



ORIGINAL

Interdisciplinary Teaching Strategy for Social Sciences in Primary Education: A Theoretical Proposal with Immersive Virtual Learning Projections

Estrategia didáctica interdisciplinar para Ciencias Sociales en Educación Primaria: una propuesta teórica con proyección hacia entornos virtuales inmersivos

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ABSTRACT

Introduction: this theoretical article proposes an interdisciplinary teaching strategy for Social Sciences in Primary Education, aimed at transforming traditional pedagogical practices. It integrates critical pedagogy, the competency-based approach, and immersive technologies such as virtual reality and metaverse.

Method: a qualitative, exploratory and propositional approach was adopted. A document-based literature review was conducted using recent studies on immersive learning, interdisciplinary pedagogy, and digital education. The data were analyzed through a comparative and integrative synthesis to design the strategy and assess its alignment with contemporary pedagogical demands.

Results: four key dimensions emerged: (1) the conception of an interdisciplinary teaching strategy; (2) the identification of guiding pedagogical principles; (3) the articulation between critical pedagogy and the competency-based approach; and (4) the projection of the strategy toward immersive virtual learning environments. These elements form a pedagogical model capable of promoting critical thinking, social responsibility, and meaningful learning experiences.

Conclusions: the proposed strategy offers a relevant and adaptable pedagogical framework that aligns with 21st-century educational challenges. Although empirical validation has not yet been performed, this theoretical foundation may guide future pilot implementations, expert evaluations, and the development of digital instructional designs.

Keywords: Interdisciplinary Teaching; Social Sciences; Primary Education; Critical Pedagogy; Competency-Based Education; Metaverse.

RESUMEN

Introducción: este artículo teórico propone una estrategia didáctica interdisciplinar para la enseñanza de las Ciencias Sociales en la Educación Primaria, orientada a transformar las prácticas pedagógicas tradicionales. Integra la pedagogía crítica, el enfoque por competencias y tecnologías inmersivas como la realidad virtual y el metaverso.

Método: se adoptó un enfoque cualitativo, exploratorio y propositivo. Se realizó una revisión documental basada en estudios recientes sobre aprendizaje inmersivo, pedagogía interdisciplinar y educación digital. Los datos fueron analizados mediante una síntesis comparativa e integradora para diseñar la estrategia y evaluar su coherencia con las demandas pedagógicas actuales.

Resultados: se identificaron cuatro dimensiones clave: (1) la concepción de una estrategia didáctica interdisciplinar; (2) la identificación de principios pedagógicos orientadores; (3) la articulación entre pedagogía crítica y enfoque por competencias; y (4) la proyección de la estrategia hacia entornos virtuales de aprendizaje inmersivos. Estos elementos configuran un modelo pedagógico capaz de fomentar el pensamiento crítico, la responsabilidad social y experiencias de aprendizaje significativas.

Conclusiones: la estrategia propuesta ofrece un marco pedagógico pertinente y adaptable, alineado con los desafíos educativos del siglo XXI. Aunque aún no ha sido validada empíricamente, la fundamentación teórica desarrollada puede orientar futuras implementaciones piloto, evaluaciones de expertos y el diseño de propuestas didácticas digitales.

Palabras clave: Enseñanza Interdisciplinar; Ciencias Sociales; Educación Primaria; Pedagogía Crítica; Educación por Competencias; Metaverso.

INTRODUCTION

The teaching of social sciences in primary education continues to face certain limitations. Traditional pedagogical approaches persist, which revolve almost exclusively around memorizing content, a one-way, unparticipatory transmission that lacks dialogue and active knowledge construction.⁽¹⁾ This educational logic has not yielded the expected results regarding critical thinking or a fundamental understanding of the social context. In many cases, students fail to develop a comprehensive view of their world.⁽²⁾ Therefore, it is urgent to imagine other ways of doing things, explore more open strategies and new teaching methods that link disciplines, and offer more dynamic, lively educational experiences that are more connected to everyday life.

