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Transformation in the teaching of Social Sciences with Information and Communication Technologies

Transformación en la enseñanza de Ciencias Sociales con Tecnologías de Información y Comunicación

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ABSTRACT. The research explored the impact of the integration of interdisciplinary approaches and the use of Information and Communication Technologies (ICT) in the teaching of Social Sciences. Through a mixed methodological design that included surveys of 3,556 students and in-depth interviews with teachers, it was evaluated how these pedagogical strategies improved the critical thinking and comprehensive understanding of university students. The findings indicated that the experimental group, exposed to interdisciplinary approaches and ICT, showed significantly higher performance compared to the control group in terms of grades, critical understanding and satisfaction. Evidently, this study contributed to the discussion about the effectiveness of ICT in education and highlighted the importance of constant training for teachers and the implementation of pedagogical strategies that promoted the effective use of these technologies.

RESUMEN. La investigación exploró el impacto de la integración de enfoques interdisciplinarios y el uso de Tecnologías de la Información y la Comunicación (TIC) en la enseñanza de las Ciencias Sociales. A través de un diseño metodológico mixto que incluyó encuestas a 3556 estudiantes y entrevistas en profundidad con docentes, se evaluó cómo estas estrategias pedagógicas mejoraron el pensamiento crítico y la comprensión integral de los estudiantes universitarios. Los hallazgos indicaron que el grupo experimental, expuesto a enfoques interdisciplinarios y TIC, mostró un rendimiento significativamente más elevado en comparación con el grupo de control en cuanto a calificaciones, comprensión crítica y satisfacción. Evidentemente, este estudio contribuyó a la discusión sobre la eficacia de las TIC en la educación y resaltó la importancia de la capacitación constante para los docentes y la implementación de estrategias pedagógicas que promovieran el uso efectivo de estas tecnologías.

KEYWORDS: Social Sciences, Higher education, Interdisciplinary teaching, Critical thinking, Information and Communication Technologies.

PALABRAS CLAVE: Ciencias Sociales, Educación superior, Enseñanza interdisciplinaria, Pensamiento crítico, Tecnologías de la Información y la Comunicación.

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1. Introduction

In the digital age, education can not remain unaffected by technological innovations that transform all areas of daily life. The integration of ICT in social science teaching. not only responds to a need for pedagogical updating, but also opens up new opportunities for more inclusive and accessible education, enabling digital tools to adapt to educational content in the various learning styles and individual requirements, thus facilitating the inclusion of students with different abilities and backgrounds (Chapa-García, 2022). In addition, ICTs foster the creation of global learning communities where students and teachers can exchange knowledge and experiences across geographical boundaries (González Velandia, Gómez & Rodríguez Parrado, 2023). Thus, this global connectivity enriches academic learning and fosters greater intercultural understanding and a broader view of social problems, essential for the formation of global citizens (Zaragoza-Alvarado et al., 2024).

Social science teaching plays a crucial role in the formation of informed and critical citizens in our society. Historically, this discipline has focused on the study of social phenomena from specific perspectives, such as Economy, Sociology and History (Fernández Delgado, 2022; Araya-Muñoz & Majano-Benavides, 2023). However, in an increasingly interconnected and complex world, it is crucial to adopt an interdisciplinary approach that leads to a more global understanding of contemporary social problems (Arenas, 2019). In this scenario, the combination of ICTs emerges as a transformative instrument that is capable of revolutionizing the way social sciences are taught and understood.

ICT not only provides access to a wide variety of information, but also encourages new ways of interaction and collaboration between students and teachers, enabling the development of flexible learning environments adapted to individual needs, where students can explore and analyze social phenomena through various digital tools (Agurto-Gallo, Beltrán-Galarza & Bravo-Otorongo, 2023; Guisado Domínguez, 2024). Also, the incorporation of technological tools such as online education systems, interactive simulations and real-time data analysis strengthens students' critical thinking and ability to address complex problems from multiple perspectives (Aguilar Cuesta, Colomo Magaña & Ruiz-Palmero,2023).

Critical analysis is a fundamental skill in higher education, and the use of ICT can strengthen this ability by providing students with access to a range of sources and methodologies (Badillo Mendoza, Vélez Ortiz & Salgado Quintero, 2021). Thus, by integrating knowledge and methodologies from heterogeneous disciplines such as Philosophy, Anthropology, Psychology, Economics and Sociology, the students develop a more enriching and nuanced view of social problems and human relations, which promotes through this interdisciplinary and technological approach an integral understanding of social phenomena, Recognizing its multifaceted nature and the need for a valuation that transcends traditional disciplinary boundaries.

