial personal review and input. Take advantage of opportunities to improve their digital literacy.

Organizations such as CEUB, Ministries or science and technology agencies should support (even financially) pilot projects of AI integration in education, such as this one. This could be done through calls for projects to improve the quality of education, incentives for universities to modernize their curricula, or dissemination of best practices.

In sum, the adoption of AI-supported active methodologies in postgraduate education is not an end in itself and ends there, but a process of continuous improvement. The recommendations presented here lay the groundwork for initiating this process in Bolivia, anticipating that the lessons learned and adjustments along the way will allow the model to be refined. With vision, commitment and the right actions, it is possible that in a few years we will see Bolivian universities leading cutting-edge educational practices.

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FAMILY COMMUNICATION AND PARENTAL RULES REGULATING THE USE OF MOBILE DEVICES BY MINORS

Comunicación familiar y normas parentales que regulan el uso de dispositivos móviles en menores

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ABSTRACT

Keywords:
Families, minors, rules, mobile phones, communication

Screens often block or interfere with interpersonal and family communication. In this regard, adults play a crucial role in promoting the responsible use of technology. This study provides an analysis of the families' rules impose on their children aged 3 to 12 to regulate mobile phone use at home, as well as explores their perceptions of the consequences of taking *smartphones* away from their children and how *smartphone* use influences children's socialization, behavior, and academic performance. A quantitative study with a non-experimental design was conducted using a survey method and convenience sampling. The respondents were 1.694 families from the city of Lugo (Spain). The results indicate that *smartphones* are the most used device by both parents and children, and that 8 out of 10 families set rules for their children to regulate mobile phone use, including prohibitions on using them during meals or at bedtime. Furthermore, half of the families in Lugo believe that mobile phone use does not affect socialization, academic performance, or behavioral changes in children, and 1 out of 10 are unaware of the potential effects. Overall, these findings highlight that parental accompaniment, supervision, and the reduction of time spent on mobile devices are key aspects for enhancing family communication.

RESUMEN

Palabras clave:
Familias, menores, normas, móviles, comunicación

A menudo las pantallas bloquean o interfieren en la comunicación interpersonal y familiar. En este sentido, los adultos desempeñan un papel importante en el fomento del uso responsable de la tecnología. Este estudio presenta un análisis de las normas que las familias imponen a sus hijos/as de 3 a 12 años para regular el uso del móvil dentro del hogar y examina la percepción que tienen de las consecuencias de retirar los *smartphones* a sus hijos/as y de cómo influye su uso en la socialización, conductas y rendimiento académico de los menores. Se utilizó un enfoque cuantitativo con un diseño no experimental basado en el método de encuesta en el que se empleó un muestreo por conveniencia. Los/as encuestados fueron 1.694 familias de la ciudad de Lugo (España). Los resultados apuntan a que el *smartphone* es el dispositivo más utilizado tanto en progenitores como en hijos/as, que 8 de cada 10 familias pone normas a sus hijos/as para regular el uso del móvil, entre ellas la prohibición de usar el móvil durante la comida o a la hora de dormir. Además, la mitad de las familias lucenses piensan que el uso del móvil no repercute en la socialización, en el rendimiento o en los cambios de conducta de los menores y 1 de cada 10 desconoce los posibles efectos que puedan tener. El acompañamiento, la supervisión y reducir el número de horas de uso de dispositivos móviles son aspectos claves para mejorar la comunicación familiar.

Introduction

The family is the first agent of socialization, where children learn norms, values, customs, language, beliefs, behaviors, habits, as well as forms of behavior and communication. Currently, family communication is deeply mediated by digital technologies, particularly by the use of mobile devices (Rodríguez and Estrada, 2019), which have introduced new challenges in the communicative and relational dynamics between parents and children (Martínez-Roig et al., 2023).

Classic models of family communication, such as those proposed by Chaffee and McLeod (1972), or those developed in Olson's family systems theory (2000), highlight the importance of cohesion, adaptability and communicative style as fundamental axes for the emotional development of children. However, the irruption of mobile devices has altered these dynamics, generating phenomena such as *technoference*, understood as the interruption of family interactions by the constant presence of screens (McDaniel and Coyne, 2016; Martínez-Roig et al., 2023).

This phenomenon is compounded by *phubbing*, or the practice of ignoring others by attending to the cell phone, which has been linked to higher levels of anxiety, depression and behavioral problems in childhood (Pérez, 2024; Muñoz-Carril et al., 2025). Affective communication and shared family time are thus compromised by the presence of the device, which negatively influences the quality of bonds and the perception of emotional support (Carmenate and Marín, 2021).

In this context, it is essential to analyze how families manage communication to establish rules and limits that guide the responsible use of digital devices, especially during routine interaction times such as meals or bedtime. Several studies have shown that the use of cell phones by parents during mealtimes can decrease family interaction and reduce the quality of the time spent with their children. A survey study of children under 5 years of age showed that approximately one-third of children used mobile devices during lunch or dinner, suggesting that the presence of screens at mealtimes is common even in home settings (Dinleyici et al., 2016). These findings reinforce the need to establish clear family norms that promote communication and emotional connection between parents and children at early ages (3-12 years).

In the digital context, parental rules seek to balance access to technology with protection from its potential risks. In this sense, the presence of clear limits, accompanied by dialogue and affective supervision, favors a more responsible use of the devices by minors (Muñoz-Carril et al., 2023; San-Martín et al., 2024). International studies also show three parental mediation strategies: time and content control (restrictive), conversation and guidance (active), and time for sharing digital experiences (co-use) (Valkenburg et al., 2013; Livingstone and Helsper, 2008). A balanced combination of these approaches is associated with greater development of digital autonomy and a lower likelihood of addictive or problematic behaviors.

Other recent research shows how families establish differentiated norms according to the context and age of the children. San-Martín et al. (2024) found that parents of children under 5 years of age often limit cell phone use during meals and sleep, concerned about early screen exposure. Carrasco et al. (2017) and Sandoval (2021) add that family perceptions of parental control oscillate between fear, distress, and need for care, reflecting the tension between protection and child autonomy.

Parenting styles also significantly influence the effectiveness of rules. According to Aguirre et al. (2025), authoritarian styles that combine affection and control are related to lower levels of aggressiveness and better social adaptation, while permissive or

negligent styles can lead to unregulated use of technology and a greater propensity to digital dependence.

Likewise, parental perception of the risks and benefits of using mobile devices is a determining factor in the formulation of norms. Besolí et al., (2018) show that many parents recognize both the educational benefits of the cell phone and its addictive potential, which generates ambivalence in normative decisions. This duality evidences the need to rethink digital mediation from a family co-responsibility approach, which integrates dialogue, negotiation and adult example as early regulation tools.

On the other hand, several studies indicate that the excessive use of mobile devices in childhood can negatively affect the psychological, cognitive and social development of children. Overexposure to screens has been linked to emotional problems, attention difficulties, and delays in cognitive and social development (Huang et al., 2023; Kardefelt, 2017; Kar et al., 2025; Luo et al., 2024). However, parental involvement and parenting styles can moderate these effects, as adult supervision and active mediation help to partially mitigate risks (Abdoli et al., 2024; Rabbani et al., 2022). Likewise, early exposure to screens can affect language and favor the appearance of behavioral disorders in young children (Bailón and Vaca, 2021; Cabrera, 2023; Figueroa and Campbell, 2020). These findings underscore the importance of setting appropriate limits on the use of mobile devices and promoting quality parent-child interactions from early childhood.

One of the most studied effects of mobile device use is its impact on sleep. Almodóvar et al. (2023) and Ochoa et al. (2023) demonstrated that cell phone use before bedtime is associated with insomnia, daytime fatigue and decreased academic performance. Celis et al. (2022) also link device abuse with sleep disorders in adolescents, warning about the influence of screens on the regulation of the circadian cycle. Along these lines, several studies have documented similar effects at younger ages: Lee et al. (2022) found that frequent *smartphone* use predicts sleep problems in children aged 4 to 7 years; Cartanyà et al. (2022) reported that spending more than 2 hours a day in front of screens is associated with shorter sleep duration in children aged 3 to 12 years; Sakamoto et al. (2022) observed that the use of digital devices among elementary school children is associated with less sleep time and associated problems; Torres et al. (2025) found that in children aged 3 to 7 years, excessive screen time decreases sleep duration; and Kadambi et al. (2021) confirmed that longer hours of exposure to devices are related to lower quantity and quality of sleep in children aged 3 to 12 years. These findings highlight the importance of limiting screen time, especially before bedtime, to protect children's health and development.

Academic performance is also compromised. Gallego (2023) showed that the addictive use of cell phones in children aged 10 to 12 years negatively affects their concentration and school performance. These results coincide with international research, such as that of Twenge and Campbell (2018), who point out that intensive screen use among children and adolescents aged 2 to 17 in the US is associated with lower performance and psychological well-being.

From a social point of view, the excessive use of mobile devices can limit face-to-face interactions and generate isolation (Carmenate and Marín, 2021). Bueno (2025) argues that technological overexposure during childhood reduces opportunities for exploration, play, and interpersonal learning, essential elements for socioemotional development.

On the other hand, studies such as those by Luna et al (2024) and Feijoo et al (2024) analyze the influence of mobile devices on intellectual and behavioral development, showing how constant exposure to digital content can modify attention and the relationship with advertising, increasing the cognitive vulnerability of minors.

In this scenario, parental rules take on a crucial role in mitigating the risks and enhancing the benefits of the digital environment. Muñoz-Carril et al. (2022) emphasize that families' perceptions of children's cell phone use are mediated by socioeconomic, educational and cultural factors, which calls for family policies adapted to each context.

Likewise, strategies based on conversation and parental modeling favor the internalization of limits and child self-regulation (Clark, 2011). Adult example is an essential element, as children observe their parents' usage patterns, so inconsistent control, such as prohibiting use while adults remain connected, can undermine the credibility of the rules (Muñoz-Carril et al., 2023).

Recent studies show that the use of cell phones during meals or before bedtime interferes with essential processes of socialization, rest and cognitive development, while the rules established in these contexts contribute to the strengthening of family bonds and the well-being of children. Consequently, digital education must be approached from a systemic perspective in which the family assumes an active, reflective and coherent role, combining dialogue, accompaniment and being able to integrate technology as a learning tool and not as an element of affective disconnection.

Taking all of the above into account, the purpose of the study was to analyze the type of control mechanisms exercised by the family within the home to regulate the use of cell phones by their minor children. More specifically, the following objectives were defined:

- Detail the mobile devices most used by parents and children in the family environment.
- Analyze parental permissiveness in the use of cell phones at key times such as mealtime or bedtime.
- To ascertain family beliefs or expectations about the possible behavioral and emotional reactions that their minor children would experience in the event of withdrawal, prohibition, confiscation or reduction of cell phone use.
- To describe the knowledge of parents and guardians related to the influence of cell phones on their children's socialization, academic performance and behavioral changes.

Method

A non-experimental quantitative methodology was used, employing an ex post facto descriptive and cross-sectional design through the survey method (McMillan and Schumacher, 2005).

Participants

A total of 1694 parents with children attending kindergarten and primary school in 23 schools (public, private and subsidized) in the city of Lugo (Spain) participated in the study by means of convenience sampling (families from Lugo selected for their easy availability and proximity to the researcher).

The families participated voluntarily, anonymously, and with informed consent, explaining in detail the purpose of the study and clarifying that the data obtained would be treated with due ethical guarantees.

Regarding gender, 71.3% of the respondents were female. The mean age of the parents surveyed was 41.17 years (SD=5.85).

Regarding marital status, a large majority (71.2%) indicated that they were married, while 9.2% indicated that they were single. In turn, 7.2% said they were in a common-law relationship, 6.2% were divorced, 5.2% were separated and 0.9% were widowed. The rest of the participants reported another type of marital status (e.g., polygamous marriages). Regarding their employment situation, only 13.1% said they were unemployed.

In terms of educational level, 44.9% had university-level education, while 28.7% had vocational training. Likewise, 18.8% completed ESO, Bachillerato or the equivalent. A total of 6.9% indicated that they had primary education and only 0.7% indicated that they had no education.

Instrument

The study used a self-developed questionnaire, organized into several thematic blocks: identification of smartphone use; time spent using the device; actions and tasks performed with the smartphone; parental rules and control of smartphone use; mobile device usage habits; and opportunities and dangers of smartphones. Before these blocks, a section of sociodemographic data was included for both the surveyed parent and the child.

For the validation of the instrument, content validity, construct validity and internal consistency were considered. Eight international specialists with expertise in research methodology and educational technology reviewed each item for univocity, relevance and importance (Fleiss Kappa = .848). Their comments made it possible to adjust, restructure and optimize the initial content of the questionnaire. For the Likert-type scales, internal reliability was estimated using Cronbach's alpha, obtaining an adequate level (α = .797). This coefficient was not applied to categorical response items.

Procedure

The data collection process lasted about three months, and the questionnaire was administered at school entrance and exit times, when adults accompanied the children. In addition, contact was established with the Parents' Associations and, in those cases where it was necessary to access school facilities, authorization was requested from the corresponding school management.

Prior to the application of the questionnaire, it was verified that the respondents had children in school between the ages of 3 and 12 years old. Subsequently, the purpose of the study was explained in detail, inviting voluntary participation and guaranteeing the anonymous and confidential treatment of the data in accordance with the ethical principles of the research. They were also informed that the questionnaire was anonymous, and that they could omit any question or interrupt their participation at any time.

Data Analysis

In order to respond to the research objectives and considering the categorical nature of the variables analyzed, descriptive statistics were used, using frequencies and percentages as the main measures of analysis. Statistical treatment of the data was performed using Microsoft Excel for Office 365 and SPSS v.24.

Results

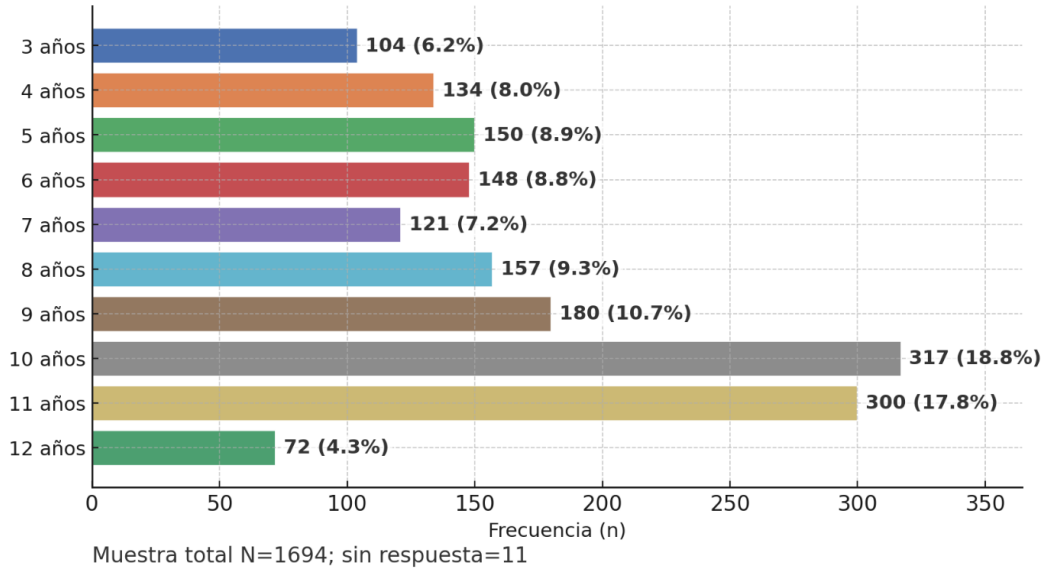
Regarding the gender distribution of the children of the families that completed the survey, the data show a higher representation of girls (51.4%; n=868), compared to boys (48.6%, n=820), which shows an adequate representation between both genders.