Among these possible paths, interdisciplinarity is an enjoyable and even beneficial key. It allows us to link knowledge, build bridges between areas of expertise, and address the cognitive, emotional, and social aspects of learning and what is learned among peers. In this context, the role that immersive technologies—such as augmented reality or the metaverse—can play is becoming increasingly evident. These are tools that transform the classroom: no longer just a physical space but also a digital environment for interaction, where collaboration and sensory experiences take center stage.^(3,4,5) These platforms activate student motivation and strengthen their connection with the content when used well.

In recent years, various studies have shown that these types of technologies promote understanding and retention of concepts and foster the development of social, emotional, and cognitive skills. These are necessary for a comprehensive education, especially in the early stages of schooling.^(4,5) Creating environments that spark curiosity and activate critical thinking is essential for moving toward a different kind of education. Pérez-Guzmán⁽⁶⁾ also raises this point, noting that reviewing and transforming teaching practices is necessary today, especially if we want to respond to the demands of new generations, which are more technological and hyperconnected.

From this perspective, interdisciplinarity makes even more sense when we consider the potential of the metaverse as a space where students consume content and create it. They participate in collective projects and collaborate with others beyond the borders of their school or country, transforming the way they learn. Geographical barriers are broken down, but so are symbolic ones; something like a global, open, horizontal learning community is fostered.^(6,7,8) However, not everything is progress: real, very concrete barriers still exist that hinder the implementation of these technologies. Lack of access, high costs, insufficient teacher training, and even personal data protection are obstacles that cannot be ignored.^(9,10)

Faced with this ambivalent scenario—with both promises and challenges—this work is part of an effort to propose a viable alternative, a teaching strategy that, while based on a face-to-face model, is projected toward the virtual realm. Interactive platforms, simulators, and collaborative digital environments offer a real opportunity to expand the possibilities of the traditional classroom. This is particularly true in social sciences, where context and experience play a key role in learning.

However, if one looks at the available literature, a significant gap can be observed. Although there are studies on educational technologies and interdisciplinary experiences, few integrate three essential components into a coherent theoretical proposal: critical pedagogy, a competency-based approach, and immersive technologies. This is especially true at the primary education level. Many studies merely report specific interventions or isolated cases without consolidating robust pedagogical frameworks that can be replicated or adapted to different school settings. This is precisely the gap that this study aims to address.

Therefore, this study has a clear purpose: to build an interdisciplinary teaching strategy for the teaching of social sciences in primary education, which is based on solid pedagogical theories and, at the same time, has the potential to be adapted to immersive learning environments. The idea is not only to integrate technologies but to do so in a pedagogically meaningful and critical way to train reflective students capable of acting in their

It is important to note that, as this is a theoretical proposal and not an empirical study, no experimental phases or field data collection were considered, nor was the direct participation of teachers or students included. However, it is expected that in later stages, the strategy will be validated by expert judgment and eventually applied in real school contexts as part of pilot studies or educational innovation experiences (see figure 1).

RESULTS

Designing an interdisciplinary teaching strategy

Conceptualizing an interdisciplinary teaching strategy for social sciences in primary education involves combining methods and approaches that integrate different disciplines, promoting meaningful and contextualized learning for students. This methodology addresses diverse ways of learning and understanding the world, a crucial aspect of students' comprehensive education.

Interdisciplinary teaching strategies must be designed considering the nature of social sciences and their relationship with other areas of knowledge. For example, Ladowski's research ⁽¹⁸⁾ reveals that social science teaching in teacher training highlights the need for reflective practices in education, which can be enhanced by integrating reading methods and critical analysis of texts. This reflective practice is in line with the proposal of Araújo-Oliveira et al., who promote the professional development of teachers through the joint design of pedagogical tools, highlighting the importance of collaboration in identifying the strengths and limitations of the strategies used in the classroom.⁽¹⁹⁾ Integrating different disciplines into a single strategy enriches the content and allows students to develop communicative and critical skills, stimulating their curiosity and desire to explore.