Thus, interdisciplinary work and collaboration are significantly enhanced by ICT, which facilitates the interaction and flow of ideas between experts from different fields to establish common conceptual and methodological frameworks, where each team member contributes from their own knowledge base, enriching the learning process and encouraging the search for innovative solutions (Cabero Almenara, 2015; Granda Ayabaca, Jaramillo Alba & Espinoza Guamán, 2019; Cuetos Revuelta et al., 2020; Ordoñez Calva & Benavides Bailón, 2024).

Consequently, this research aims to examine the integration of interdisciplinary perspectives and the use of ICT in social science teaching to enhance critical analysis and comprehensive understanding of university students. To achieve this, effective pedagogical approaches and educational practices will be analysed that cause collaboration between disciplines and the application of complementary methods and theories through advanced technologies.

By understanding and valuing the benefits and challenges associated with this innovative approach, practical guidelines will be provided for educators interested in implementing interdisciplinary strategies and technology in the teaching of the Social Sciences. This will strengthen the students' training, preparing them to

be informed citizens, critical and committed to understanding and renewing the society in which they are immersed.

2. Literature review

The integration of ICTs in the social sciences teaching , which has been the subject of growing interest and analysis in recent decades, has been accompanied by an interdisciplinary approach which seeks to go beyond the traditional boundaries of disciplines in order to provide a more holistic understanding of social phenomena.

Existing literature highlights both the potential of ICT to foster innovative teaching methods and the challenges associated with their effective implementation (Bobadilla, Galán & Vásquez, 2020; Caramés, 2020; Solano, 2021; Pereira Junior, Capela Bispo & Ponte, 2022; Charris Pacheco & Polanco Coronado, 2023). In this context, the literature analysis below explores these dynamics, addressing how ICT and interdisciplinarity can interrelate to enhance critical analysis and integral understanding in students. In particular, it examines the key contributions and current discussions around the incorporation of these tools and approaches into education.

2.1. Transformation of Social Science education through ICT

The constant advancement of technology has improved many aspects of life, including work, social and especially educational, leaving many traditional forms of teaching obsolete. In this area, technology is seen as having significantly transformed education, replacing traditional learning models with more modern approaches adapted to an increasingly computerised society (García Magna et al., 2011; Basso Aránguiz et al., 2018), considering technological advances as essential allies of current educational models, adapting to the demands of a globalised society.

In particular, the work of the teacher is crucial to create motivating learning areas that awaken the benefit of students and enhance their talents (Rhela Estrada & Bennásar, 2021), for which teachers must be prepared to observe, Evaluate and examine the characteristics of each student, implementing educational strategies that integrate technological skills development. For their part, ICT are vital tools to update teaching methods, facilitating the organizational and educational administration of institutions as well as the learning of students (Peralta & Guamán, 2020).

Despite the benefits of ICTs, many teachers still use traditional methodologies that discourage students (Ordoñez Ocampo et al., 2021). Therefore, it iscrucial to promote active methods that enable learners to relate to the content, develop their own ideas and engage interactively with peers and the teacher as facilitator. This encourages the creation of flexible educational environments in which students can work autonomously and collaboratively, using multimedia resources such as images, audio, videos and hypertexts (Suasnabas Pacheco et al., 2017).

However, the implementation of ICT in social science teaching remains limited, as evidenced by academic results. Several studies indicate that, despite the advantages of ICTs, they are not sufficiently exploited due to lack of technological training of teachers and resistance to change (Ertmer & Ottenbreit-Leftwich, 2010; Guzmán Huayamave, Arriaga Hachi & Cobos Díaz, 2019). It is essential that teachers understand the characteristics and functions of ICT in order to integrate them effectively into the educational process (Vega Gea, Calmaestra & Ortega Ruiz, 2021).

The integration of ICT in social science teaching has proved to be transformative, promoting more interactive and collaborative pedagogical approaches, which facilitate a more dynamic learning environment, Enabling students to explore and analyse social phenomena from multiple perspectives. United Kingdom, previous research highlights that the use of ICT improves access to diverse information and fosters critical and analytical skills crucial for comprehensive understanding of issues (Poliszuk, 2008; Selwyn, 2011; Alonso,

2020; Haas, 2022).