On the other hand, with regard to the age of the children of the families that responded to the survey (Figure 1), the majority of these children are between 10 and 11 years old (36.6% of the total). They are followed by age groups between 8 and 9 years old (equivalent to 20% of the total) and the remaining 38.8% are between 3 and 7 years old. Children under 12 years of age are a minority compared to the rest of the age groups. Specifically, there are 72 subjects, equivalent to 4.2%.

It is important to clarify that each family responded to only one survey, regardless of the number of children they have; in these cases they responded by referring to the youngest child.

Figure 1

Age of sons and daughters of parents surveyed (n valid=1683)



As can be seen in Table 1, 86.5% of the children of the parents surveyed use a cell phone, either because they have one of their own (19%; *n=322*) or because, even without one, they use the cell phone of a relative, friend or acquaintance (67.5%; *n=1143*). Only 13.5% (*n=229*) of the 1,694 families surveyed stated that their offspring did not own or use a cell phone.

Table 1

Does your child use a cell phone? (n valid=1694)

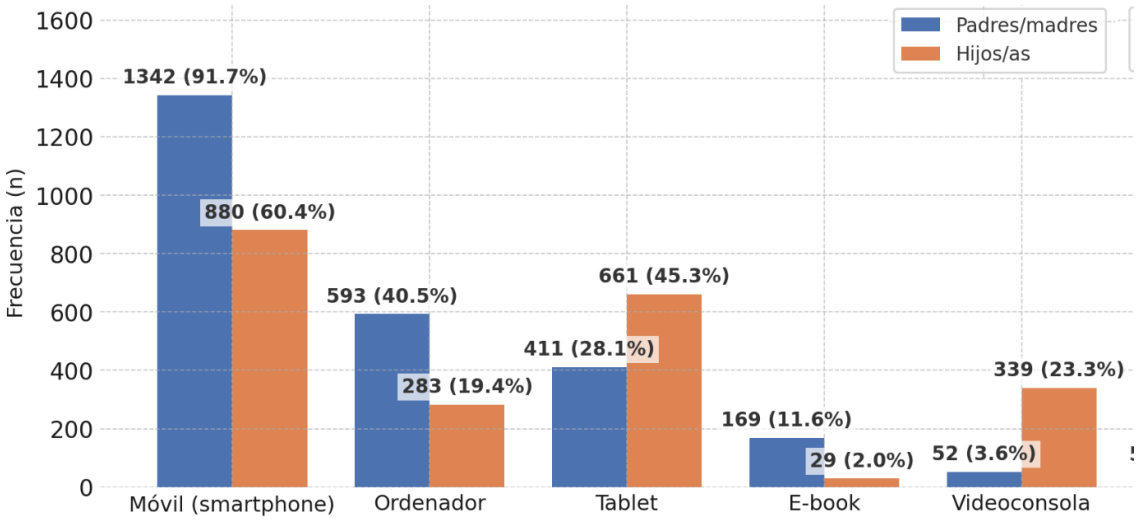
	Frequency (n)	Percentage (%)
Yes, he has his own cell phone	322	19.0
Yes, but he does not have his own cell phone	1143	67.5
No, he does not own or use a cell phone	229	13.5

Figure 2 below shows the type of mobile devices that parents use for more than one hour, without having to use them consecutively, and which are not linked to their

work environment and working hours, as well as those used by their children outside the school.

Figure 2

Devices used outside of work (at least 1 hour per day) by parents and devices used by their children at least 1 hour per day outside of school (multiple choice)



Note. The value of "Mobile (smartphone)" for children reflects use ≥1 hour/day outside the center, so it is lower than the overall prevalence of the item "Does your child use a cell phone?"

The results report that the cell phone (smartphone) is the device most used by both parents (91.7%) and children (60.4%). The computer is the second most used device by families (40.5%) but for their children it is in fourth place (only 19.4% use it at this age). The opposite occurs with the Tablet: while its use by children amounts to 45.3%, in the case of their parents it drops to 28.1%, placing it in third place. E-books are the devices least used by families (11.6%), occupying fourth place. Among children, it is definitely the least used (2%), ranking fifth and last. Finally, video game consoles are the devices least used by parents (3.6%), while for their children they are in third place in terms of preference and use (23.3%).

In the open-ended responses, some families insist that their child "*cares more about the console than the phone*", or that "*I don't like my child to use the cell phone, but I admit that occasionally we let them use it so that they can be entertained, but less and less*". Other parents express more restrictive positions, such as "*[...] I am not in favor of my children having a cell phone until they are 16 years old, an age at which I consider that they already have the minimum experience to know what is good and what is bad*". Along the same lines, opinions such as "*I consider that a child does not need to use a cell phone at all. Their addictive potential is very high, so I think it is also a risk, I will not allow them to have their own cell phone until well into ESO (14 or 15 years old)*". Families indicate in their comments that "*By age, children use a Tablet more than a cell phone...*" and that "*I am in favor of establishing guidelines for good use rather than time restrictions*".

On the other hand, families were asked if they had established any type of rule to control their children's use of mobile devices. Practically 1 in 10 families (9.8%) stated that they do not set rules, which is equivalent to saying that 1 in 10 children under 13 could access inappropriate content without supervision. In addition, 7% of the families recognize that they set standards that are not met or that their compliance is not monitored. Likewise, 83.5% of the 1,464 valid responses from parents who answered this

item affirmed that they set rules, although they do not reliably affirm that they are always complied with, but only from time to time.

Taking these results into consideration, some of the family's comments and observations focus on the importance of enabling mediation, as well as the need for adequate digital education, for example: "*The way to control the cell phone our child uses is by being concerned about what he/she does with it and with the EAS (Educate, Accompany, Supervise) strategy.* Other families also emphasize the need for continuous training from an early age: "*It would be necessary for children to receive information from kindergarten on the dangers of technology*". Other responses from parents are linked to proposals where they suggest "*that training should be a continuous activity, not a one-day event*" and, along the same lines, "to*establish curricular guidelines that are part of the course program rather than occasional talks in schools*".

If we go a little deeper into the routines of family life at home, for example, at mealtime, when we ask the parents of Lugo whether they allow their children to use their cell phones at that time, practically 2 out of 10 families sometimes allow them to eat while looking at their cell phones, while the remaining families (almost 8 out of 10) state that they do not allow them to do so.

Families recognize the importance of setting standards. Some of them stand out: *"We should control cell phone use more...so that it doesn't become something that can't be remedied later,"* and they point to practices they consider problematic*:* "*First of all, parents who buy a cell phone for their children just for the sake of keeping them sitting or quiet and not disturbing them should receive some kind of communication, but then there is no control over them".* However, they also express feelings of insecurity or lack of preparedness to exercise or sustain such vigilance: *"I do not agree with unsupervised Internet use in our children, it is a very large window to the world that sometimes even we adults are not prepared for, much less a child."* Faced with these difficulties, families demand risk reduction measures - *"I would like to have the option of phones that only have access to calls and WhatsApp"*-, propose the accompaniment of professionals - *"Give more information to children, especially by appropriate staff who know how to explain it and make them understand it"*- and request structured support for families: *"It would be essential to create a school for parents in schools or a common meeting place for parents or guardians, children and teachers on a regular basis, to deal with issues of this nature: (setting limits, ...)"*.

Another of the habits analyzed was the use of cell phones during bedtime. Parents were asked if they allowed their child to sleep with a cell phone nearby. Of the 1463 valid responses, 85.7% said they did not allow it, while the remaining 14.3% said they did, either with the cell phone turned off (8%) or with it turned on/muted (6.3%; some 92 families in Lugo). Of the latter group of families that allow their children to sleep with their cell phones on, 85.1% (87 of the 92 families) said they did not know what their children were doing or did not follow up on it, while the remaining 14.9% assumed that their children might wake up to look at their cell phones, read and respond to messages. These results seem consistent with a permissive family practice that conflates with an absence of parental control.

As part of the study, parents were also asked what kind of emotional reaction they think their minor child would have if he/she were to be left without a cell phone for a week due to circumstances beyond his/her control. Of the 1464 valid responses, approximately 7 out of 10 children would express neutral emotions (resignation or indifference), while almost 3, 2 and 1 out of 10 would show negative emotions such as boredom, distress, sadness and anger, respectively. Positive emotions after being left without a cell phone are very scarce, practically residual.

The families agree that avoiding abusive use is a responsibility that should fall on the parents themselves, "*I believe that the use of cell phones is positive as long as it is controlled by the parents who dedicate time to them*", as well as avoiding addiction to cell phones, as they say: "*I consider it good that they have cell phones but always with family control and in short periods of time ... to avoid addiction or misuse of them*," insisting that the key is supervision.

In this regard, the families from Lugo were also asked what type of behavioral reaction they thought their minor child would have in the event of being restricted or prohibited from using a cell phone. The results obtained from 1461 valid responses are presented in Table 2.

Table 2

Frequencies and percentages obtained referring to the question "In general, when faced with the prohibition to use and/or play with the cell phone, what do you think would be the MAIN REACTION of your child?"

	Frequency (n)	Percentage (%)
I would understand and accept it	710	48.6
Would be frustrated	259	17.7
He would become aggressive	22	1.5
I would insist on continuing to use the cell phone	417	28.5
We have never forbidden him to use the cell phone	51	3.5

Finally, three questions related to family beliefs about the influence of the cell phone on their children's socialization opportunities, academic performance and behavioral changes were raised. Among the main results, it was found that 1 in 10 families believe that the cell phone has a positive impact on the ability to socialize (10%), on academic performance (5.6%) or on positive behavioral changes (1.9%). However, when it comes to highlighting the negative impact on children, there is a significant increase. Thus, 33.6% of parents affirm that it has a negative influence on their children's ability to relate to others; 30.3% confirm this negative influence on academic performance, and 29% consider that it has a negative effect on behavioral changes. It is worrying that almost half of the families in Lugo state that the use of cell phones does not affect their children at all in their ability to socialize (40%), nor in their academic performance (51.9%) nor in their behavioral changes (50.2%). In addition, 16.4% of parents acknowledge not knowing or not knowing the possible influences of cell phones on their children's socialization (16.4%); this lack of knowledge is around 12.2% in relation to academic performance and 18.9% in relation to possible behavioral changes in their children.

In line with these results, some families express concern and attribute the difficulty in exercising adequate control to a lack of knowledge on the subject: *"not having the necessary knowledge in this area makes it more difficult to control my children".* Others emphasize the importance of education and regulation rather than sanctioning: "*I believe that the survey is necessary and I emphasize that it is better to help and regulate than to persecute and punish".* Likewise, other families attribute child development problems to mobile devices when they point out that: *"it is necessary not to facilitate access at very early ages as it prevents the development of the imagination"* and social limitations expressing that *"new technologies used well are a step into the future of the new generations, but never losing the traditional, such as relating to their friends and family".* These perceptions reflect a tension between technological innovation and the preservation of traditional forms of socialization.

Discussion and Conclusions

The present study highlights the high presence of cell phone use among children aged 3 to 12 years, as well as the diversity of devices available in households. The results indicate that a considerable percentage of minors (86.5%) use mobile devices, either their own or those of family members, with *smartphones* being the most common among both children and their parents. Tablets and computers occupy a secondary place, while video game consoles and electronic books are less widely used. Although most families establish rules to regulate cell phone use, their implementation and monitoring varies significantly, reinforcing the importance of active parental mediation and constant supervision (Muñoz-Carril et al., 2022).

Regarding regulation of use, a large number of families report establishing parental rules, although the effectiveness of these rules depends on monitoring and supervision. Although only a small percentage of families do not impose rules (9.8%) or do not ensure compliance with them (7%), permissiveness at certain routine times, such as mealtimes or sleep, is evidence that supervision is not always strict. For example, although most parents do not allow children to sleep with their cell phones, 14.3% do, generally without effective control over their use at night.

One of the most common measures is the reduction of the time minors use their cell phones. The study shows that parents perceive that their children would mostly react with resignation to the temporary withdrawal of the cell phone. However, almost a third believe that their children would show frustration or insistence on continuing to use it. These perceptions reflect a growing parental awareness of the emotional dependence that cell phones can generate in children and the importance of supervision.

Regarding beliefs about the effects of cell phones, parents identify a negative impact on their children's socialization, academic performance and behavior, although there is a significant percentage that does not know or underestimates it. According to Bueno (2025), this lack of guidance turns children and adolescents into digital orphans, not digital natives, referring to the fact that adults have not known how to adequately guide them. Likewise, open comments reveal that families value the need for training and support for a safe and responsible use of technology, enabling mediation strategies that prioritize education over strict prohibition. These results underscore the need to promote healthy digital habits in the home, strengthen emotional bonds and improve family digital skills through example and supervision.

A noteworthy aspect of this study is that it focuses on an age range that is usually little explored - 3 to 12 years of age - coinciding with schooling in the second cycle of pre-school and primary education. In addition, we consider the sample to be particularly valuable because it is family data and has a size of n= 1,694. The quality of this research lies in rescuing the voice of real families, their opinions, demands and personal proposals, which allows us to give meaning to the quantitative results, thus connecting the research with social reality.

Finally, it is considered pertinent that future research should continue this study in other Spanish cities or in international contexts, broadening the age range and type of sample and deepening inferential, comparative and explanatory analyses. This would advance the understanding of patterns of use and parental control of mobile devices, as well as their educational implications.

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BUBUSKISKI: DESIGN AND VALIDATION OF A MOOC IN MEDIA EDUCATION FOR TEACHERS

FORMACIÓN DOCENTE EN EDUCACIÓN MEDIÁTICA: DISEÑO Y VALIDACIÓN DE UN MOOC CON BUBUSKISKI

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ABSTRACT

This paper addresses the design, implementation, and validation of a Massive Open Online Course (MOOC) aimed at the training of primary school teachers in media competence (or media literacy), integrating the audiovisual project Bubuskiski as a didactic resource. The research was supported by a methodological design and validation study, structured according to the ADDIE model and the six dimensions of media competence. The validation phase was carried out through a pilot involving seven experts in media education, intentionally selected members of the Alfamed Network, who used an instrument that combined a numerical scale and open-ended questions. The results of the validation evidenced a robust, coherent, and pertinent design, registering an 85.7% High valuation in the correspondence between the training objectives and the modular structure. The main areas for optimization identified focused on the need to consolidate the content production component and to incorporate emerging topics such as mental health and artificial intelligence. It is concluded that the MOOC constitutes an innovative training proposal with high potential for the professionalization of the teaching staff in the domain of media competence.

Palabras clave:
Competencia Mediática, Alfabetización Mediática e Informacional, MOOC, Formación Docente, Educación Primaria, Educomunicación.