A fundamental aspect that emerges from this research is that teaching practices should focus on experiences that are meaningful to students. Garavito-Campillo points out that monotony in the classroom and a lack of interactive activities can lead to disinterest among students, highlighting the importance of implementing varied and engaging teaching practices.⁽²⁰⁾ This may include active methodologies such as projects, which are increasingly recognized for actively engaging students in the educational process. Research by Calle-Carracedo et al.⁽²⁶⁾ also highlights how teaching strategies, when focused on active learning, can potentially improve teaching quality.⁽²¹⁾

On the other hand, interdisciplinary teaching in social sciences involves mixing concepts from different fields, such as history, geography, and civic education, to understand social issues ^(22,23) comprehensively. This approach helps students see the connections between different areas of knowledge, promoting a more integrated view of the world.⁽²⁴⁾

In this regard, a constructivist approach is essential in interdisciplinary teaching, as it encourages students to construct their own understanding and knowledge through experience and reflection.⁽²²⁾ Teachers should facilitate learning by posing problems, encouraging exploration, and guiding students to make connections between disciplines.⁽²⁵⁾ This method supports the development of critical thinking and problem-solving skills, which are crucial for understanding complex social issues.⁽²³⁾

This interdisciplinary approach is complemented by exploring contemporary technological and methodological resources. For example, "escape rooms" in history teaching, as detailed in Calle-Carracedo et al.⁽²⁶⁾ can increase student motivation and facilitate a deeper understanding of historical concepts through playful practice and problem-solving. In addition, the systematic review of teaching strategies and their relationship with technology carried out by Zárate-Moedano et al.⁽³⁰⁾ highlights the capacity of digital tools to support collaborative learning and problem-solving in education.

Implementing interdisciplinary teaching strategies requires constant reflection on the part of educators. The research by López-Lozano and Ramírez⁽²⁷⁾ on the didactic knowledge of assessment in science reveals the evolution of teachers' thinking about continuous assessment, which should also be considered in teaching social sciences. This indicates that teachers must be willing to adapt their approaches based on the needs of their students and the social context in which they operate.

The development of cross-curricular skills is also highlighted, as interdisciplinary strategies should aim to develop cross-curricular skills such as critical thinking, communication, and collaboration. Activities that require teamwork and communication across different subject areas can improve these skills.^(28, 29) These skills are essential for students to navigate and address the multifaceted challenges of the 21st century, such as climate change and socioeconomic disparities.⁽²³⁾

However, implementing an interdisciplinary strategy can present significant challenges, such as institutional resistance and the need for faculty development.⁽²³⁾ To overcome these obstacles, it is essential to provide professional development opportunities for teachers and promote a school culture that supports collaborative work and educational innovation.⁽³¹⁾

Identification of guiding principles

The pedagogical principles underlying an interdisciplinary teaching strategy are based mainly on three

concepts: meaningful interaction, problem solving, and active learning. Interdisciplinarity, in this sense, allows different areas of knowledge to connect, providing a more comprehensive response to complex and relevant problems in educational contexts. This, in turn, generates more integrative, contextualized, and, in many cases, more dynamic learning. However, one of the key aspects of interdisciplinary teaching is that tasks must be guided by specific problems and clear questions that guide students. This is undoubtedly essential because there are no predefined paths for addressing problems that cut across different disciplines.⁽³²⁾

In turn, the exchange of teaching strategies among teachers, as occurs in co-teaching, fosters positive interdependence among them. At the same time, it allows for better attention to student diversity, thus creating a collaborative environment that is so necessary in this type of educational approach.⁽³³⁾ The importance of adapting educational infrastructures should also be highlighted. The incorporation of technology is crucial for personalizing learning and meeting the needs of each student, but not only that, it also facilitates collaboration between different disciplines.⁽³⁴⁾ These types of changes facilitate pedagogical innovation and allow for a better response to the challenges of today's education.