In contemporary education, ICTs provide online learning platforms, interactive multimedia resources and applications that foster cooperation and dialogue between students and teachers (Cruz et al., 2019). Despite challenges such as the digital divide and the need for teacher training, ICT remains an essential component in modernizing education and promoting a more adaptive learning and adjusted to individual requirements.

Research shows that the quality of education is not only dependent on the technology used, but also on how it is integrated into the teaching-learning process to create student-centred educational environments (Cedeño Romero & Murillo Moreira, 2019; Peralta & Guamán, 2020). Whereas, it highlights the paradigm shift that technologies have introduced from a teacher-centred to a student-centred approach, where the teacher must appropriate the methodologies and knowledge needed to improve their work and the learning of their students (Zeballos, 2020).

ICT are transformative tools in education that invite teachers to change their pedagogical approaches and adapt to the diverse learning styles of students, facilitating the creation of more attractive, interactive and collaborative learning environments, Improving educational outcomes and empowering students to face the demands of an increasingly digitalized world (Navarrete Mendieta & Mendieta García, 2018; Fajardo & Cervantes, 2020).

Interdisciplinary in higher education The interdisciplinary approach to education seeks to overcome traditional disciplinary barriers, recognizing that social problems are complex and multifaceted. By integrating knowledge from various disciplines, it facilitates a richer and more nuanced understanding of social phenomena, to promote collaboration between teachers and students from different areas, creating multidisciplinary teams that bring diverse perspectives. Undoubtedly, interdisciplinarity in higher education encourages deeper revision and more effective problem-solving, stimulating critical thinking skills and creativity (Cuban, 2001).

The conceptualization of interdisciplinarity has evolved since the International Conference on Education (UNESCO, 1967), which recommended collaboration between disciplines to address educational complexity. Different logics are presented to understand interdisciplinarity, encompassing the logic of meaning, functionality and phenomenological intentionality, which show the variety of theoretical approaches on how to integrate disciplines into education.

In recent years, the approaches to Science, Technology and Innovation (STI) have undergone significant transformations (Kattel & Mazzucato, 2018; Chaminade & Lundvall, 2019; Loray, 2017; Boon & Edler, 2018). Their changes share a "post-competitive" approach (Vasen, 2016, p. 244), moving away from the conception that the market should be the main driver of STI policies. On the contrary, it recognizes the importance of incorporating social agendas, directing science and innovation towards general well-being (Boon & Edler, 2018). Thus, the search for sustainable development goals that impact on global quality of life is promoted.

It is important to highlight that the proposed solutions are not univocal or unique (Loray, 2017; Vasen, 2016), which underlines the need for a continuous interdisciplinary perspective and interaction with society. In this evaluation, the role of the social sciences and humanities is decisive, since their knowledge and methods facilitate understanding and communication with various social actors, allowing a contextual and systemic assessment of problems.

The notion of interdisciplinarity refers to a process of opening and diversifying relations between sciences, whether between multiple disciplines or within the same science. It is distinguished in turn from multidisciplinarity by its greater integration and overlapping of concepts between disciplines (Guzón, 2020). It is essential that this integration increase the links between sciences and strengthen the links and facilitate

complementarity, reflected in the term "imbrication", which denotes a partial overlap of similar elements.

In this same sense, it should not be seen as a mere juxtaposition of disciplines. Bazdresch (2020) highlights several important considerations on the subject. First, it is conclusive in relativizing the disciplines and moving towards an integral starting point, which implies a reintegration of knowledge separated by Western thinking (Valverde-Gutiérrez & Esteves-Fajardo, 2023). Second, fragmentation between sciences has allowed for great advances, but it has also prevented consideration of the side effects of applying partial truths in complex contexts. Finally, each discipline can be satisfied with its results without examining how these advances relate to other fields.

Interdisciplinarity is aligned with complex thinking, which advocates the establishment of connections between specialties without limiting disciplinary boundaries, This requires simultaneous treatment of problems from different perspectives and mutual understanding among the members of the research team. Therefore, interdisciplinary dialogue is essential, not simply as an exchange of ideas, but as a confrontation of perspectives that grants deeper understanding and problem solving (Santos, Coelho & Fernandes, 2020). The exchange must necessarily be genuine and consider the possibility of contradictions, with the aim of reaching a consensus that will enrich the understanding of the phenomenon studied.