RESUMEN

El presente trabajo aborda el diseño, implementación y validación de un Massive Open Online Course (MOOC) orientado a la formación del profesorado de primaria en competencia mediática, integrando el proyecto audiovisual Bubuskiski como recurso didáctico. La investigación se sustentó en un estudio de diseño y validación metodológica, estructurado conforme al modelo ADDIE y las seis dimensiones de la competencia mediática. La fase de validación se llevó a cabo mediante un piloto con siete expertos en educación mediática, miembros de la Red Alfamed seleccionados intencionalmente, quienes utilizaron un instrumento que combinó una escala numérica y preguntas abiertas. Los resultados de la validación evidenciaron un diseño robusto, coherente y pertinente, registrando un 85,7 % de valoración Alta en la

correspondencia entre los objetivos formativos y la estructura modular. Las principales áreas de optimización identificadas se centraron en la necesidad de consolidar el componente de producción de contenidos y de incorporar temáticas emergentes como la salud mental y la inteligencia artificial. Se concluye que el MOOC constituye una propuesta formativa innovadora con un elevado potencial para la profesionalización del cuerpo docente en el dominio de la competencia mediática.

Introduction

Throughout history, the media have been fundamental in the construction of forms of social interaction, the circulation of information and the shaping of public opinion. In its early stages, communication was articulated in a unidirectional manner: the media emitted messages from a production center and the audience received them passively, with no real capacity to intervene in the process. Even so, mechanisms such as letters to the editor or telephone calls began to open small gaps in citizen participation, anticipating a profound change in the way of relating to media content.

During the 20th century, television consolidated its position as the dominant medium, expanding audiovisual culture and modifying information and leisure consumption habits. Today, the massification of the Internet, the intensive use of mobile devices and the emergence of platforms such as *YouTube, Instagram, TikTok*, online video games and generative artificial intelligence tools have configured a radically different communication ecosystem. In it, users no longer only consume information: they participate, create, share and reconfigure messages, giving rise to the figure of the prosumer (Toffler, 1980), an active agent in symbolic production.

This new environment multiplies opportunities for access to knowledge, creativity and citizen participation, but also introduces challenges that should be analyzed. The overabundance of information can lead to infoxication (Cornella, 2000), affecting the ability to discriminate what is relevant. The circulation of fake news, polarizing discourses and manipulation by algorithms make it difficult to form informed opinions. In addition, phenomena such as filter bubbles, echo chambers and algorithmic segmentation reduce exposure to diversity of perspectives, strengthening prejudices and cognitive biases.

Added to this are the already widely documented risks: loss of privacy, exposure to cyberbullying and hate speech, compulsive use of devices, impairment of sustained attention and tensions in interpersonal relationships (Hobbs, 2008; Livingstone, 2004; Pérez Tornero et al., 2007). These challenges not only have an individual, but also a collective and systemic impact, as they influence the way in which social narratives and democratic processes are constructed.

For this reason, promoting training opportunities in media education is a task that cannot be postponed. Its development requires the active involvement of educators and families, in order to promote critical thinking, respect for diversity, ethical sensitivity and responsible use of digital environments (Portugal & Aguaded, 2020). In addition to this need, it is important to have resources and public policies that support these processes in a sustainable manner. Within this framework, this article presents the design and validation of a MOOC on media education aimed at primary school teachers, which integrates audiovisual resources and the Bubuskiski Project characters to promote playful, critical and meaningful learning.

Conceptual Framework of Media Competence: Dimensions

The notion of media competence has been consolidated from the proposal of Ferrés (2007) and its subsequent development together with Piscitelli (2012), who establish six fundamental dimensions, which are expanded below:

- **Technology:** It includes the handling of devices, digital tools and computer programs, as well as the ability to adapt to new technologies in an autonomous manner. It involves understanding how digital systems and platforms work,

knowing the dynamics of updating and developing strategies to maintain effective and secure use. It also includes skills related to the technical production of images, audio and video, as well as privacy settings, data management and digital identity protection.

- **Language:** It refers to the recognition and interpretation of media codes, formats and grammars. It involves understanding how audiovisual, iconic, verbal, sound and interactive languages work and how they combine to construct meaning. This dimension covers the reading of images, the identification of elements of montage, rhythm, soundtrack and composition, as well as the ability to communicate messages using these codes appropriately in different digital media.
- **Reception and Interaction:** It includes the ability to critically analyze media messages, recognizing intentions, emotions, values and interests present in them. It also encompasses the ability to manage interaction in digital environments: participating in communities, collaborating, debating respectfully and evaluating the consequences of one's online actions. It involves understanding how media influence individual and collective perceptions, and how identities are constructed and negotiated through digital interaction.
- **Production and Dissemination:** It includes not only the creation of digital content, but also the responsibility involved in its distribution. It includes knowing the processes of planning, scripting, recording, editing and publishing audiovisual materials, as well as understanding the dynamics of information circulation in digital environments. In addition, this dimension includes respect for copyrights, licenses, privacy rules, ethical handling of images and the veracity of the content produced.
- **Ideology and Values:** It involves analyzing messages from an ethical and civic perspective, identifying the values they convey, possible manipulations, the stereotypes or biases they reinforce, and the interests (commercial, political or cultural) that sustain them. It also includes the ability to assess the credibility of sources, recognize discriminatory or hate speech, and exercise digital citizenship that promotes social justice, inclusion and respect for diversity.
- **Aesthetics:** It refers to the development of artistic sensitivity and appreciation of the expressive quality of media messages. It involves valuing creativity, originality, beauty and formal coherence in the production and comprehension of messages. This dimension also stimulates the ability to experiment with visual and sound resources, promoting creativity and divergent thinking in the production of content.

These dimensions make up a comprehensive vision that goes beyond the functional domain of technology: they are part of a citizen competence that is essential to develop in a critical and responsible manner in the digital society (Pérez-Rodríguez & Delgado-Ponce, 2012; Rojas-Estrada et al., 2024). However, recent research indicates that many teachers still do not feel prepared to take on this challenge (Aguaded et al., 2021; Gutiérrez-Martín et al., 2022; Serrano-Hidalgo et al., 2023). This training gap justifies the need for accessible and contextualized proposals such as MOOCs, capable of reaching a large number of educators and adapting to their pace and needs.

In this context, it is important to point out that its development not only allows understanding how messages are produced, circulated and consumed in digital environments, but also provides people with tools to face problems such as disinformation, *fake news* and post-truth, which affect decision-making and the quality of public debate (Kačinová & Chalezquer, 2022). Likewise, it is key to identify and counteract

hate speech, polarizing narratives and manipulated content that can damage democratic coexistence (Blanco-Alfonso et al., 2022).

Edutainment as a Pedagogical Engine of the Bubuskiski Project

The Bubuskiski Project is an educational audiovisual initiative that uses puppets as a didactic resource to promote media literacy among children and families. It arose from a study that showed the need to strengthen media skills in kindergarten and primary education, and was conceived as a playful and educational proposal that would bring the media closer to children in a critical and creative way. From the beginning, the project started from a simple premise: children learn better when the content connects with their emotional world and when learning is presented in a close and attractive format.

Figure 1
Use of puppets as a didactic resource in the Bubuskiski project

Note. Archive.

The series began to be developed in March 2013 and was broadcast for three consecutive editions in the program "La Aventura del Saber" of Televisión Española (TVE). In its initial stage, Bubuskiski addressed the six dimensions of media competence proposed by Ferrés (2007) in a progressive and child-friendly manner. Over time, Bubuskiski expanded its thematic scope to include emerging issues in the digital ecosystem, such as digital identity, misinformation, responsible use of devices and ethics in virtual environments. This evolution allowed the project to keep up to date with changes in the media environment, offering children tools to face contemporary challenges such as managing their own digital footprint or recognizing manipulated content. Currently, the project is part of Amibox, an initiative of the Atresmedia Foundation that brings together educational resources classified by age, aimed especially at children between 6 and 8 years of age. From this platform, Bubuskiski continues to contribute to the development of a more conscious, inclusive and participatory media culture from the early stages of education.

The driving force behind Bubuskiski's proposal is based on the principle of edutainment, a pedagogical strategy that combines teaching with enjoyment. As Américo et al. (2015), this trend integrates educational content with entertainment resources, which allows learning to be more meaningful and attractive to children. In addition, they

emphasize that this methodology favors the integral development of the individual by articulating cognitive, emotional and social dimensions within a coherent and stimulating experience.

The edutainment approach offers concrete benefits for children's learning. By combining fun and teaching, it facilitates information retention, increases intrinsic motivation and stimulates students' active participation. It also boosts the development of cognitive, social and emotional skills, while enhancing creativity and critical thinking (Batista-Rangel et al., 2024). This methodology makes it possible to present complex content in an accessible way, generating meaningful connections with children's daily lives and promoting the practical application of what they have learned (Matsiola, 2024). Thus, it contributes to strengthening essential media and digital competencies from an early age (Queiroga, 2007; Mainer Blanco, 2006).

Throughout history, edutainment has proven its effectiveness in various audiovisual productions. A classic example is Walt Disney's educational documentaries, which brought scientific knowledge to broad audiences through engaging visual narratives. Similarly, the iconic *Sesame Street* program became a benchmark by integrating songs, animated characters and everyday situations to promote early literacy and active learning. These proposals show how entertainment, when used with pedagogical intent, can become a powerful engine for education.

History and Consolidation of MOOCs in Digital Education

A MOOC, or Massive Open Online Course, is understood as a course available on the Internet for a large number of participants, without enrollment restrictions and with the possibility of learning at different paces and schedules. This flexibility, together with their accessibility from anywhere with a network connection, has made MOOCs a relevant proposal within digital education. For Callejo Gallego and Agudo Arroyo (2018), they represent an innovation with transformative potential in higher education; while García Aretio (2015) places them as another stage in the evolution of distance education.

This evolution has historical roots. In the 18th century, postal mail allowed the first experiences of non-face-to-face teaching, such as the tutorials announced by Caleb Philipps in 1728. During the 19th century, the telegraph and modern postal services facilitated the expansion of correspondence education. As early as 1886, William Rainey Harper of the University of Chicago came to believe that this model could outperform face-to-face education.

Throughout the 20th century, new technologies were incorporated. Radio and television became important tools for distance education, and institutions such as the *Open University* (1969) and UNED (1972) emerged and used them to offer accessible educational programs. Advances were also made in Latin America, such as Teleduc in Chile (1976), which began as a television program and today continues to offer online courses.

The end of the 20th century brought with it the advent of *e-learning*. The expansion of the Internet in the 1990s transformed distance education by enabling synchronous and asynchronous modalities, and technologies such as *Wi-Fi* facilitated mobility and seamless access to digital platforms.

In this context, MOOCs appeared in the 21st century as a natural evolution of digital education. Since 2007 the concept began to spread, and platforms such as Khan Academy, Coursera, Udacity and edX contributed to its popularization. The year 2012 was even

called "the year of MOOCs" due to its impact on the opening of access to knowledge (García Aretio, 2014).

MOOCs seek to expand training opportunities, especially in continuing education and professional updating. Thanks to their flexibility and low cost, they allow people from different backgrounds to access studies that might otherwise be difficult to attain. However, they also have important limitations. Its massive nature makes personalized attention difficult and poses challenges in evaluation strategies, which can lead to demotivation and abandonment. Therefore, those who design these courses need specific skills to create materials and activities that foster critical thinking, collaboration and self-regulated learning.

Today, MOOCs have established themselves as useful resources not only for general training, but also for teacher updating. Their accessibility makes them allies in educational contexts that seek to integrate approaches such as AMI. An example of this is the Autonomous University of the State of Morelos (UAEM), which has developed three MOOCs within its Digital Culture Program. Similarly, the University of Extremadura (2025) is promoting a MOOC in its third edition dedicated to AMI, aimed at teachers interested in the critical use of media in the classroom. It is important to mention that, in parallel and in a much more accessible and immediate way, we can find video tutorials on various topics on YouTube, or short videos on TikTok, which many people use for informal training, demonstrating that these platforms also play a significant role in contemporary learning processes. However, although these digital spaces allow quick access to multiple contents, they do not offer the necessary organization for a serious professional training. In contrast, a MOOC is designed with a structure that ensures a logical sequence of learning, as well as competency assessment and validation activities. This allows the user not only to receive information, but also to improve his or her educational practice in a critical and informed way.

Although they still face challenges, such as digital access inequalities, attrition or the need for more interactive pedagogical proposals, MOOCs reflect a history of innovation that continues to develop. When designed with clear pedagogical criteria and sensitive to local realities, they can become valuable tools to promote a more open, inclusive and critical education.

Method

The MOOC design was carried out following the five phases of the ADDIE instructional model (Analysis, Design, Development, Implementation and Evaluation), widely recognized for its effectiveness in planning and optimizing structured, learner-centered learning environments (Morales-González, 2022; Losada-Cárdenas & Peña-Estrada, 2022). This model, of a systematic and flexible nature, allows organizing the teaching-learning process in a progressive, evaluable and feedbackable manner, guaranteeing coherence between training objectives, contents, didactic strategies and evaluation mechanisms (Juárez-García et al., 2022).

In the **Analysis** phase, a lack of practical and contextualized tools for teaching AMI in Ibero-American educational scenarios was identified. To guide the structuring of the MOOC, the dimensions of Ferrés (2007) were adopted, considering that they allow addressing the different aspects of media competence in a comprehensive manner. The target audience was primary and secondary school teachers, who require continuous training and resources to adapt to contemporary digital environments, where information circulates quickly and complexly.

During the **Design** phase, the course was organized in two sequential modules (Table 1): the first, "Interaction and use of media", and the second, "Media competence". Each module consists of nine units that integrate a variety of didactic resources designed to encourage active learning. Among these resources are the videos with the Bubuskiski, designed to explain theoretical concepts in an understandable and entertaining way (see videos): https://www.bubuskiski.es/); expert interviews, which provide professional and contextualized perspectives; and interactive tools, such as *Genially*, which facilitate the creation of quizzes, simulations and practical activities aimed at consolidating the knowledge acquired.

Table 1

General structure of the MOOC

Module	Units	Objectives
Module 1: Interaction and use of media	Digital Devices, Inclusion, Fake News, Copyright, Digital Identity, Being a YouTuber, Influencers, Sharenting and Evaluation.	This module introduces teachers to the basic principles of responsible use of digital devices, inclusion in media environments and early detection of misinformation. From these axes, key aspects such as respect for copyright, the construction and care of digital identity and the critical analysis of current phenomena such as youtubers, influencers and sharenting are also addressed. The module concludes with a brief evaluation to assess the essential learning and recognize the most common challenges in daily interaction with the media.
Module 2: Media Competence	Education and AMI, Media Competence, Language, Technology, Reception and Interaction, Production and Dissemination, Ideology and Values, and Aesthetics.	This module delves into the fundamentals of media education and AMI, offering a synthetic vision of media competence and its component dimensions. The content explores the languages and codes of the media, the role of technology in the communicative processes, the critical interpretation of messages, as well as the basic principles of content production and dissemination. It also reflects on the ideologies, values and representations present in the media, together with the aesthetic dimension, understood as the ability to recognize expressive intentions and to value creativity in media communication.

Note. Own elaboration.

In the **Development** phase, 48 educational videos were produced, all accompanied by accessible subtitles and scripts, ensuring the inclusion and understanding of all participants. In addition, complementary resources were developed, such as infographics and downloadable guides through *Genially*, and various accessibility tools were incorporated, including subtitles, descriptive audio and compatibility with mobile devices. The collaboration with Grupo Comunicar was key to ensure a solid pedagogical design and a quality technical implementation, aligned with international digital education standards.