We cannot forget that methodologies such as Problem-Based Learning (PBL) and Collaborative Methodology (CM) are effective in promoting interdisciplinary learning and already play an essential role. They promote active, critical, and, of course, interdisciplinary learning.^(35,40) This way of working not only encourages critical thinking, but also allows students to apply what they have learned in a more realistic and practical way. As for assessment, it needs to be formative and adaptive. Recognizing differential learning is key, because not all students progress at the same pace. Methodologies must be inclusive, and assessment should guide pedagogical practice toward more inclusive and effective methodologies, as pointed out by Torres et al.⁽³⁶⁾ and Macancela-Coronel et al.⁽³⁷⁾ The inseparability of theory and practice is a basic principle in interdisciplinary education. This approach ensures that students not only acquire knowledge but also learn to apply it in real-world contexts.⁽⁴¹⁾

Finally, it is essential not to lose sight of the holistic approach. In an interdisciplinary approach, it is essential to integrate values, beliefs, and cultural contexts. This not only enriches the educational process but also allows cultural diversity to be addressed in a respectful manner. Values education, when carried out within an interdisciplinary framework, promotes deeper learning and an inclusive educational space.^(38,39) Thus, all these elements must be interrelated to ensure that teaching practice, student needs, and their active contribution to the educational community are balanced and effective.

Additionally, teachers may require additional training to effectively implement interdisciplinary strategies, as they need to be competent in multiple areas and able to facilitate connections between them. Despite these challenges, the interdisciplinary approach remains a valuable educational strategy, as it reflects the interconnected nature of real-world problems and prepares students for diverse professional environments.

Articulation between critical pedagogy and competency-based approach

Integrating critical pedagogy and the competency-based approach in basic education curricula represents a significant step toward a more equitable and transformative education. Both approaches share the common goal of fostering critical thinking and emancipation and preparing students to face relevant problems in their social and cultural context. In this sense, each approach contributes a key dimension to students' comprehensive development.

Critical pedagogy, influenced by the work of Paulo Freire, focuses on questioning and transforming the structures of oppression that affect students. Thus, the classroom becomes a space for resistance and change, where critical practices are promoted to develop students' ability to engage in society actively. Critical pedagogy seeks to democratize education by encouraging critical thinking as a cross-cutting skill, providing equal development opportunities for all students.^(42,43,44,45) Gutiérrez-Ujaque and Fernández-Rodrigo⁽⁴⁶⁾ emphasize that this approach not only revises the foundations that legitimize learning but also promotes fundamental values such as justice and equity since, by incorporating the concept of Transpraxis, it seeks to create interdisciplinary links that favor inclusion and social equity.

On the other hand, the competency-based approach focuses on developing skills and attitudes that prepare students to be active agents in their environment.⁽⁴⁷⁾ This model, which has gained relevance in basic education, emphasizes the importance of training individuals with technical skills and the ability to face social and cultural challenges.⁽⁴⁸⁾ A competency-based curriculum facilitates practical knowledge acquisition and promotes critical thinking and deep reflection on reality.⁽⁴⁸⁾

The intersection of these two trends opens up the possibility of designing a curriculum that is not limited to transmitting knowledge but also promotes critical awareness in students. Based on experience, dialogue, and action, this type of learning fosters more comprehensive and reflective development.^(49,50) In this way, students can face real situations where they apply their competencies in a critical and reflective context, promoting their comprehensive development and civic engagement.⁽⁵¹⁾

Given the diversity of educational contexts and the complexity of today's social reality, an educational approach that addresses these issues is necessary. In this sense, critical pedagogy and the competency-based

approach complement each other, helping students not only develop academic skills but also engage with their society, question injustices, and seek solutions to the problems in their environment.^(52,53)

In this sense, integrating critical pedagogy and the competency-based approach in basic education constitutes a robust and transformative framework. This approach not only challenges structures of oppression but also seeks to empower students. This model promotes the development of life skills and an ethic of commitment and social responsibility, which is essential in today's world.