From an educational perspective, Gutiérrez (2004) defines interdisciplinarity as a "process of exchange and collaboration between two or more disciplines or subjects" (p. 96), which gives a more complete view of the subject matter and the integration of learning without sacrificing the identity of the disciplines involved. Cepeda (2021) stresses the usefulness of interdisciplinary work in identifying difficulties and overcoming barriers for both students and teachers, highlighting that interdisciplinary work affects the content and the educational process itself. While, Carvajal (2010) emphasizes that interdisciplinary teams should avoid a limited technical vision and seek to integrate knowledge from different disciplines in order to contribute effectively to the advancement of knowledge, to enrich higher education and science by incorporating perspectives from the humanities and other areas.

However, other authors advocate an interdisciplinary perspective that combines epistemological and actitudinal elements, incorporating a dialogue between subjects to effectively address the complexity of educational phenomena (Fazenda, 2011; Souza et al., 2022). Mozena and Ostermann (2014) point to the need for a pedagogical attitude that goes beyond the linear curricular tradition in order to improve teaching and teacher training.

2.2. Critical thinking and meaningful learning

Developing critical thinking is crucial in the educational and vocational field, since it makes it easier for individuals to analyse, evaluate and synthesise information in an objective and reflective way. In pedagogical practice, fostering critical thinking involves empowering students to question, investigate and argue, allowing them to make informed choices and face problems independently (Espinola Calderón & Santos Meza, 2022; Tapia & Castañeda, 2022; Novoa Seminario & Sandoval Rosas, 2023; Apaza Tito, 2024).

Critical thinking is described as a complex process encompassing several interrelated skills. Facione (2020) highlights that this process includes interpretation, analysis, evaluation, inference and explanation, all of which are necessary to form reasoned judgements. While, Paul & Elder (2003) describe critical thinking as the act of examining and evaluating one's own thought for the purpose of perfecting it, emphasizing self-regulated reflection and constant self-assessment, both authors agree that critical thinking is essential for problem solving and decision making in both academic and personal contexts.

In higher education, critical thinking is key to the development of cross-disciplinary competences across disciplines. Teachers should implement pedagogical strategies that promote argumentation, reflection and critical analysis. According to Zambrano (2015), professionals who develop critical thinking are able to assess

the quality and reliability of information sources, make hypotheses and come to clear conclusions, They are therefore better equipped to face the challenges of today's world.

To develop critical thinking, it is necessary to create an educational environment that encourages curiosity and questioning, which can be achieved through the use of active teaching methods such as problem-based learning, discussion and the use of case studies (Ossa Cornejo et al., 2018). As a result, these strategies will help students apply critical thinking to real-world situations, improving their ability to analyze information and make informed decisions. Besides, it should be promoted from an early age and develop further throughout academic and professional life. It is essential that educators provide opportunities for students to practice and hone their critical thinking skills in a variety of situations and contexts (Tamayo et al., 2015).

Critical thinking is fundamental to preparing professionals who can address the challenges of today's environment. Individuals with critical thinking skills are able to assess the quality and reliability of sources of information, make assumptions, come to clear conclusions and defend their views with well-founded arguments (Aguilar, Alcántara & Braun, 2020; Cangalaya, 2020; Benavides & Ruíz, 2022). Becoming indispensable in the academic and professional sphere, where the ability to make informed decisions and solve problems is essential

On the other hand, meaningful learning seeks to retain content for a long time while considering previous experiences and interests. Moreira (2021) argues that teachers should create attractive learning environments that allow students to investigate their interests, which not only increases their motivation and dedication, but also makes it easier for them to apply their knowledge in everyday situations. According to Posso-Pacheco et al. (2020), critical thinking and problem solving encourage students to better apply the content in real situations, requiring teachers to generate opportunities for practice and constructive feedback, Besides working as a team to foster collaboration and leadership in problem solving. Similarly, López Pazmiño et al. (2022) adds that this approach also promotes the development of metacognition, allowing them to reflect on their own learning process. In addition, Ferreira, Olcina-Sempere & Reis-Jorge (2019) argue that inclusion and diversity are crucial aspects of meaningful learning, because students come from diverse cultural, linguistic and socio-economic backgrounds. Education must therefore be adapted to these different contexts, designing learning strategies that allow everyone to participate and achieve their full potential.