During the **implementation** phase, the MOOC was hosted on the virtual platform of Grupo Comunicar, recognized for its orientation towards educational innovation and scientific dissemination in the field of educommunication. At this stage, a validation pilot was carried out to test the technical functionality, pedagogical relevance and usability of the materials and activities designed.

The validation process involved the participation of seven experts in media education, selected by means of a purposive sampling based on their relevance to the Alfamed Network, their academic trajectory and professional experience in the field. Of these, six were specialists from different universities in Spain (Universidad de Huelva, Universidad

de Valladolid and Universidad de Cantabria) and one from Chile (Universidad Católica del Norte), which made it possible to incorporate an Ibero-American and comparative perspective on the training proposal. This process also allowed for the collection of qualitative and quantitative feedback on content coherence, technical accessibility and pedagogical depth. The first focused on the correspondence between objectives, activities and resources, ensuring a logical and relevant sequence. The second evaluated the ease of navigation, compatibility with different devices and the inclusion of accessible resources. Finally, the pedagogical depth analyzed the level of cognitive complexity, the appropriateness to the teaching profile and the ability of the MOOC to foster critical reflection and meaningful learning. This evaluation made it possible to adjust and optimize the final design, ensuring a coherent, inclusive and pedagogically sound course prior to its official launch.

Finally, in the **evaluation** phase, a validation instrument was used (available at: https://bit.ly/49lA5gH) that combined a numerical scale from 1 to 4 (1 = Low, 2 = Fair, 3 = Good, 4 = High) with open-ended questions. The instrument evaluated 21 items that covered the clarity and relevance of the general objective of the MOOC, its correspondence with the dimensions of media competence proposed by Ferrés, the balanced integration of these dimensions, the organization of the course in two modules, the sequencing of the units, the relevance and updating of the contents, their relation with the educational practice, the adequacy of the didactic resources, the pedagogical usefulness of the puppets, the quality of the audiovisual resources, the level of interactivity, the clarity and coherence of the evaluation activities, the diversity of evaluation instruments, the ease of navigation, the technical accessibility on different devices, the technical quality of the multimedia materials, the stability of the platform and, finally, the overall suitability of the MOOC to the training needs in teaching media competence.

The observations obtained made it possible to make significant adjustments, such as the optimization of technical resources, the deepening of emerging topics and the improvement of interactivity. While the evaluation of digital and delayed MOOCs may have limitations in measuring the actual acquisition of media competence, expert judgment provided strong initial validation. In addition, formative evaluation strategies were considered, through surveys and analysis of the use of the platform, as well as a final evaluation based on practical projects, to complement the assessment of learning.

Results

The analysis of the content validity of the MOOC on Media Competence, carried out through the quantitative and qualitative assessment of seven experts, provided complementary and highly relevant information to evaluate the relevance, coherence and applicability of the course.

Coherence of Contents. From a quantitative perspective, the results show a high degree of internal coherence in the course design. The majority of experts rated as high the correspondence between the objectives and the proposed modules (85.7%) and the adequacy of the design to the six dimensions of Ferrés (2007) (71.4%). In addition, the structure, sequencing and relevance of the contents reached a maximum rating (100%), which shows that the MOOC presents a logical, balanced and well-articulated development between theory and practice.

In the qualitative analysis, the experts coincided in highlighting the conceptual and methodological coherence of the course. Paula Renés highlighted the proposal as "innovative and transforming", while Odiel Estrada emphasized that the didactic design

is "in line with the objectives and contents proposed". Ignacio Aguaded valued positively the playful integration of the Bubuskiski, pointing out that they facilitate the understanding of complex concepts through attractive audiovisual resources.

However, areas for improvement were identified in relation to the deepening of certain modules. Heleny Mendía suggested expanding the content of Module 2, especially in the Production dimension, while Estrada Molina proposed strengthening the Aesthetics and Reception and Interaction dimensions to achieve a more complete balance in the coverage of media competence.

Technical accessibility. In terms of accessibility, the experts agreed that the MOOC presents a functional, intuitive and visually attractive platform, with adequate use of interactive resources (e.g. *Genially*). The navigability was positively evaluated, as well as the organization of the materials and the clarity of the interface. However, some evaluators pointed out technical aspects that could be improved. Heleny Mendía and Begoña Mora identified minor synchronization problems between audio and image, as well as textual repetitions in certain sections. It was recommended that these elements be reviewed prior to public launch to ensure a smoother and more accessible user experience. Ignacio Aguaded also proposed incorporating complementary resources per unit and creating a teaching exchange forum, in order to strengthen the interactive dimension of the course and promote collaborative learning, a key element in MOOC environments.

Pedagogical depth. This dimension analyzed the cognitive complexity, the appropriateness to the teaching profile and the potential of the MOOC to foster critical reflection and meaningful learning. The quantitative results reflect high evaluations in the theory-practice balance (42.9%) and, especially, in the transfer to the classroom (85.7%), which indicates that the contents are applicable to real educational contexts.

Qualitative comments reinforced this perception. The experts highlighted the course's ability to link theory with teaching practice, as well as the use of audiovisual resources that stimulate creativity and understanding of current issues. Patricia de Casas Moreno and Águeda Delgado Ponce valued the narrative and visual appeal of the MOOC, while Begoña Mora stressed its relevance for understanding the relationship between the new generations and the media.

Among the recommendations, it was suggested to incorporate emerging topics such as mental health, digital ethics, technological addictions and crimes in social networks, in order to update the content in the face of the contemporary challenges of digital citizenship. Delgado Ponce also emphasized the need to constantly update materials and to explore alternative evaluation methods that are more suitable for measuring media competencies in mass environments.

The triangulation of quantitative and qualitative results shows that the MOOC presents a didactically coherent, technically functional and pedagogically sound structure. The positive evaluations confirm the relevance of the design, the innovation of the ludic and audiovisual resources and the adequacy of the course to the dimensions of Ferrés.

The observations for improvement constitute an optimization map aimed at reinforcing the depth of some dimensions, broadening the thematic coverage, improving technical accessibility and strengthening interaction among participants. These suggestions aim, on the one hand, to enrich the contents related to teaching practice and the contextualized application of media competence, and on the other hand, to integrate more dynamic resources that facilitate the critical appropriation of the concepts. Opportunities are also identified to diversify presentation formats, including multimodal materials and interactive experiences that favor different learning styles and help reduce

gaps derived from connectivity or basic digital literacy. Regarding interaction, the comments highlight the convenience of promoting more sustained spaces for dialogue and collaboration, capable of stimulating collective reflection, co-creation of knowledge and a sense of community among teachers from different contexts.

Discussion and Conclusions

The validation process through expert judgment of the Bubuskiski MOOC has been key to ensure the quality and relevance of the training proposal aimed at primary school teachers in media competence. The results confirm that the design is consistent with its objectives and aligns with the theoretical framework of the six dimensions of media competence of Ferrés (2007).

The analysis shows that Bubuskiski's characters and resources facilitate the understanding of complex media phenomena, such as disinformation, digital identity or content production. The strengths highlighted by the experts, in particular the pedagogical innovation derived from the use of puppets and the integration of interactive resources, indicate that the MOOC has a significant potential to motivate and facilitate playful, active and close learning. This evidence supports the viability of the edutainment approach in teacher training (*edutainment*), and coincides with Queiroga (2007) and Mainer Blanco (2006) on the effectiveness of combining teaching and enjoyment in training experiences.

The results also highlight the relevance of integrating narrative and contextualized elements, as they favor the internalization of complex concepts and their application to real classroom situations. This approach responds to the need for practical and applied training emphasized by Pérez Tornero et al. (2007) and Toscano-Alonso et al. (2022) who point out that media literacy requires not only theoretical knowledge, but also skills to analyze, produce and mediate digital content in a critical and ethical manner. In this sense, the Bubuskiski MOOC offers an opportunity to bridge the gap between theory and practice, providing concrete tools that allow teachers to promote effective and contextualized media learning.

The MOOC is presented as a tool for direct application in the classroom, backed by its effectiveness. Thanks to its modular structure and Bubuskiski's resources, teachers can reproduce these dynamics with their students, using them to encourage discussions on digital identity or as an example to develop their own audiovisual content, thus promoting the transition from theory to effective school practice.

One of the limitations of the study is the small size of the sample of experts (seven), which restricts the scope and generalization of the results, even though an exhaustive qualitative analysis was carried out to obtain observations of high interpretative value. In addition, there is a lack of empirical validation with end users, practicing teachers or teachers in training, which limits the possibility of estimating the real impact of MOOCs in diverse educational contexts and of identifying how learning is translated into concrete pedagogical practices. The evaluation focused on content validity and relevance of the instructional design, without systematically addressing other dimensions of validity, such as inter-rater reliability or usability assessment.

Likewise, the research does not contemplate post-implementation follow-up metrics, so it is not possible to assess the pedagogical effectiveness of the MOOC in terms of acquisition, transfer and sustainability of media competence over time. Another aspect to consider is the rapid evolution of digital environments, theoretical frameworks on media

literacy and edutainment formats themselves, which demand constant updating processes of content, resources and activities to maintain the validity and coherence of the course (Ferrés & Piscitelli, 2012; Hobbs, 2008). Finally, the study does not address possible biases derived from the profile of the experts, their institutional background or their relationship with similar initiatives, which could influence the overall assessment of the MOOC. Despite these limitations, the findings provide a solid basis for guiding future improvements and expansions of the training project.

With a view to future editions, it is pertinent to delve deeper into the impact of the edutainment approach characteristic of the *Bubuskiski* MOOC, examining how its narrative, playful aesthetics and use of characters influence teachers' motivation, retention and learning experience. It is also worth investigating to what extent teachers subsequently transfer these creative and narrative strategies to their own pedagogical practices, especially in activities oriented to the development of critical thinking, information verification and ethical reading of the media. Another promising area is to evaluate the effectiveness of multimodal course resources, challenges such as *scape rooms*, fictional situations or gamified dynamics, to strengthen the understanding of contemporary phenomena such as disinformation, hate speech, *deepfakes* or algorithmic bubbles.

Similarly, future lines of work could focus on expanding the *Bubuskiski* narrative universe through the creation of new micro-stories, audiovisual capsules or mini-games that address emerging issues of media literacy. It is also important to promote accessibility through adapted materials, alternative routes for participants with low connectivity and inclusive support tools. Finally, it is suggested to promote post-course communities of practice, design didactic kits that can be transferred to the classroom and carry out comparative studies between this edutainment approach and other training models in AMI, in order to consolidate its contribution to pedagogical innovation and the strengthening of media competence.

In short, the expert validation endorses the theoretical and pedagogical soundness of the Bubuskiski MOOC, consolidating it as an innovative proposal in the teaching of media competence, capable of integrating academic rigor, didactic creativity and ethical commitment, promoting critical, responsible and meaningful learning in digital education.

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EVALUATION OF PODCASTING AS AN INDEPENDENT AND UNIQUE COMMUNICATION MEDIA COMPARED TO TRADITIONAL RADIO

Valoración del podcasting como medio de comunicación independiente y singular frente a la radio tradicional

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ABSTRACT

The study analyzes the nature of podcasting as an independent communication media compared to radio. The problem posed is to determine whether podcasts establish a unique relationship with their audience, differing in terms of credibility, influence, validation, etc., from conventional radio. The methodology used is qualitative, based on a "personality test" designed by the authors that compares ten key areas. The results show that independent podcasts exhibit eight notable particularities, highlighting thematic flexibility, investment, or interaction. In contrast, radio and podcasts from large networks show greater similarities to each other. This work concludes that independent podcasting constitutes a unique communication media due to its ability to address alternative topics, the absence of significant legal restrictions, and its democratization of content creation access. However, podcasts from networks reflect radio patterns. The research reveals that, although both formats share a common foundation and use words to convey messages to the audience, they do so through different emotional connections.

Palabras clave:
podcasting, pódcast, radio, medios de comunicación, audiencias.

RESUMEN

El estudio analiza la naturaleza del podcasting como medio de comunicación independiente frente a la radio. El problema planteado es determinar si el pódcast establece una relación única con su audiencia, diferenciándose en términos de credibilidad, influencia, validación, etc,. de la radio convencional. La metodología empleada es cualitativa, basada en un "test de personalidad" diseñado por los autores que compara diez áreas clave. Los resultados muestran que los pódcasts independientes presentan ocho particularidades notables, destacando la flexibilidad temática, la inversión o la interacción. La radio y los pódcasts de cadenas muestran, en cambio, mayores similitudes entre sí. El trabajo concluye que el podcasting independiente constituye un medio de comunicación singular por su capacidad para abordar temas alternativos, la ausencia de restricciones legales significativas y su democratización en el acceso a la creación de contenido. Los pódcasts de

cadenas, sin embargo, reflejan los patrones de la radio. La investigación revela que, aunque ambos formatos comparten un tronco común y utilizan la palabra hablada para hacer llegar mensajes a la audiencia, lo hacen mediante vínculos emocionales diferentes.

Introduction

The problem to which this research provides an answer is to assess the nature of a sound format that is gaining followers every day, but has not yet defined its place in the media landscape. Due to its characteristics, the podcast could be decisive in conditioning the way radio is understood, or represent only a useful resource. Pedrero Esteban et al. (2023, p. 62) indicate that:

> The podcast has established itself as a key medium in today's media landscape, offering an intimate and personalized narrative that connects with diverse audiences, from entertainment to education, in a context where traditional radio is losing sync with digital consumption habits.

The appearance of a different media always generates a new link with the audience, attracts new segments of the public and reinforces the assumption of a particular language. In addition, with a different media and a changing audience, the door is open to innovative advertising investment strategies. Let's remember that the media are the main supports used by brands to promote themselves. This is recalled by Rodríguez Ardura (2011, p. 142):

> There is a strong symbiosis between advertising and the media. Advertising needs the medium, takes advantage of it, squeezes every last drop of its capacity to provoke and inform. The media needs advertising; advertising revenue is a resource that is hard to refuse.

Although radio maintains a solid position in social customs, it cannot be ruled out that we are at the dawn of a different medium, inspired by radio broadcasting, but with its own characteristics, functions, audience, nature and identity. Costa-Sánchez and Piñeiro (2022, p. 103) state that:

> The podcast is positioned as a disruptive medium in the media ecosystem, as its flexible and accessible format allows creators to experiment with unique narratives, differentiating itself from traditional media by prioritizing authenticity and closeness to the audience,

The main novelty of this work is the approach to which the podcast is subjected, since it is a phenomenon that has been studied from different perspectives, but in general, its expansion, consumption, language and potential have hardly been examined. A review of previous research revealed the existence of a scientific gap, since the essence of the format's character, i.e. its capacity to generate a relationship between the transmitter and the receiver different from the one offered by radio, is often overlooked. Rojas-Torrijos and García Marín (2022, p. 127) state that:

> The nature of podcasting lies in its ability to democratize content production, allowing diverse voices to generate authentic and accessible narratives, breaking with the hierarchical structures of traditional media and consolidating itself as a space for communicative innovation.