Potential of the strategy for integration into virtual environments

The application of interdisciplinary teaching strategies in virtual environments or educational metaverses is gaining ground as a transformative educational approach. The metaverse, characterized by its immersive and interactive nature, offers a unique platform for integrating diverse academic disciplines and enhancing the learning experience.⁽⁵⁴⁾ This integration is facilitated by technologies such as virtual reality (VR), augmented reality (AR), and artificial intelligence (AI), which create dynamic and engaging learning environments.

These technologies not only simulate real-world scenarios but also enable personalized learning experiences tailored to students' individual needs. The interdisciplinary approach in the metaverse is particularly beneficial in fields where practical experiments are challenging, such as space exploration and chemical experimentation. This transition to virtual environments is supported by a growing body of research highlighting the potential of the metaverse to enrich education by improving understanding and engagement across various academic disciplines.^(55,56,57)

By offering platforms for interaction and collaboration between students and teachers, virtual environments have made it possible to enhance active learning. According to Villacís et al.⁽⁵⁸⁾ collaborative learning in these spaces favors social interactions and reinforces methodologies that promote the development of pedagogical skills. Similarly, Espinoza et al.⁽⁵⁹⁾ highlight that these environments are configured as educational spaces where tools that favor the development of digital skills are integrated, which is crucial in the current context. In addition, the incorporation of emerging technologies in teaching, as mentioned in the work of Avalos-Pulcha et al.⁽⁶⁰⁾ offers teachers the possibility of designing more immersive educational experiences, which represents an advantage over traditional online classes.

The constructivist pedagogical approach plays a fundamental role in these virtual environments, promoting collaboration and the co-construction of knowledge. Pérez-Pérez and Castro argue that the design of these spaces should include tools that facilitate collaborative work and assessment, creating an environment conducive to shared learning.⁽⁶¹⁾ Teacher training in the effective use of these platforms is also crucial, as pointed out by Núñez, who stresses the need to train educators in intercultural and technological skills to face the challenges of teaching in virtual environments.⁽⁶²⁾

As for metaverses, these platforms expand the possibilities for interaction, offering richer and more complex learning environments. Garay et al.⁽⁶³⁾ affirm that the pedagogical strategies applied in these virtual contexts have proven effective in improving student academic performance. In addition, Iparraguirre-Bernaola and Huillca highlight that immersive and extended classrooms facilitate more meaningful learning as they simulate environments that go beyond the limits of the conventional classroom, improving students' understanding and skills.⁽⁶⁴⁾

Finally, virtual reality has been shown to have a positive impact on the educational process. Sousa-Ferreira,⁽⁶⁵⁾ in his research on the application of this technology in basic and professional education, highlights that virtual reality is capable of generating multisensory experiences that attract and maintain students' attention, which is valuable in a digital environment that can be easily affected by distractions.⁽⁶⁵⁾

DISCUSSION

The interdisciplinary teaching strategy developed in this study is based on theoretical foundations that have been widely debated in contemporary pedagogical literature. Its construction responds to the need to integrate knowledge and methodological approaches and the urgent need to adapt to the technological transformations impacting current educational settings. In this sense, the following discussion focuses on critically analyzing the four main dimensions that emerged from the review and synthesis process, contrasting them with findings from other studies and assessing their feasibility within the framework of immersive virtual environments.

Although conceptually distinct, these dimensions are coherently articulated within a model that combines pedagogical theory, methodological principles, and technological projection. In this context, figure 2 summarizes the strategy's internal organization and possible evolution toward educational scenarios mediated by immersive technologies:

The proposed interdisciplinary teaching strategy is a viable pedagogical alternative for transforming the teaching-learning process in social sciences in primary education. Its design responds to the need to move beyond traditional practices, which focus on the simple transmission of content, promoting instead learning that is contextualized, reflective, and, above all, meaningful. This approach aligns with current educational

perspectives advocating inclusive and collaborative education.^(18, 19, 21)