Connecting different areas of knowledge is essential for deep learning. Students understand information better when they can relate new concepts to their previous knowledge and identify interrelationships between different concepts. According to Moreno (2021), teachers can foster these connections by offering possibilities for interdisciplinary learning and the integration of different fields of knowledge.

Referring to the ability of students to integrate new knowledge with previous experience in a coherent and comprehensive manner. Constituting a type of active and constructive learning, leading to, students form deep and lasting connections with the study material. It goes beyond simple memorization, involving the understanding and application of concepts in different contexts. Ossa Cornejo et al., (2018) argue that for learning to be meaningful, educational content must be relevant and meaningful to students, What is achieved when new knowledge relates logically and coherently to existing cognitive structures, promoting deep understanding and facilitating the application of knowledge in new and varied contexts. In addition, this educational approach fosters intrinsic motivation, as students find learning most interesting and valuable when they can see its practical application.

Critical thinking and meaningful learning are closely related, as they both give rise to a deep and reflective understanding of educational content. To develop critical thinking, it is essential to acquire cognitive and metacognitive skills, as well as the ability to evaluate and reflect on one's own thinking, enabling students to participate actively in their culture and be critical and reflective of their socio-cultural reality. Similarly, meaningful learning requires students to connect new knowledge with previous experiences and real-world contexts, which in turn encourages the development of critical thinking. Thus, both approaches complement

and strengthen each other, promoting more integral and autonomous learning.

2.3. Benefits and challenges of ICTs in education

Although the literature largely supports the benefits of ICTs for education, there are also debates about their effective implementation. Some authors question whether ICTs actually transform educational practices or simply reinforce traditional methods (González, 2023; Carvalho, 2024; Jaramillo-Hurtado & Escudero-Benavides, 2024).

ICT has revolutionized social science education, bringing multiple benefits. Within them, the improvement in understanding and concentration by offering interactive and multimedia resources that facilitate the assimilation of complex concepts. Autonomy and flexibility are also favoured, as students can explore content and conduct research at their own pace, adapting learning to their individual needs. They also encourage the development of critical thinking by providing access to diverse sources and perspectives, which enriches the examination and discussion of social issues. Also, the streamlining of communication between students and teachers allows for more effective collaboration and faster response to questions and queries, even in distance learning environments.

However, the integration of ICT in the social sciences also presents challenges. Distractions from access to multiple non-educational resources may divert attention from the topics discussed. As well, excessive use of technologies can lead to a dependency that affects health and academic performance. Together, false information online can make it difficult to critically assess sources and put the security of students' personal data at risk. Finally, the reduction of human contact in digital environments and the potential for digital bullying are concerns that must be managed to ensure a safe and effective learning environment.

3. Methodology

This project focuses on the context of the law career, an academic level crucial for the training of future legal experts, offering an opportunity to consolidate knowledge and develop analytical and reflective skills.

The research is carried out in two main phases: a qualitative phase and a quantitative phase, integrating theoretical and empirical methods. The methodological approach adopted is quasi-experimental with two groups: one control and one experimental. Both teams will receive instructions designed to promote interdisciplinary integration. The qualitative phase includes in-depth interviews and focus groups, while the quantitative phase uses structured surveys.

To ensure inclusion of a representative sample, a simple random method was used in the selection of participants. Out of a total universe of 4978 eligible law students, 3556 (71.4%) were randomly selected to be part of this study, ensuring that all had the same chance of being selected, which contributes to the general validity and applicability. of the data obtained. Participants include 50 faculty and 200 students from various faculties, selected for their experience and participation in interdisciplinary teaching and ICT use programmes.

For the collection of qualitative data, 15 in-depth interviews were conducted with teachers and 5 focus groups with students, each composed of 8-10 participants. Interviews and focus groups were recorded and transcribed for further review. In the quantitative phase, a structured survey was used, including questions about the frequency and forms of use of ICT in the classroom, perceptions of its effectiveness and interdisciplinary collaboration. Questionnaires, written work evaluation and systematic evaluations were used to obtain quantitative and qualitative data on the critical analysis and comprehensive understanding of students in both groups. It is also necessary to specify that the control group will follow a traditional teaching approach in law studies, while the experimental group will be exposed to interdisciplinary approaches, linking concepts from the Legal Sciences with other disciplines of the Social Sciences.