The justification for this article lies in assuming the importance of whether or not podcasting is a communication medium different from radio. If this format constitutes a different way of communicating with respect to previous ones, it will bring with it a theoretical universe. New forms of communication "create new audiences, have new forms of rhetoric and content and even provide new forms of knowledge" (Cardoso, 2010, p. 128). And, on the other hand, new media "attract innovators, iconoclasts and risk-takers, i.e., some of the most active creative minds" (Manovich, 2005, p. 15).

This research may also break new ground in the study of social interactions and provide guidance on future communication trends. The nature of a medium forces us to review our vision of its use and can lead to unsuspected discoveries. Bonini and Sellas

(2024, pp. 24-30) advance that broadcasting and podcasting "point toward greater personalization and use of immersive technologies such as artificial intelligence and 3D audio."

The main objective of this research is to assess the nature of the podcast as a means of communication different from traditional broadcasting. That is, to determine whether it generates a link between the sender and the receiver other than the one established by the radio. Each media outlet builds its own interaction with its audience, but not only in terms of the language codes that unite them, but also in much deeper aspects such as credibility, influence or validation. If the podcast can provide a novel relationship, it may also generate new approaches that lead us to think of it as more than just an advantageous resource. Santos Díez assumes it (2023, p. 89) when he states that podcasting "redefines the relationship with the public by offering an intimate and personalized experience, where the audience feels directly challenged, fostering an emotional connection that contrasts with the more impersonal nature of traditional media".

Our secondary objective is to compare the distinctive features of podcasting and radio in order to understand their respective reactions to different areas of interest, such as legal aspects, content structuring, financing, etc.

In the background to the problem, in February 2004, British journalist Benjamin Hammersley published an article entitled *Audible revolution* in *The Guardian*, in which he used the term podcast. He did not write this word in the first instance, but when he handed in the note, the proofreaders asked him for one more sentence to complete the text.

Hammersley added: "What might we call this new phenomenon, how about podcast?". Months later, Oxford Dictionary officials contacted him and assured him that they had not located any previous citation of that word and asked him if he himself had read it before. Hammersley said no and, in 2005, the Oxford Dictionary referred to the term -podcast- as the most important entry added to its publication that year. According to Mendoza (2021, p. 26), "amateurism is behind the genesis of podcasting, since many podcasters today recognized, started their projects without sufficient technical knowledge to develop them".

Three aspects contributed to the emergence of the podcast: one technological, one related to accessibility and one historical. Regarding the former, the most widespread audio format of all is the so-called mp3, launched in 1993, which triumphed due to its versatility. Lopez (2015, p.180) adds quality and compatibility:

> The mp3 data loss only affects frequencies inaudible to the human ear, so its audio quality is very similar to CD quality. It stands out for its high comprehension capacity and its wide hardware and software compatibility, being the digital audio format par excellence in the Internet world.

Once the technical problem was solved, the second difficulty was accessibility, that is, achieving multiple use of the information contained in an audiovisual document. So, once computer files capable of transporting quality sound were available, how could they be massively consumed and shared? The answer was brought by the concept of syndication, which consists of periodically reviewing files in their download sources to see if any new ones have been added. This is achieved through documents called *feeds*, which are accessed through aggregators.

The third part of the process is of a historical nature, since a success story was needed to attract the attention of the audience, as reported on the UNESCO website in a text by Siobhan McHugh, professor of journalism and co-producer of podcasts. McHugh is referring to the work he developed in 2014 an independent radio program called "Serial" about the murder of a Maryland student, Hae Min Lee. Sarah Koenig, author of the program in podcast format, obtained five million downloads in one month, but also

discovered a way of radio expression. According to McHugh (2016, pp. 65-82), the investigative journalistic approach, combined with an intimate and thoughtful narrative style "not only humanized the news, but also redefined how real stories can be told through audio, inspiring a new generation of podcasters."

Method

To address the problem of this research, a qualitative methodology has been chosen, constructed by means of a "personality test" designed by the authors to test the parallels and differences between radio, podcasts produced by radio networks and those generated by independent podcasters. Moreno García (2023, p. 837) clarifies that:

Independent podcasts stand out in the media landscape for their creative freedom and ability to address niche topics with authenticity, while network podcasts, backed by large platforms or media outlets, tend to prioritize professional production and scalability.

To analyze the differences, the test compares ten areas of interest, configured by a set of criteria that includes accepted notions of what a media means and the functions it fulfills. It is inspired by the conception that some thinkers developed around the concept of communication -Lazarsfeld, Lasswell, Merton or Wright-, the approaches that Dominick develops as characteristics of the media and a decalogue that the British Broadcasting Company proposes to distinguish a radio program from a podcast.

The first step was to review the concept that these theorists ascribe to the media and examine the functions they assign to them. We intended to test whether podcasting is compatible with these functions or simply presents some overlaps. In 1948, Harold Lasswell, an expert on the relationship between media and propaganda, explored these functions in an article entitled "Structure and function of mass communication", identifying three, as Lopez (2004, p.159) reports:

> The monitoring of the environment, revealing everything that could threaten or affect the value system of a society; the bringing together of the different parts of society to produce a response to the environment and the transmission of the social inheritance.

With respect to surveillance, Lasswell believes that the media warns of natural hazards, wars or news that may affect the economy and admits to a moralizing role. At the individual level, it refers to opinion leadership and status transmission. It also highlights some dysfunctions, since they promote panic and produce a narcotizing effect. Within the framework of correlation, he believes that the media support mobilization, combat threats to social stability, help preserve power and maintain cultural consensus.

In parallel Abelino (2017, p. 50) points out that "the functions of the media enable standardization and the maintenance of cultural consensus. On the other hand, they reduce the variety of subcultures". Two sociologists, Paul Lazarsfeld and Robert Merton, in their study of the effects of radio during the Second World War, developed between 1940 and 1945, identified an additional function that Lopez (2004, p. 159) picks up "entertainment and complicates the scheme by distinguishing the possibility of dysfunctions, as well as latent and manifest functions". Similarly, in an essay entitled "Functional Analysis and Mass Communication", published in 1960, Charles Wright adopts the four functions and stresses that the media produce mass entertainment, but entail passivity.

So far we have talked about the media, but it is necessary to specify that our work is oriented towards a specific typology: mass communication. Reviewing the works of McLuhan (2009, p. 11), we find that it makes no sense to measure the audience for a

medium to be mass or not since the expression mass media refers "not to the size of the audiences but to the fact that everyone is involved in them at the same time".

This ambiguity is underscored by the ideological component that conditions it. Thus, Lucas (1976, p. 128) believes that the expression *mass society* has no scientific character and the word *mass*, "in spite of its abundant use in sociological writings, does not have a precise meaning and becomes intelligible only when used in a precise context and related to certain kinds of behaviors, institutions and structures". For his part, Parra (2000, p. 131) considers that mass society has already been surpassed and circumscribes it to the audience influenced by cinema, radio or television. For this author, we are already immersed in a "new mass society" framed by globalization.

We speak today of this new mass society because modern communication techniques simultaneously address masses of listeners or viewers who are bombarded with ideas to arouse aspirations or needs through advertising. Artero Muñoz and Martínez Costa (2022, p.55) place the podcast at the epicenter of these changes and believe that "podcasting transforms mass communication by allowing segmented and personalized distribution, challenging the unidirectional model of traditional media and promoting a closer and more participatory dialogue with global audiences".

Another author who has influenced our check table is Dominick (2000, p. 16), who refers to the media as "channels of mass communication. It includes not only the mechanical devices that transmit and sometimes store the message, but also the companies or institutions - public or private - that use these devices to transmit messages." Dominick proposes a series of traits to identify a media outlet and it will be our job to check if the podcast fits them:

- Mass communication is carried out by complex organizations.
- They have gatekeepers.
- They need large resources.
- They are for profit.
- They are highly competitive.

The third pillar on which the table is based is a decalogue that the British Broadcasting Company developed to differentiate a radio program from a podcast. This research has another purpose, but given the quality of the source and the content of the proposal, it is a valuable support. The mention is made by Orrantia (2020, p. 38) and, because of its relevance to this study, it is transcribed below:

- A podcast is not a radio program; even if radio programs are consumed in podcast format.
- For the younger generations, who will never own a radio, podcasts are their radio.
- The story and theme will always be the guide to determine the length of the podcast.
- They are designed for the headphone generation and so we must be respectful, warm and soft inside their heads.
- Be informal, be intimate, but remember that the freedom to use other language is not an obligation.
- Podcasts are a visually powerful form of audio. It is cinema for the ears.
- The "angels" are in the details and the podcasts tell big, emotionally complex stories, real or invented.
- The podcasts offer clarity within the chaos. They offer focus and context.
- They are tribal. They create community. Unen.
- Regardless of where podcasts emerge, digital forms of audio are native worldwide.

With these considerations, we present the criteria that make up the media personality "test" in Table 1.

Table 1

Criteria of the media "personality test" and objectives to be pursued

Differential Aspect	Objective of the Comparison
Legal	Reflect how laws adapt to changing technologies.
Technological	Know the technical solutions used by each format to reach their listeners.
Investment	Compare how resource efficiency is maximized.
Financing	Understand how changes in consumption patterns and technology impact the media industry.
Channel	Clarify how content is distributed within the audience and observe the impact of the audio.
Public interaction	Highlight the parallels and differences in the way of connecting with the public.
Content organization	Observe how their spaces are arranged and verify whether their behaviors are parallel or differ significantly.
Genres	Understand how technological changes and the distribution of sound content influence the way stories are told.
Themes	Clarify aspects such as thematic flexibility, innovation in creation and the difference between fixed programming and on-demand content.
Language	Identify the predominant forms of language because they establish the relationship with the audience.

Note. Table prepared by the authors.

To validate the "personality test" as a methodological tool, author reflexivity, "a method that critically examines the role of the researcher in the construction of knowledge" (Finlay, 2002, p. 531), was used. Through a reflective journal, it was documented how the experience of the main author of this paper, both in the area of professional journalism and in the creation of podcasts, influenced the selection of the ten criteria (legal, channel, language, etc.). It is true that there was an initial inclination towards the hypothesis that podcasts are inherently independent and this led to the prioritization of criteria such as "content organization" or "language", focused on creativity. However, when this bias was identified, the items were adjusted by reviewing the literature on regulation and financing, ensuring greater representativeness.

During the application of the test, we meditated on how to reduce our own influence on the subject, interacting with other journalists and podcasters, who provided balance with different perspectives. It should be noted that there was a much less enthusiastic tendency among journalists than among content creators to consider podcasting as an independent media, a value that has been assumed in the critical spirit of this analysis.

The sample on which the test has been applied has had two aspects, a generic one, since during ten months, numerous radio programs and podcasts of different themes and nature were monitored and listened to. The second route has been more specific, focusing on three podcasts (two independent and one network) and two radio programs (also available as podcasts), which are described in Table 2.

Table 2

Radio programs and podcasts analyzed

	RADIO PROGRAMS		**PÓDCASTS**		
Title	**Weekend with Cristina López Schlichting**	**It's morning of Federico**	**Libros de arena (Spain)**	**Sayonara Baby (Spain)**	**Let's talk of what does not exist**

					(Mexico)
Emitter/ Location	COPE (Spain)	esRadio (Spain)	RNE Audio	Ivoox, Apple Podcasts, YouTube	Spotify, iVoox, Amazon, Apple Podcasts, YouTube
Broadcast	Saturdays and Sundays (10-14 hours)	Monday to Friday (6-12 hours)	Weekly	Variable	Variable
Typology	Magazine	Magazine/ Informative	-	-	-
Financing	Advertising	Advertising	Public, RTVE budgets	Monetization, listener support	Monetization, listener support
Other considerations	Also available in podcast	Also available on podcast	It is also broadcasted on Radio 5	-	-

Note. Table prepared by the authors.

Results and Discussion

The first comparative level is the **legal aspect** that regulates broadcasting and podcast transmissions. Taking the Spanish legal system as a reference, there are complex legal regulations for starting up a radio station, especially if national coverage is sought. In addition, there is one area in which the provisions are vague, and that is timing. The granting of a license has a duration of fifteen years, but does not require deadlines for the state to offer new licenses (or even the same ones). All this gives an idea that broadcasting over the airwaves has legal requirements that are not easy to meet. Gallego and Leyva (2012, p.34) indicate that:

In order to protect the plurality of information, the law establishes a series of restrictions. It is not allowed to directly or indirectly control more than 50% of the hertzian radio administrative licenses, nor more than five licenses in the same area of coverage.

The same is not true for podcasts. Those produced by broadcasters are stored in their own repositories, where listeners can easily locate them, but since they are downloadable sound documents, the legal requirements almost disappear. It is even easier for independent podcasters, who simply deposit their podcasts on their own websites or on hosting platforms created by third parties their own websites or on hosting platforms created by third parties. Campos Freire and Fernández Alonso (2023, p. 19) reaffirm the particularity of podcasting when analyzing its status:

The consumption of podcasts poses new legal challenges in the media landscape, especially around copyright and content regulation, as their decentralized nature complicates the application of traditional regulations designed for mass media.

The platforms only impose minimum standards that have more to do with the inner workings of the website or app than with the regulation itself. In general, they refer to copyright, intellectual property, permitted content and monetization. Spotify states that creators must hold the rights to uploaded content, including music or material from third parties. It also prohibits content that violates local laws or international regulations; allows monetization of podcasts through subscriptions and advertisements, but charges fees and requires compliance with its Monetization Terms.

IVoox allows creators to control the privacy of their episodes, including restricting content to subscribers, but they must ensure that it does not infringe on third party rights or local laws. Content considered "illegal" is removed.

Apple Podcasts has a stricter approach to content control, especially for paid programs in the Apple Podcasters Program, focusing on copyright, explicit content and regional restrictions. The two independent podcasts analyzed are hosted on one or more of these platforms, while "Libros de arena" is hosted on RNE Audio, Radio Televisión Española's repository.

The second differential aspect—the **form of broadcasting**—is of a technical nature and states that traditional radio transmits by means of electromagnetic waves put into the air by a powerful antenna that are picked up by listeners through their receivers. More precisely, the radio, according to Iglesias (2021, p. 66) "emits sound waves that a receiver picks up and recovers so that the listener only receives the transmitted signal." This definition highlights the technical nature of radio as a one-way transmission system, where the quality of the listener's experience depends on the accuracy of signal retrieval. However, in the current context, where podcasts and digital radio have transformed audio consumption, Iglesias' description could be expanded to include non-traditional formats that transcend conventional sound waves. This observation suggests that, although traditional radio maintains its relevance, its technological evolution poses new challenges for its definition and use in modern communication.

Álvarez-Chávez et al. (2022, p. 773) state that podcasts are "audio files, whose length and style vary according to the needs of the sender and receiver" "are audio files, the length and style of which vary according to the needs of the sender and receiver". In addition, they can be reproduced by means of programs and applications that are intuitive to use and, in many cases, free of charge and accessible in seconds.

Our third measure is **investment**. This aspect is usually high in traditional radio, even for a simple municipal radio station. Expenses start with a legal team to ensure legal management and compliance with regulations to access the license and continue with the provision of a studio to produce programs. In addition, a transmission antenna must be installed, which also requires permits, maintenance, operators, etc. Once this investment has been made, personnel capable of putting it into operation are needed.