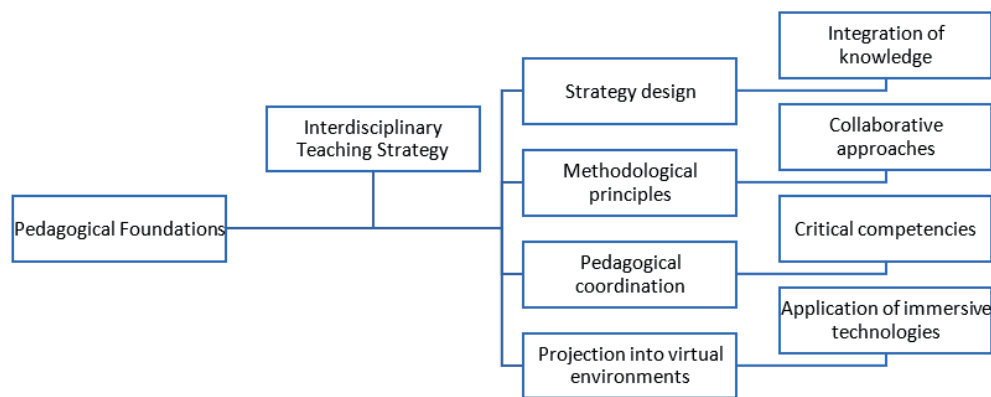


Figure 2. Integrative model of teaching strategy with projection towards the educational metaverse

Previous research highlighting the effectiveness of methodologies such as Problem-Based Learning (PBL) and co-teaching, which enrich pedagogical practices in schools^(33,36) supports the emphasis on active learning, problem-solving, and the promotion of critical thinking. Integrating disciplines such as history, geography, and civic education allows for a more holistic understanding of the social environment, in line with the educational demands of the 21st century.^(22, 23, 24)

A key aspect of the proposed model is the articulation between critical pedagogy and the competency-based approach. This combination promotes education oriented toward “knowing how to do” and “knowing how to transform.” Inspired by the ideas of Paulo Freire, critical pedagogy places students as active subjects in their learning process. At the same time, the competency-based approach promotes autonomy, real-world problem-solving, and active engagement with the social environment.^(42,43,47,52) This convergence makes it possible to build a curriculum that transmits knowledge and fosters ethical attitudes, social awareness, and civic responsibility.^(46,48,51)

About technological integration, the strategy takes on an innovative dimension by projecting itself into virtual and metaverse environments. The research reviewed shows that using augmented reality, immersive environments, and interactive simulations significantly improves motivation, knowledge retention, and the development of digital skills.^(1,3,54,56) These environments offer richer and more personalized learning experiences, especially useful in contexts where traditional methods fail to capture students’ interest.^(58,59)

Virtual platforms also facilitate collaborative work, enable dynamic assessment, and promote personalized learning, expanding the scope of teaching strategies and aligning them with educational inclusion and equity.^(60,61,63) However, structural and contextual limitations must be considered, such as the digital divide, the lack of specialized teacher training, and institutional resistance to curricular changes.^(66,67)

Although this work is not based on applied empirical data, it constitutes a valuable theoretical contribution that can guide future research in real school contexts. Validating this strategy through expert judgment and implementing it in physical and virtual classrooms will allow for a more accurate assessment of its impact and sustainability.

CONCLUSIONS

The interdisciplinary teaching strategy developed in this study represents a coherent theoretical proposal for transforming social sciences teaching in primary education. Its foundation combines current and relevant pedagogical approaches, such as critical pedagogy and the competency-based approach, articulated in an integrative logic that seeks more meaningful and contextualized learning.

One of the model’s main contributions is its ability to be projected into immersive virtual environments, which broadens its possibilities for application in diverse educational contexts. This innovative dimension, supported by technologies such as augmented reality and the metaverse, offers teaching alternatives aligned with the demands of contemporary education.

Although the proposal has not been empirically validated, its conceptual structure can guide future research and applied developments. Its evaluation through expert judgment and pilot experiences, both in face-to-face and digital settings, is recommended. With this, progress will be made toward educational models that are more inclusive, critical, and adaptable to the technological and social transformations of the 21st century.

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