Quantitative data were analyzed using basic statistical tools to summarize and understand the information

collected. The SPSS software was used to perform descriptive analyses that identified general trends and frequencies, as well as detailed observations such as t-test, to detect significant differences in participants' perceptions and experiences, according to their demographic and academic characteristics.

The report used theoretical methods such as historical-logical, which allowed identifying general aspects of the development of the phenomena investigated, and the hermeneutic, which interpreted the importance and extent of the rules systematizing the subject of research. The analysis-synthesis approach made it easier to break down phenomena into their components and qualities, in order to integrate them later on and highlight the system of relationships between them. The empirical methods used were content analysis, which evaluated documents, curricula and established standards in an objective and consistent manner.

To ensure validity and reliability, several strategies will be implemented. In the qualitative phase, triangulation of data was used by comparing results from interviews and focus groups. In the quantitative phase, pilot tests of the survey were conducted to ensure clarity and relevance of the questions.

It is important to note that informed consent was obtained from all participants, who were duly informed about the study's objectives, the voluntary nature of their participation and the confidentiality of their responses. In addition, the project was approved by the University's Ethics Committee, and all necessary measures were implemented to ensure the ethics and integrity of the process.

4. Results

4.1. Quantitative results

Data obtained from structured surveys conducted with 3,556 students, equally distributed between the control group (50%) and the experimental group (50%). The results are presented in the following tables and graphs.

Types of ICT	Control group (%)	Experimental group(%)
Educational software	45	78
Learning platforms	50	85
Collaboration tools	30	70

Table 1. Frequency and forms of use of ICT in the classroom. Source: Self-made.

Interpretation (Table 1): Data show that the experimental group used ICT more frequently than the control group, especially in the use of learning platforms and collaborative tools. Their differences indicate a more intensive and varied adoption of ICT in the experimental group.

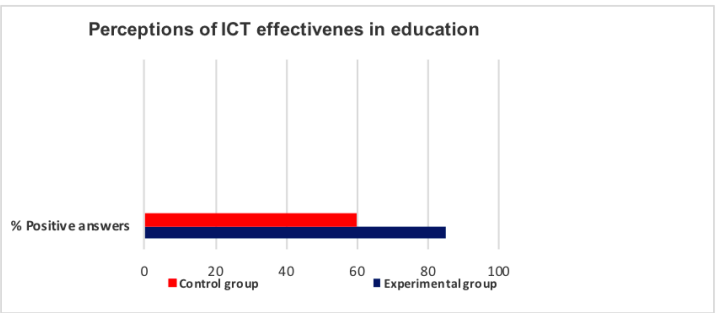

Figure 1. Perceptions of ICT effectiveness in education. Source: Self-made.

Interpretation (Figure 1): The perception of ICT effectiveness in education is shown according to the results of the survey, for which students in the experimental group who received instruction with ICT reported

Pérez Nájera, C.; Flores Castillo, M. M.; Suysuy Chambergo, E. J.; Angulo Corcuera, C. A.; Carmona Brenis, C. J.; Sánchez Yarleque, A. M. (2025). Transformation in the teaching of Social Sciences with Information and Communication Technologies. *Campus Virtuales*, 14(2), 9-23. https://doi.org/10.54988/cv.2025.2.1593

a positive perception of 85%, whereas the control group, which received traditional instruction, reported only 60% of positive perception, suggesting that students in the experimental group valued more the impact of ICT on their learning.

Measure	Control group	Experimental group
Average score in critical evaluations	75	85
Comprehensive understanding assessments	70	80

Table 2. Differences in the development of critical thinking. Source: Self-made.

Interpretation (Table 2): The experimental group performed better in critical thinking and integral understanding evaluations compared to the control group, this difference highlights the effectiveness of interdisciplinary approaches and intensive use of ICT in developing critical skills and integrating knowledge.

4.2. Qualitative results

15 in-depth interviews were conducted with teachers and 5 focus groups with students to explore the perception of interdisciplinary integration and ICT use. The main findings are summarized in the following themes:

Topic 1: Benefits of Interdisciplinary Integration

Description: Teachers and students agreed that the integration of interdisciplinary approaches has been highly beneficial. Teachers reported that these approaches facilitated students' assessment of social phenomena from multiple perspectives, resulting in a richer and more holistic understanding of the subjects. The students, for their part, highlighted how the combination of different disciplines allowed them to connect concepts and apply knowledge in a more integrated way.