The teams of radio companies, warn Gallego and Leyva (2012, p. 38), "have a clear multidisciplinary character, made up of professionals with different profiles and skills who assume all the necessary functions in the production and marketing process: journalists, broadcasters, technicians, IT, commercial, financial, etc.".

A valuation by the Exonegocios website estimates an investment of "between five thousand and twenty thousand dollars to start a small but standard radio station that can only cover a limited location, such as a university campus. If we are talking about a medium scale station, but with the appropriate standards and levels, about $350,000 will be required. But if the claim is to create a large-scale radio station with an unlimited coverage area and outlets in key regions of the United States, a radio chain that intends to sell franchises, then the initial budgetary requirements may have as a starting point no less than two and a half million dollars."

In examining the two radio stations whose programs were analyzed in this study, we found that COPE is the second most listened to general radio station in Spain, with almost 3.7 million daily listeners according to the 2025 General Media Study. Its revenues come from advertising, sponsorships and, to a lesser extent, agreements with religious institutions. There is no public record of its annual budget, although some reports based on data such as infrastructure, the number of local stations or the pension plans of its staff put it at just over twenty million euros.

For its part, Es Radio, being a smaller private company, discloses even less financial information, but again alluding to those reports that calculate figures based on similar data, its annual budget would not reach ten million euros.

When it comes to incorporating programs in podcast format, however, broadcasters do not have these problems because they take advantage of all the infrastructure they already have (studios, microphones, mixing desks, etc.) to produce other sound documents. And in the case of independent podcasters, they have significant competitive advantages: all they need is a computer, a medium-quality microphone and a rudimentary mixing desk, all of which are available for modest investments. We would be talking about amounts between 570 and 1,900 euros with brand new equipment and including subscription to distribution platforms. It was not possible to verify this with Ice Murdock, director of the "Let's talk about what doesn't exist" podcast, but it was possible to do so with Toni Moya, head of "Sayonara Baby", who indicated that "in the beginning, the equipment was minimal, just the bare essentials. At present, with more than two hundred chapters broadcasted and because of my love for technology, I always try to introduce improvements and I am aware of any new developments, but it is not essential to make a good podcast".

The fourth point is **financing** and it is the one with the greatest overlap. Both traditional radio and network podcasts, as well as independent podcasts, cover an important part of their costs through advertising, although this is an increasingly complicated market. Also relevant is the concept of monetization of the podcast, which is carried out not only through advertising promotion, but also through other means such as subscriptions, premium content, donations, crowdfunding or product sales. The first three were identified in the independent podcasts we have studied, "Hablemos de lo que no existe" and "Sayonara Baby", but also in other listening objects such as "Treki 23", "Hilos de Musicología", "Yo Virtualizador" or "Jugones". This is not the case of "Libros de Arena" which, belonging to the platform of Radio Nacional de España, is financed with public money.

Gómez Zurita and Pedrero Esteban (2024, pp. 1-20) admit the difficulties of independent creators to make their products profitable:

Podcast financing in Spain faces a complex landscape, where most of the revenues come from advertising (70% according to 2023 data), although diversification towards subscription and crowdfunding models is gaining relevance, especially among independent creators.

But how much does it cost to broadcast a radio spot? We are talking about a media that is cheaper than the press and extremely cheaper than television. However, the broadcast of a single commercial, even in a program with a large audience, has little effect. Therefore, although the fee for a commercial break can range from 18 to 60 euros for a private broadcaster, to obtain an acceptable result the break must be broadcast a reasonable number of times for a few days. These campaigns depend on the number of broadcasts priced, the time at which they are broadcast and the program in the course of which they are aired.

Public funding should also be pointed out as a solution for state broadcasters, whose survival depends on government budgets, with the servitudes that this entails. Independent podcasts, on the other hand, generate revenue through ads and sponsorships, but offer a more flexible format than radio and are always cheaper.

The fifth comparative level is the **channel** and is shared by all three formats; in this case it is the spoken word. Even the listening liturgy is similar in all three cases. Every day it is more and more unusual to turn the dial in search of a program, scanning through the airwaves, but rather using the scanner to pre-tune the frequency, or applications running

on the cell phone or computer. Once the chosen voice has been found, the charisma of the speaker, the thematic approach, the ability to finish the program, the interest of the data or the revelation of the interviews all come into play. The spoken word transferred to the medium, says Cortés (1998, p. 617), "provokes in the audience a personal relationship thanks to the quality of sound to be introjected, to the possibility for the listener to recreate the message according to his experience, his experiences, his history".

Public interaction is the sixth item and helps to understand the scope of the three formats. The radio has some spaces where the listener can participate live in the broadcasts. This is the case of the two programs we have studied, both "La mañana de Federico" and "Fin de semana con Cristina López Schlichting", usually open a short time to the listener's voice, although in the second case it is limited to banal topics.

It is always a risk and can cause uncomfortable situations, but it also brings closeness to the environment and even generates interesting contributions. Podcasting is more open to these initiatives, both network and independent, and since it is often promoted through social networks, this interaction can go viral. This has its positive side but also its opposite; the massive awakens the interest of advertising, but it is true that it can generate an adverse effect if the reaction of the listener is not as expected.

In one of the independent podcasts we have studied, "Let's talk about what doesn't exist", the host, Ice Murdock, offers listeners the opportunity to tell their own stories or propose topics for future programs. He calls this group of participants The Nocturnal Family. Sayonara Baby" is also open to suggestions from the public, but you must be a subscriber to participate.

Martínez Costa and Lusarreta (2023, pp. 45-54) point out that podcasting creates a bilateral dynamic "that allows content creators not only to disseminate information, but also to build a relationship of trust and engagement with their audience".

The next criterion is the **organization of content**, ranging from the presentation of programming grids in traditional stations to the spontaneous and almost chaotic broadcasting of independent podcasts. Sellas and Sola (2022) observe an evolution "towards more flexible structures adapted to the demands of digital audiences. Podcast producers prioritize non-linear narratives and episodic formats that allow for greater thematic segmentation".

In September, the radio stations present their season's programming, and the stations' podcasts also maintain a certain order, almost like documentary collections. Independent podcasts, on the other hand, do not follow strict schedules; they appear and disappear according to their needs or as they have new content for their listeners. There are some *podcasters* who, according to Sellas (2022, p. 18), "advocate improvisation and lack of pre-planning as a style."

With respect to the **genres** that predominate -the eighth criterion-, the traditional networks are inclined towards the usual journalistic formulas: information, entertainment and opinion, because they prefer to be recognizable to the audience and to offer what listeners expect in the style of each company. Independent podcasts can be cut to any pattern, they are often unpredictable; sometimes they imitate the style of classic broadcasters, combining speech and tunes, and sometimes they break with the unwritten rules and try new formulas with varying degrees of success. Listeners reward with their attention those who connect with their tastes and move away from proposals they consider less attractive. For Lucas and Garcia (2013, p. 533) "the podcast is very free in topics and styles (...) and although it can be formal, it tends to the opposite".

Something similar happens with the **topics**, which constitute the penultimate section of the test, although it is important to highlight the greater boldness of independent podcasts in the way they approach content, since they are not subject to

ideological or economic barriers. This principle is often transmitted to those who participate as collaborators in the programs and the most tangible example is the interviews. This is what Terán (2021) quotes in an opinion article: "In the freedom of the podcast, unfiltered chatter shines again. The same one that is undervalued by the mass media".

For their part, Fernández-Sinde and Gallego (2023, pp. 123-140) praise the freedom of independent podcasters as it "allows creators to explore hyper-specific content, connecting with segmented audiences and generating active communities that value the authenticity and depth of the topics covered".

The last criterion is the **language** used in the three formats and the fact that conditions each one is the use or not of a style guide. In the case of traditional channels, but also in the case of podcasts produced by them, the use of the manual is mandatory.

Comparative formats	Overlapping aspects	Non-matching aspects
Independent radio / podcast	2	8
Radio / podcast network	5	5
Stand-alone podcast/chain podcast	3	7

This is not meant to imply that this fact is limiting, but a medium of a certain size imposes on its professionals a set of rules that make the chain recognizable. In contrast, freelance podcasters do not usually have a style guide, but work out the imponderables of voiceover as they go along. In the "Sayonara Baby" podcast, we have detected the use of expressions that are a little bit dirty, in an attempt to generate closeness with the audience. Possibly this "style" is intended to emphasize the difference with programs and even podcasts of a formal nature. Again, the intention is not to assess the effect of these decisions, but to record the differences involved. Sabés (2008, p 194) states that a style guide "is an instrument of consensus approved by the medium to be used by the editors".

Some authors such as Pedrero-Esteban and Herrera-Damas (2022, pp. 849-860) note a formula used by independent creators that develops a narrative style that combines spontaneity with carefully designed structures. Its objective would be to "adapt the discourse to niche topics and to the expectations of specific communities, which reinforces listener identification and engagement".

Although its value is indicative, Table 3 shows, as a numerical summary, the parallels and dissimilarities of this analysis.

Table 3

Numerical summary of parallels between radio and podcasting.

Note. Table prepared by the authors.

Taking into account the ten points of comparison and the three formats examined, Table 4 has been constructed to highlight the particularities observed.

Table 4

Differential aspects between radio and podcasting.

Differential aspect	Traditional radio	Podcast chains	Independent podcasts

Legal	Frequency concession	No prerequisite	No prerequisite
Broadcast	Electromagnetic waves	Through the Internet	Through the Internet
Investment	High	Media	Download
Financing	Advertising / public funds	Advertising / public funds	Advertising / sponsorship / membership / crowdfunding
Channel	Word	Word	Word
Public interaction	Media	Nearby	Very close
Content organization	Programming grid	File repository	Freedom of schedule and extension
Genres	Journalistic	Journalistic	Free
Themes	Generic	Generic and special programs	Total freedom, including variable
Language	Chain style guide	Chain style guide	Very close to the listener

Note. Table prepared by the authors.

Conclusions

The data provided by the "personality test" allow us to draw a series of inferences about the nature of the podcast and its potential entity to value it as an independent medium:

- The table of differential elements indicates that there are eight opposing variables between radio and independent podcasts, which gives a clear idea of the divergent realities in which they operate. Only two areas coincide: the use of words as a communication tool and advertising as the main source of financing. These differences are smaller when we compare radio and podcasts produced by broadcasters, but there are not only smaller differences in number, but also in intensity.

- The independent podcast is a unique and singular means of communication. This format has proven to be more than just an extension of radio. Our study shows that it presents a closer interaction with the public, taking advantage of the flexibility of digital platforms and the absence of significant legal and economic restrictions. This ability to connect with listeners without intermediaries or limitations imposed by large corporations, gives it its own identity as a communication medium. In addition, its independence allows it to address topics and approaches not explored by traditional media, constituting a fresh option for audiences.

- Radio and network podcasts share many similarities. Although network podcasts use digital platforms, their structure and operation still reflect many characteristics of radio. They share elements such as the organization of content in planned formats, the use of style books that guarantee editorial consistency and the use of the existing infrastructure of the radio stations. This allows them to maintain the quality and professionalism of their broadcasts, but limits their innovative capacity.

- Traditional radio requires high investments for licenses, as well as technical infrastructure and specialized personnel, but podcasts have low initial costs. With very

basic equipment, creators can produce quality content. In addition, the absence of complex legal requirements for issuance simplifies the process, which democratizes creation and allows anyone to share their ideas with a global audience.

- Podcasting offers greater thematic and format flexibility. Traditional radio tends to focus on familiar genres and topics, with predefined structures that seek to satisfy the general expectations of the audience. In contrast, podcasts, particularly independent ones, enjoy creative freedom. They can explore niche topics, break with narrative conventions and even vary the length and style depending on the content.

- Digitalization has a transcendental impact on the media. It has transformed communication, and podcasts are an example of this revolution. They have emerged as an accessible, global and adaptable format and have created communities, strengthening the link between senders and receivers. This phenomenon reflects a shift in the consumption of audio content, putting control in the hands of the user.

In view of the above, and in response to the question raised in this article regarding the potential of podcasts as a means of communication other than traditional radio, we can affirm that this is not the case when this product is produced by the large conventional channels. However, the independent podcasts generated by *podcasters* do have enough entity to meet the characteristics of a singular and independent media from traditional radio.

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SYSTEMS FOR STRATEGIC SALES INFORMATION MANAGEMENT: THE CASE OF THE COCOA PRODUCTION SECTOR IN COLOMBIA

Sistemas para la gestión estratégica de la información de ventas: caso sector producción de cacao en Colombia

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ABSTRACT

In the context of technologies affecting small and medium-sized rural enterprises in Colombia, this project addresses a critical need identified in a cocoa-producing SME located in the municipality of El Peñón, Santander, comprised of farming families with limited technological capabilities. The company faces difficulties in managing sales and profitability information, which impacts its strategic decision-making, operational efficiency, and sustainability. In response, the main objective of this project is to develop a functional web prototype to digitize and optimize these processes through accessible tools such as Google Apps Script and Google Sheets. The work is structured as an Intervention Project, divided into two main phases: diagnosis of the technological and organizational situation, and a proposed solution through the design, development, implementation, and evaluation of the prototype. The methodology combines qualitative and quantitative techniques, such as interviews, direct observation, modeling with UML diagrams, and validation with real users. Among the most significant results are the creation of a functional cloud-based system that reduces registration errors, enables the generation of strategic reports in less time, and centralizes sales and cost information on a single accessible platform. Furthermore, a significant economic return is projected, with a Return on Investment (ROI) of 28.57% in the first year, along with a positive social impact by strengthening the technological autonomy of the SME. The project also includes a strategic proposal for replication in other SMEs. As a general conclusion, it is highlighted that the incorporation of simple

technological solutions, adapted to the rural environment, improves the operational efficiency of small enterprises.

RESUMEN

Palabras clave:
Digitalización, productividad, sostenibilidad

En el contexto de las tecnologías que afectan a las pequeñas y medianas empresas rurales en Colombia, este proyecto aborda una necesidad crítica identificada en una pyme cacaotera ubicada en el municipio de El Peñón, Santander, conformada por familias campesinas con limitadas capacidades tecnológicas. La empresa enfrenta dificultades para gestionar la información de las ventas y rentabilidad, lo que afecta su toma de decisiones estratégicas, eficiencia operativa y sostenibilidad. Como respuesta, el presente proyecto tiene como objetivo general desarrollar un prototipo funcional web que permita digitalizar y optimizar estos procesos mediante herramientas accesibles como Google Apps Script y Google Sheets. El trabajo se estructura como un Proyecto de Intervención, dividido en dos fases principales: Diagnóstico de la situación tecnológica, organizacional, y propuesta de solución mediante el diseño, desarrollo, implementación y evaluación del prototipo. La metodología combina técnicas cualitativas y cuantitativas, como entrevistas, observación directa, modelado con diagramas UML y validación con usuarios reales. Entre los resultados más importantes se encuentran la creación de un sistema funcional en la nube que reduce los errores de registro, permite generar reportes estratégicos en menor tiempo y centraliza la información de ventas y costos en una única plataforma accesible. Además, se proyecta una rentabilidad económica significativa, con un ROI (retorno sobre inversión) del 28.57% en el primer año, así como un impacto social positivo al fortalecer la autonomía tecnológica de la pyme (pequeña y/o mediana empresa). El proyecto también incluye una propuesta estratégica de replicabilidad para otras pymes. Como conclusión general, se destaca que la incorporación de soluciones tecnológicas simples, adaptadas al entorno rural que mejora la eficiencia operativa de las pequeñas empresas.