Topic 2: Challenges in ICT use

Description: Several challenges in the implementation of ICT were identified, such as lack of adequate training for teachers and resistance to technological change. Teachers mentioned the urgent need for continuing training and support strategies to overcome these barriers. In addition, it was observed that resistance to change can be mitigated by the implementation of training programmes addressing both the technical and pedagogical aspects of ICT.

The comparative test between the experimental and control groups revealed significant differences in educational outcomes. The experimental group, exposed to interdisciplinary approaches and intensive use of ICT, showed notable improvements in critical thinking and comprehensive understanding, were evidenced in the results of the evaluations and corroborated by detailed statistical analyses, including significance tests such as t-test.

Data showed that the experimental group scored significantly higher in the tasks related to analysis and integration of information than the control group, This indicates a positive impact of interdisciplinary approaches and the use of ICT in the educational process.

Group	Average in critical thinking (%)	Average in integral compression (%)
Experimental group	87,5	75.2
Control group	62.3	58,9

Table 3. Performance comparison in critical thinking and comprehensive understanding. Source: Self-made.

Group	% de Satisfaction with ICT
Experimental group	85%
Control group	60%

Table 4. ICT Use Satisfaction Level. Source: Self-made.

Interpretation (Tables 3 and 4): The results highlight the effectiveness of ICT in interdisciplinary education. The experimental group showed an 87.5% improvement in critical thinking development and more comprehensive understanding, compared to a minor improvement in the control group. These figures clearly suggest that the combined use of ICT and interdisciplinary approaches facilitated better integration of concepts and increased ability to address complex problems.

Detailed analysis:

- Participants and Research Design: Out of a total of 4978 students, 3556 were selected for research, representing 71% of the total population. Of these 3556 students, 1600 received interdisciplinary instruction (experimental group) and 1600 received traditional instruction (control group). The selection was random and balanced to ensure a representative sample and minimize biases. The remaining 356 students were not included in the review due to specific defined inclusion or exclusion criteria, ensuring that the final sample conformed to research objectives.
- Implementation and activities: During the implementation period, 24 interdisciplinary activities were designed for the experimental group and 24 traditional activities for the control group. Between the two groups, 3105 applications, 3000 written papers and 3500 questionnaires were carried out, allowing a detailed comparison of the impact of teaching approaches on student performance and understanding.

Evaluation results:

Notable differences between the two groups were observed. The experimental group, which received interdisciplinary instruction and used ICT, achieved an average of 85 per cent in examination scores with a standard deviation of 5.4. In contrast, the control group, which followed a traditional teaching, had an average of 78% on examination scores with a standard deviation of 6.1. In the written papers, the experimental group had a positive evaluation rate of 88% in terms of interdisciplinary integration, while the control group reached 75% in the context of traditional education.In addition, 90% of the students in the experimental group reported an increase in their perception of global understanding of the subjects, compared to 70% in the control group, which also reported an improvement in their understanding of the subjects.

Statistical results:

Substantial variations between groups were confirmed.

The T-test revealed a significant difference in the average scores between the experimental and control groups ($p < 0.01$), indicating a superior performance of the experimental group and highlighting the effectiveness of the interdisciplinary approach combined with the use of ICT in students' academic and critical development.

Interpretation of Results:

The results show that the interdisciplinary approach significantly improved students' ability to connect concepts and apply knowledge in a holistic manner. The experimental group showed a 10% improvement in critical thinking and a more comprehensive understanding of subjects compared to the control group. This data undoubtedly suggests that interdisciplinary teaching encourages a greater integration of critical knowledge and skills in the context of social sciences.

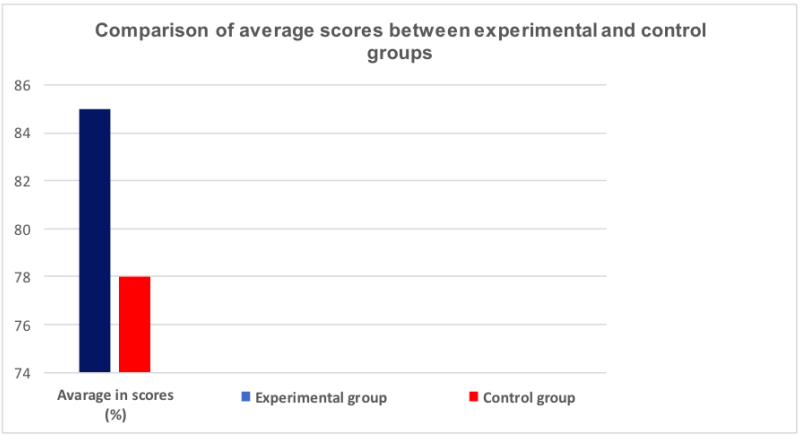

Figure 2. Comparison of average scores between experimental and control groups. Source: Self-made.

Description (Figure 2): The graph shows the comparison of average scores between the experimental group, which received ICT-supported interdisciplinary instruction, and the control group, which received traditional instruction. The experimental group also achieved an average of 85 per cent, while the control group achieved an average of 78 per cent; this difference reflects the greater effectiveness of the interdisciplinary approach and the use of ICT in academic achievement.

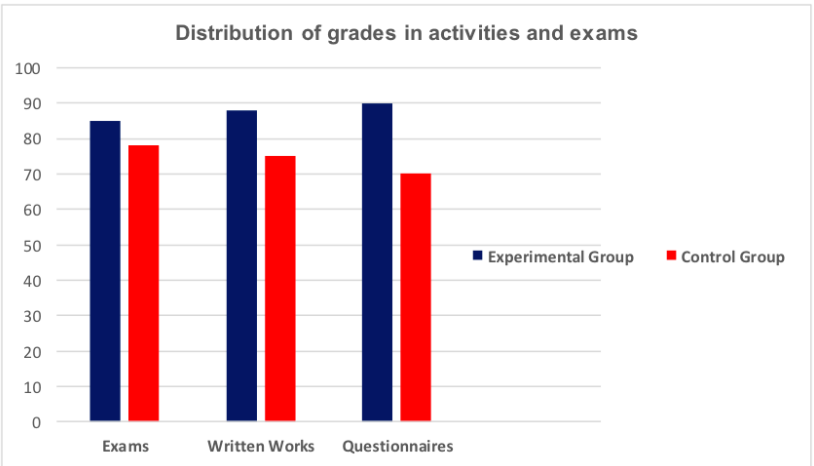

Figure 3. Distribution of grades in activities and exams. Source: Self-made.

Description (Figure 3): The graph shows the distribution of average grades in three types of assessments: examinations, written work and questionnaires, for experimental and control groups. Data indicate that the experimental group, which received interdisciplinary instruction and ICT use, scored higher in all evaluations compared to the control group, Highlighting the effectiveness of the interdisciplinary approach and ICT in improving academic performance in various forms of assessment.

Type of evaluation	Experimental group	Control group
Exams	85%	78%
Written works	88%	75%
questionnaires	90%	70%

Table 5. Results of evaluations by type and group. Source: Self-made.

Metrics	Experimental group	Control group
Average grades	85%	78%
Standard deviation	5.4	6.1

Table 6. Descriptive statistics of academic performance. Source: Self-made.

The results clearly support the effectiveness of interdisciplinary teaching in improving academic performance and critical thinking in the social sciences, suggesting a need for more implementation of interdisciplinary approaches in education (Tables 5 and 6).

5. Conclusions

The present study has investigated the impact of integrating interdisciplinary perspectives and the use of ICTs in social science education, demonstrating that the application of interdisciplinary approaches, complemented by the use of ICTs, has a significant positive effect on the development of critical thinking and comprehensive understanding in university students.

The quantitative results revealed that students in the experimental group, who received interdisciplinary instruction and used ICT intensively, showed a markedly better academic performance than the control group, Highlighting the potential of ICTs to improve critical thinking and foster complex analysis. However, the challenges identified in implementation, such as resistance to change and lack of adequate training for teachers, stress the need for educational policies that promote continuing training and the development of technological skills among educators, as reflected in qualitative observations.

Research contributes to the promotion of the combination of interdisciplinary and ICT approaches to improve social science education, providing empirical evidence that reinforces the need to integrate these strategies into higher education, Include the continuous evaluation of interdisciplinary practices and the development of teacher training strategies to ensure effective implementation of ICT. These actions are obviously crucial to maximise the potential of ICT and interdisciplinarity in academic training and equip students to face the challenges of the contemporary world more effectively.

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