Introduction

In an increasingly competitive economic environment, small and medium-sized enterprises (SMEs) in the agribusiness sector face the challenge of adopting technological tools to optimize their processes and increase their profitability. The cocoa sector in the department of Santander, Colombia is no stranger to this reality. Many of the companies involved in the processing and marketing of cocoa derivatives still manage their information through manual means or basic tools such as Excel, which significantly limits their capacity for analysis and control and strategic decision making. Being the specific objectives of the research: To identify good practices in the use of ICTs in agribusiness SMEs, evaluate the effectiveness of the prototype in terms of improved decision making and explore the applicability of the model in similar rural contexts. This is in order to resolve the following questions: What impact does the use of the functional prototype have on the sales management and profitability of a cocoa SME in Santander, What are the best practices in the use of information technology (ICT) in similar agroindustrial SMEs, To what extent does the functional web prototype contribute to improve the strategic decision making of the cocoa company, How applicable is the proposed model in other rural SMEs with similar conditions.

Against this backdrop, there is a need to implement IT solutions that facilitate the efficient management of information related to cocoa production sales and profitability. This work focuses on the construction and validation of a functional web prototype, developed with Google Apps Script, a JavaScript language that allows to automate and extend the functionalities of the Google Workspace application (cloud toolset). This environment facilitates the rapid development of web solutions integrated with Google Sheets tools (spreadsheets), which will be the primary data storage medium for this project. Among the advantages of using Google Apps Script are its easy integration with Google services such as Gmail, Calendar and especially Google Sheets. And its rapid and accessible deployment from the cloud which reduces the need for additional infrastructure, thanks to these features, the proposed solution will be a practical, accessible and scalable tool.

The objectives and purpose of the project, the frame of reference, the content and scope, the expected results and the description of the specific case will be presented. The project is aimed at providing technological tools to farmers in the region to strengthen their decision-making capabilities in relation to the production and marketing of their cocoa products, allowing them to have greater control over profitability and improve market strategies

In addition, they address the strategic aspects of the project such as digital transformation, technological tools and their barriers in rural environments, including justification, global market analysis, the innovative nature of the proposal and its contribution to sustainable development objectives.

Next, the general design of the functional prototype, the technologies used, the functionalities of the system are detailed. Subsequently, the research methodologies such as the approach, strategy, data collection and analysis, as well as the validation of the prototype are presented. The results obtained are also analyzed, such as user validation, improvement in sales management and profitability, identification of opportunities, limitations observed, and the conclusions obtained and the bibliographies used as theoretical and methodological support for the work are presented. Finally, this project is aligned with the objectives of the Master in Strategic Management in Information

Technology, by demonstrating how a properly designed, strategically implemented and socially contextualized technological solution can have a remarkable impact on business management, operational efficiency and digital transformation of SMEs in the agribusiness sector.

Method

Type and Focus of Research

The current project adopts an applied research methodology that has a mixed approach (qualitative and quantitative), oriented to the ongoing validation of development. Its main objective is to create a functional prototype that meets the specific needs of small and medium agro-industrial enterprises in Santander. This methodology integrates analysis, design, development and evaluation techniques in a continuous improvement cycle, allowing the system to be adapted to real conditions and obtaining direct feedback from users. (FUNIBER, 2024)

The process begins with the identification and gathering of requirements, where the needs and characteristics of the business are recognized, allowing the functional scope of the system to be clearly established. This is followed by the UML design phase, where processes and use cases are modeled to ensure that the prototype is correctly structured.

The prototype development is carried out in iterative phases between months 2 and 4, using accessible technologies such as Google Apps Script and Google Sheets. Each iteration includes testing and validation cycles with real users, which ensures that adjustments and improvements are adapted to the specific conditions of the sector and the degree of technological adoption of the organization.

At the same time, additional research is being conducted on information and communication technologies (ICT) in agribusiness SMEs, providing a theoretical framework and best practices to optimize the system.

Finally, in the last stages of the project, the prototype is evaluated and a strategic model for technology management in similar SMEs is proposed, ensuring that the results are applicable and scalable to other contexts. In other words, each activity is organized with specific objectives, assigned resources and determined times, which allows for detailed monitoring of progress and fulfillment of objectives. The iterative nature of the development and validation facilitates the inclusion of continuous improvements, thus increasing the quality and functionality of the prototype and ensuring its relevance to the beneficiary SME. (FUNIBER, 2024)

Methodological Strategy Applied

The methodological strategy applied in an SME (small and/or medium-sized enterprise) in the municipality of El Peñón, Santander, is summarized in the collection and analysis of information that will be developed in three main phases: initial diagnosis, pilot application of the prototype, and final validation. Each incorporates different tools and techniques that will be implemented sequentially in the rural cocoa-producing SME. (FUNIBER, 2024)

Data Collection Techniques

For the construction, evaluation and validation of the proposed technological proposal, various information gathering techniques will be used, both qualitative and quantitative, which are adapted to the rural context of the SME and the actors involved. (FUNIBER, 2024):

Semi-Structured Interviews

- *Objective*: Collect qualitative information on current sales and cost management processes, the use of digital tools, information needs and technological barriers perceived by key SME stakeholders.

Participants: Members of farming families in charge of production, marketing and basic administration.

Usage: This technique will allow to understand in depth the routines, problems and expectations of the users, which will guide the design of key functionalities of the web prototype.

Instrument: Interview Guide

Direct observation of the operating process

- *Objective*: Identify how sales, cost and profitability information is currently recorded and identify potential inefficiencies or risks of data loss.

Usage: It will help validate the existing technology gap and document the manual processes that will be automated by the technology proposal.

Instrument: Observation Guide

Documentary review

- *Objective*: Analyze previous records, such as scattered physical notebooks or notes, to establish a baseline of the current state of information management in the SME.

Usage: This review will make it possible to define indicators of change, such as the percentage of records digitized or the frequency of errors in data consolidation.

Prototype Pilot Testing (Usability Test)

- *Objective*: Validate the functionality of the web system in a real environment and with end users.

Usage: Measure indicators such as report generation time, data entry error rate and user perception of usefulness.

Instrument: Usability evaluation form

Data Collection and Analysis Plan

Phase 1: Initial diagnosis (Week 1 - Week 2)

Technique: Semi-structured interviews and direct observation of the operational process.

Objective: To understand the current state of information management (sales, costs, profitability) and operational practices in the SME.

Activities:

Interviews with 2-3 key members of the SME.

Structured observation of the sales recording and reporting process.
Systematization of notes and transcriptions.

Phase 2: Prototype pilot test (Week 3 - Week 4)
Technique: Usability test of the functional web prototype.
Objective: Evaluate the ease of use, comprehension, usefulness and necessary improvements of the system.

Activities:

Initial training of users on the prototype (1 day).
Application of the usability test while users interact with the system.
Record of comments, times, difficulties and recommendations for improvement.

Phase 3: Information analysis (Week 5)
Analysis techniques:
Qualitative: Content analysis of interviews and observations. Thematic categorization (perceptions, barriers, suggestions, etc.).
Quantitative: Descriptive statistical processing of the usability test (percentage of understanding, errors, times, etc.).

Activities:

Systematization of findings.
Identification of usage patterns, strengths and areas for improvement.
Development of recommendations for prototype improvement and future implementation. (FUNIBER, 2024).

Indicators to Measure Impact and Usability

To measure the ease of use and the effect of the functional web prototype on the sales and profit management of the SME under study, indicators were established that are aligned with the goals of the research. These include both the simplicity of the system and the operational and strategic modifications that arose after its implementation. Below is a table with the suggested indicators, their connection to the project objectives and the evaluation techniques used. The following indicators are used to evaluate both the usability and impact of the prototype. Some directly measure user interaction with the system, while others reflect changes in the operational and strategic management of the SME

Results

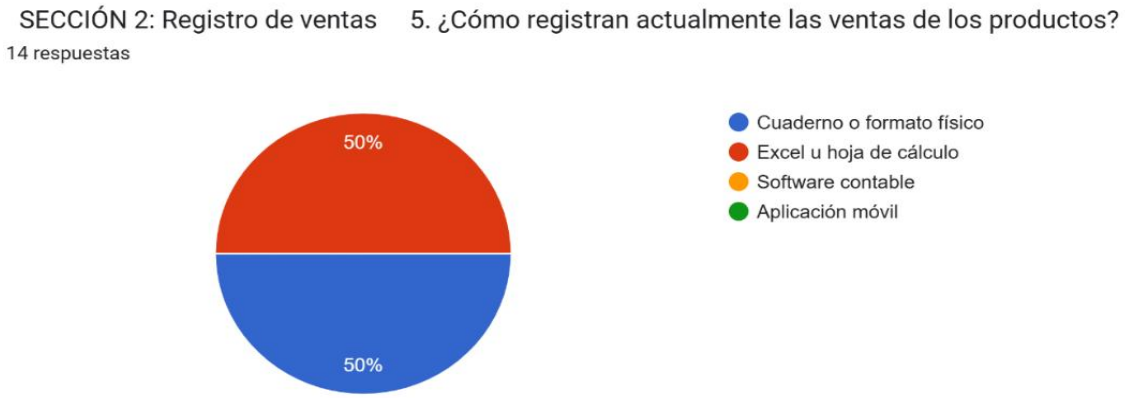
Information Analysis

Phase 1. Initial diagnosis: Application of interviews to key members of the SME, where a structured observation of the sales registration and reporting process is made.

Systematization of notes and transcriptions. According to the survey conducted, 50% of the information recorded on product sales is done in notebooks or sheets and 50% is saved in Excel. See Figure 1.

FIGURE 1

How do you currently record product sales?

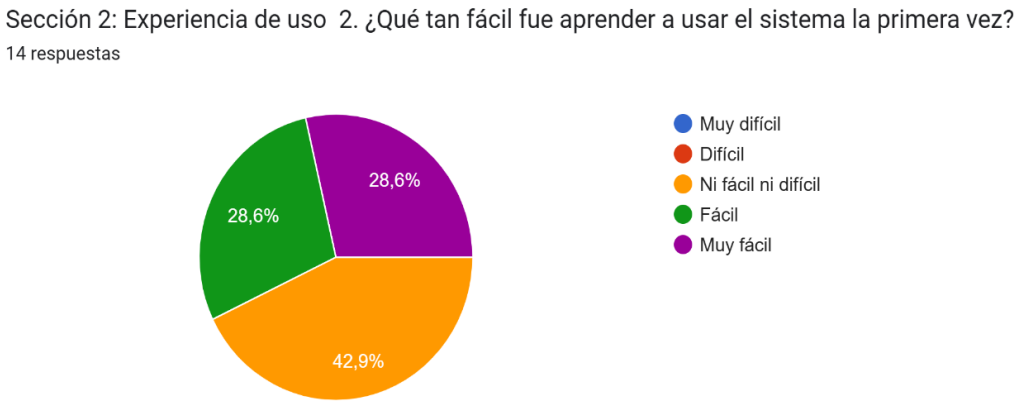


Note. Own elaboration

Phase 2. Prototype pilot test, usability test: Initial training of users on the prototype, application of the usability test while users interact with the system. Therefore, a record is made of comments, times, difficulties and recommendations for improvement. See Figure 2

FIGURE 2

How easy was it to learn how to use the system?



Note. Own elaboration

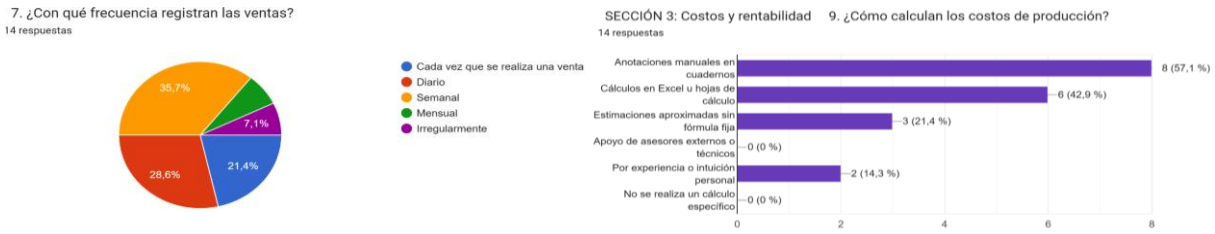
Phase 3. Information analysis

The periodicity with which sales are recorded differs: 35.7% do it every week, 28.6% record it every day and only 21.4% document it after each transaction. A smaller group does so on a monthly or irregular basis. Regarding the calculation of production costs, the vast majority prefer to keep handwritten notes in notebooks (57.1%) and use Excel for their calculations (42.9%), although there are also some people who rely on estimates without a defined formula (21.4%) or who trust their own judgment (14.3%).

Neither the use of technical advice nor the total lack of calculations is observed in this context. See Figure 3

FIGURE 3

Diagnosis of sales record frequency



Note. Own elaboration

The majority of respondents (14 out of 14) indicate that they do not have a defined tool to determine if a sale was successful, although some mention using Excel or express the need for software to help them with this analysis. The main difficulties in calculating profitability include lack of appropriate tools or formats (64.3%), lack of accounting knowledge (50%) and difficulty in grouping information (42.9%). In addition, 50% say that the current system is not sufficient to manage information, while 35.7% believe that it works only partially. See Figure 4

FIGURE 4

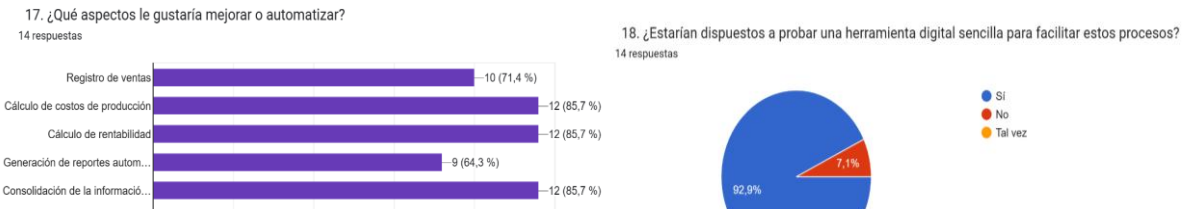
Diagnosis tools and difficulties

Note. Own elaboration

The elements that small and medium-sized companies most want to improve or automate are production costing, profitability and data collection, each with 85.7%. This is followed by sales registration, with 71.4%, and automatic report creation, with 64.3%. Reminders or alerts are also mentioned, with 57.1%, and the possibility of remote access from cell phones, with 50%. In addition, 92.9% of respondents are open to trying a simple digital tool, indicating a strong interest in digital transformation. See Figure 5

FIGURE 5

Diagnosis of employee opinion

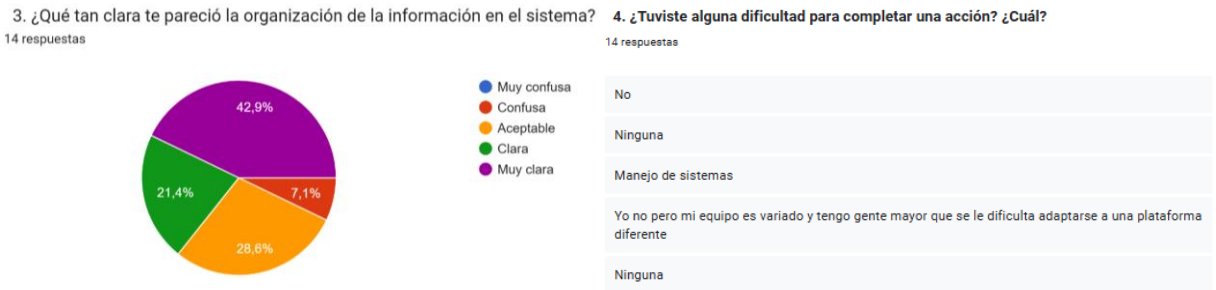


Note. Own elaboration

After the implementation of the functional web prototype, its usability was evaluated and it was observed that: 42.9% of respondents thought that the way the information was organized in the system was very clear, 21.4% considered it clear, 28.6% saw it as acceptable and only 7.1% found it confusing. Regarding difficulties, the majority said they had no problems, although some (approximately 35%) pointed out specific inconveniences such as the use of the system, difficulties of the equipment to adapt and finding specific functions such as the profitability summary. See Figure 6.

FIGURE 6

Usability test on the information

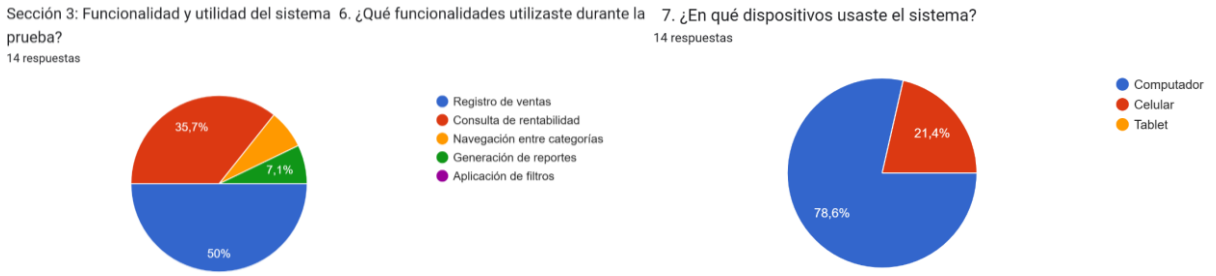


Note. Own elaboration

During the system evaluation, half of the participants made use of the sales registration function, while 35.7% used the profitability query option. A further 7.1% explored navigation between categories and another 7.1% tested the creation of reports. No use of the filter application function was observed. In addition, regarding the devices used to access the system, 78.6% accessed it from a computer, while 21.4% accessed it from a cell phone. The use of Tablets was not recorded. See Figure 7

FIGURE 7

Frequency of use



Note. Own elaboration

The majority of users (71.4%) performed important system tasks (registration or query) within 1 to 2 minutes, and 21.4% did so in less than 1 minute, showing that it is fast and easy to use. As for its usefulness, 35.7% saw it as very useful, 28.6% considered it quite useful and another 28.6% found it useful. In addition, 57.1 % strongly agreed that the prototype helps improve decision making, and 28.6 % agreed, highlighting its strategic importance. See Figure 8

FIGURE 8

Improved sales management and profitability

Note. Own elaboration

what impact does the use of the functional prototype have on the sales management and profitability of a cocoa SME in Santander?

The impact of the functional web prototype has been positive and significant in several respects:

- Facilitation of sales registration: Prior to the prototype, 100% of sales were recorded in Excel or physical notebooks. Next, 92.9% of users highlighted the digital registration as very useful, with the experience described as "intuitive and easy to use" by 64.3%.
- Improved profitability calculation: 85.7% of users consider the system useful or extremely useful for sales and profitability management. In contrast, before the prototype, only a few users calculated profitability with Excel or intuition, and 28.6% did not even measure it.
- Reduction of effort and time: 71.4% completed tasks in less than 2 minutes, and 57.1% indicated that little or no effort was required.
- Multiplatform accessibility: 78.6% accessed from a computer, and 21.4% from a cell phone, showing adaptability to different devices, although visual limitations were also reported in cell phones.

What are the good practices in the use of information technology (ICT) in similar agribusiness SMEs?

Based on the results obtained in the cocoa SME before and after implementing the prototype, the following good practices are identified, supported by participation percentages:

- Prior to the prototype, 100% of respondents recorded sales in non-specialized tools: physical notebooks (50%) or Excel (50%). This shows that many rural SMEs start their digitization processes with basic tools, a good practice if done in a structured way
- After implementing the prototype, 92.9% of users rated the sales register positively, and another 92.9% highlighted the automatic profitability calculation as a useful feature. This demonstrates that data centralization allows for more efficient management, minimizes errors and favors decision making.
- The evaluation of the system included operators, assistants, owners and managers. This diversity of roles is reflected in the variety of responses: for example, 64.3% rated the experience as intuitive and easy to use, while 21.4% requested additional training. Involving all users in the validation of the system is a good practice to achieve technological ownership.
- The system was used on computers (78.6%) and cell phones (21.4%). Although there were comments about visual difficulties on cell phones (7.1%), this multiplatform adaptation is essential in contexts where access and connectivity levels vary significantly.
- Prior to the prototype, 92.9% expressed willingness to try a simple digital tool. This shows that, even in rural areas, there is an openness to technological change if the tools are simple, accessible and adapted to their processes.
- In the pre-prototype stage, 85.7% expressed a desire to automate cost and profitability calculations, and 64.3% expressed a desire to generate automatic reports. The system implemented responded to these needs, indicating that aligning development with real requirements is key to success.

To what extent does the functional web prototype contribute to improve the strategic decision making of the cocoa company?

The prototype has a high potential to strengthen decision making:

- 57.1% of users strongly agree that the system facilitates decision making.
- The most valued modules - sales registration (92.9%), automatic profitability calculation (92.9%), and visual reports (64.3%) - provide key data that were not previously rigorously analyzed.
- The organization of information was rated as clear or very clear by 64.3% of users, which allows for a more orderly view of the business.
- Before the prototype, more than 64.3% reported a lack of adequate tools, and 50% expressed difficulties due to lack of accounting knowledge, barriers that are now mitigated with the use of the system.

How applicable is the proposed model in other rural SMEs with similar conditions?

The model is highly replicable in other rural SMEs, for the following reasons:

- Low-cost technology: Based on Google Apps Script and Google Sheets, free and accessible tools.

- Simplicity and flexibility: The design was considered intuitive by most users. 92.9% would be willing to use similar digital tools.
- Common conditions in the sector: Many agribusiness SMEs face the same barriers: manual management, lack of data consolidation and absence of systems for profitability.
- Interest in going digital: 85.7% of users want to automate aspects such as costing, reporting and consolidation of sales + expenses.

Discussion and Conclusions

This project revealed that rural agro-industrial SMEs, such as the cocoa company under study, face significant limitations in the strategic management of information, according to a survey of the people working on the farm. The implementation of a web prototype, based on Google Apps Script and Google Sheets, proved to be a viable and accessible alternative to digitize key processes such as sales registration, profitability calculation and automatic report generation with a percentage of 92.9%.

The development and validation of the functional web prototype satisfactorily fulfills the general objective and optimizes the sales management and profitability of a rural SME in Santander, facilitating technological tools for strategic decision making. In terms of objectives, the marketing process was analyzed and functional requirements were gathered to design UML diagrams to model key processes; subsequently, the prototype was developed using Google Apps Script and Google Sheets, executing functional tests that were validated by the real user with a 92% acceptance rate. The results show a positive impact: the digital sales register and the automatic calculation of profitability were valued as useful by 92.9% and 85.7% of the users, good practices in the use of ICTs in agribusiness SMEs, and a replicable strategic model of technological adoption was proposed, supported by the interest of the respondents in using similar digital tools. Otherwise, the objective not only met the stated objectives, but also demonstrated an effective solution and application in rural contexts with similar technological needs.

As described in Chapter 5, "companies that do not embrace digitization face significant risks of operational obsolescence and market foreclosure." (Sandoya & Franco,

2024). The developed system improves sales and profit processes, thus ensuring better strategic decision making within the organization by 92.9%.

From an economic point of view, the ROI is positive, indicating that for every peso invested, a return of 28.57% is generated. In addition, as no investment is required in the following years, the ROI is expected to exceed 50% per year after the second year. This profitability was estimated based on the real savings of an SME owned by Don José Santos Florez, a cocoa farmer in the municipality of El Peñón, Santander, Colombia. In addition, the project aligns with several Sustainable Development Goals (SDGs), such as decent work and economic growth (SDG 8), industry, innovation and infrastructure (SDG 9), and reducing inequalities (SDG 10).

Recent studies indicate that technology investments in the agri-food sector can offer a return of more than 20% in productivity and operational efficiency, especially if they are designed for rural areas with low levels of digitization. (FAO, 2021). And highlighting the results obtained in the surveys, 50% use it to record sales and 35.7% use it to check profitability.

The model proposed in this research is based on the use of accessible digital tools, such as Google Apps Script and Google Sheets, which makes its development and technical adoption easier in rural areas or areas with scarce technological resources. These tools allow the creation of a functional web solution that can be adapted and scaled to strategically manage the sales and profitability of cocoa-producing SMEs in Santander, Colombia. It is not necessary to have physical servers or advanced technology, since it can be implemented directly in the cloud, using free or low-cost platforms, which significantly reduces the technical barriers for its implementation. In addition, it can operate on devices that are already in use in organizations, such as laptops or cell phones with Internet access, thus reducing the initial investment.

The development will be carried out by a technical team with expertise in Google Workspace, and allows SME personnel to participate in the validation and testing stages, which fosters technological appropriation and facilitates knowledge transfer. Initially, the system is launched in a test environment to validate its main functions, such as recording sales, calculating profitability per lot of cocoa, and creating strategic reports (PDF) to assist in decision making.

The solution has been designed in a modular way, which enables the future integration of additional functions such as inventory control, product traceability, or price prediction, thus ensuring its sustainability and capacity to evolve in the medium and long term.

Recommendations

Recommendations for the successful implementation of the solution or derived from the Implementation performed: The scheme of use of the functional model for the strategic management of information in small and medium-sized cocoa companies is based on its initial use as an internal resource. "companies that do not embrace digitization face significant risks of operational obsolescence and market foreclosure." (Sandoya & Franco, 2024). This seeks to improve sales and profit processes, thus ensuring better strategic decision making within the organization. Its creation with accessible tools such as Google Apps Script and Google Sheets allows it to be implemented quickly, with a low cost and easy adjustment for other SMEs that have similar characteristics according to the survey conducted.

The strategy of use includes the development of complete technical documentation, training for users and the development of an implementation kit to

facilitate its replication in other rural organizations with technological limitations. There are also plans to promote the prototype through people close to the farm, which will help consolidate its presence in the region's agroindustrial sector. SMEs are forced to innovate their processes. "The traditional SME business model is challenged by the pressure of digitalization imposed by competitors." (Do, Villagra, & Pandolfi, 2023). This plan not only covers its current use, but also foresees the advancement of the prototype towards improved versions that include new features, such as traceability and sophisticated analysis, which would increase its attractiveness and application in the market.

Prototype validation is expected to take 3 to 6 months and the first external pilots are expected to start within 7 months after implementation in the SME. Risks of resistance to change or limitations to rural connectivity are identified and will be addressed in meetings and workshops with families. The application of the results of this project focuses on establishing the prototype as a flexible and scalable option for small and medium-sized agricultural enterprises that have limited access to advanced technology. The strategy is based on a technology transfer model that facilitates the replication of the system in other locations with similar characteristics, prioritizing sustainability, ease of use and significant impact on business decision-making.

First, we plan to validate the prototype in the pilot cocoa company, which will generate data collection on success stories, impact metrics and user feedback. This information will be critical to guide future product improvements and develop a value proposition for potential users or strategic partners. (Kamal-Chaoui, 2021). Later, the result could become a consulting service or a digital solution aimed at producer associations, rural development NGOs and government agencies.

There is a commercial approach based on three fundamentals: clear identification of potential users such as small producers, cooperatives and rural organizations. Another approach would be effective promotion channels such as agroindustrial fairs, universities, rural incubators and technological innovation networks.

Value proposition focused on ease of implementation, low cost and alignment with the Sustainable Development Goals (SDGs), according to information obtained in a survey of small business managers, 57.1% of respondents said that the system facilitates decision making. In addition, documentation of the process in the form of manuals and commercial presentations will be encouraged, which will increase the possibility of licensing the system or applying for innovation and rural entrepreneurship competitions. (World Bank Group, 2024).

From a social point of view, this solution helps bridge the digital divide by using accessible technologies such as Google Sheets and Apps Script, providing access to technological tools in rural areas where information and communication technologies are scarce. It also reinforces community empowerment by providing training and allowing producing families to take ownership of the system. In addition, it generates new local employment opportunities due to the support, adjustment and maintenance of the system.

It should be noted that one of the limitations is Internet connectivity in rural areas, which represents a technical obstacle for continuous access to the web solution, especially when real-time data synchronization is required. To mitigate this situation, it is suggested to implement a strategy of temporary offline use with backup in local synchronized spreadsheets or access to reduced versions of the system. Likewise, resistance to change on the part of users, especially in family businesses with traditional practices, where there may be distrust towards digitalization. This limitation can be overcome through participatory training processes, progressive validation of the system and socialization of short-term benefits. As stated in the project, risks of resistance to change or limitations to

rural connectivity are identified and will be addressed in meetings and surveys. Next, low digital literacy, especially in older members of the community, which may limit the autonomous use of the system. To counteract this barrier, the creation of simple and visual training materials is recommended, as well as accompaniment by rural youth trained in digital technologies.

In turn, the limitations in technological infrastructure. In other words, many SMEs do not have adequate or well-maintained computer equipment. The proposal is partially adaptable by using tools such as Google Sheets and Apps Script that require low technical capacity, but it may be necessary to provide basic equipment or partnerships for technological equipment. In addition, the lack of sustained funding to scale the prototype to more complete versions (with traceability, prediction, inventories). According to the (FAO, 2021), technological investments in rural areas must be accompanied by financing programs that support the sustainability and evolution of the system.

As a future project that would give continuity to the proposal would be a plan to industrialize the prototype that presents a long-term perspective, where the system advances from a basic functional development to achieve a solid, adaptable and commercially viable solution for different entities in the agro-industrial sector. This progress will require strategic investments to increase the impact of the system at regional and national levels.

The phases of the industrialization plan are: technical and operational consolidation, which will prioritize the strengthening of the core system through: improvements in the backend and automation of internal processes, increased cyber security and data protection, and the addition of features such as batch traceability and advanced reporting. Also, scalability and customization (medium term). (Kamal-Chaoui, 2021). For this reason, there are plans to develop versions suitable for various agro-industrial subsectors, such as coffee, fruits and dairy products, including integrations with traceability and certification systems. This will include: investments in the creation of specialized software, hiring UX/UI experts, development and support, and collaborations with educational institutions to teach technical skills to end users.

On the other hand, commercialization and expansion (long term), which is the business model will be transformed into an offering that includes: SaaS tiered subscriptions, consulting and tailored implementation and license sales to rural communities.

The success of this model will depend on the availability of additional sources of financing, such as funds for rural development and technological innovation, international cooperation programs and calls for applied research and technology transfer.

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