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RECONSTRUCTING THE PEDAGOGICAL LINK THROUGH DIGITAL ECOSYSTEMS: A THEORETICAL-EXPLORATORY STUDY IN THIRD AND SIXTH GRADE PRIMARY SCHOOL

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ABSTRACT: This article analyzes the phenomenon of digital disconnection in school contexts, caused by excessive use of educational technologies without pedagogical intent. It proposes the redesign of digital ecosystems as bridges that promote emotional, cognitive, and social reconnection between teachers, students, and learning content. From a conscious and humanistic approach to innovation, it presents a theoretical-exploratory y study developed with third- and sixth-grade teachers and students, based on techno-pedagogical models and school experiences that integrate interactive platforms, automated feedback, and emotional support. The results show that the problem does not lie in the technology itself, but in its decontextualized implementation. It is concluded that digital ecosystems, designed with flexibility and educational purpose, can act as catalysts for pedagogical reconnection.

KEYWORDS: Digital disconnection, Educational ecosystems, Conscious innovation, Educational technology, School motivation.

INTRODUCTION

In recent years, digital transformation has redefined teaching and learning processes, introducing new opportunities but also profound pedagogical challenges. The accelerated and, in many cases, disjointed integration of educational technologies has generated a phenomenon of digital disconnection, understood as the loss of emotional, cognitive, and social meaning in the relationship between teachers, students, and school knowledge (Moreira, 2020; Salinas, 2020). This situation is particularly critical in primary education, where emotional support and meaningful interaction are pillars of students' comprehensive development.

In this context, this study proposes the redesign of digital ecosystems with pedagogical intent as a strategy for rebuilding the educational bond. A digital ecosystem is not limited to the use of platforms or technological resources, but involves the intentional articulation of tools, methodologies, and human connections that enable meaningful learning experiences (Cabero-Almenara & Llorente-Cejudo, 2021). From a conscious and humanistic innovation perspective, it is proposed that technology can become a bridge for affective and cognitive reconnection when implemented with pedagogical sensitivity and attention to school diversity.

Several recent studies have shown that technological dispersion—characterized by the fragmented and purposeless use of ICT—can lead to demotivation, isolation, and a loss of meaning in learning (González-Sanmamed et al., 2023; García Aguado, 2024). In response to this, proposals have emerged aimed at designing student-centered digital experiences, where empathy, collaboration, and autonomy are the backbone of the educational process.

Within this framework, the study was conducted with teachers and students in the third and sixth grades of primary education, levels that represent contrasting moments in child development: the first, in the stage of consolidation of literacy and socialization; the second, in the transition to academic autonomy and reflective thinking. Understanding how digital ecosystems can adapt to these particularities allows us to explore new ways to strengthen motivation, participation, and a sense of belonging at school.

Based on this premise, the research seeks to answer the following question: How can digital ecosystems with pedagogical intent contribute to rebuilding the educational link in contexts of technological dispersion in schools? To this end, a theoretical-exploratory study is proposed, based on current techno-pedagogical models, theories of learning in virtual environments, and school experiences that integrate interactive platforms, automated feedback mechanisms, and emotional support strategies.

The article is organized into five main sections. First, the theoretical foundations that support the reconstruction of the pedagogical link through digital ecosystems are presented, addressing key concepts such as educational innovation, emotional support, and pedagogical intentionality in the use of ICT. Next, in the materials and methods section, the qualitative approach and procedure used to analyze students' digital perceptions and practices are described. The results and discussion section presents the main findings obtained from the diagnosis and evidence produced by the students, relating them to previous theoretical contributions. Finally, the conclusions integrate the lessons learned from the study, highlighting pedagogical implications, challenges, and future projections for the design of digital ecosystems with a humanistic approach.

THEORETICAL FOUNDATIONS

Rebuilding the pedagogical link in technology-mediated educational contexts requires understanding the transformations that have redefined the relationships between teachers, students, and knowledge. This study adopts four interrelated theoretical axes: digital ecosystems with pedagogical intent, affective bonding and emotional reconnection, technological dispersion and school disconnection, and educational innovation with a humanistic approach. Each of these axes provides a complementary perspective for analyzing how digital technologies can become means of reconnection rather than fragmentation.

1. Digital ecosystems with pedagogical intent

Digital ecosystems are conceived as flexible environments that integrate technological resources, teaching strategies, and emotional support geared toward a clear educational purpose. The pedagogical intention implies that all technological actions respond to educational objectives and are not merely instrumental. Cabero-Almenara and Llorente-Cejudo (2021) emphasize that the effectiveness of these ecosystems depends on contextualized planning and teachers' sensitivity in adapting digital media to the real needs of students. Along the same lines, González-Sanmamed, Muñoz-Carril, and Vázquez-Cano (2023) point out that techno-pedagogical design should encourage active participation, inclusion, and collaborative knowledge building. Thus, the digital ecosystem makes sense when it promotes meaningful interaction and student autonomy.

2. Affective bond and emotional reconnection

The pedagogical bond is an ethical, emotional, and cognitive relationship that supports learning and gives meaning to the educational experience. In digital environments, this bond tends to weaken if interaction is limited to the exchange of informa-

tion. Carretero and Fernández-Díaz (2021) propose emotional reconnection strategies based on empathetic virtual tutoring, personalized feedback, and continuous affective communication. For his part, García Aguado (2024) emphasizes that digital empathy is an essential component of contemporary teaching, as it allows for maintaining pedagogical presence in screen-mediated contexts. Consequently, strengthening the affective bond in virtual environments requires designing affective learning experiences that integrate the emotional dimension as a central part of the educational process.

3. Technological dispersion and school disconnection

The phenomenon of technological dispersion refers to the fragmented, repetitive, or purposeless use of digital resources, which generates demotivation and a loss of pedagogical meaning. Salinas Ibáñez (2020) warns that decontextualized technification can lead to mechanical practices, lacking in human interaction and critical reflection. In response to this, Area Moreira (2020) emphasizes the need for pedagogical intentionality, understood as the conscious design of digital experiences geared toward meaningful learning and school cohesion. Technological dispersion, therefore, is not a technical problem, but a pedagogical one: it arises when technology replaces teacher mediation instead of enhancing it. Overcoming it involves restoring the unity of the educational act through the coherent articulation of tools, methodologies, and human connections.

4. Educational innovation with a humanistic approach

Educational innovation is conceived not as the adoption of new tools, but as the transformation of learning relationships. Pozo and Pérez (2021) argue that all authentic innovation must focus on the learners, recognizing their emotions, contexts, and trajectories. Domínguez-Fernández, López-Meneses, and Vázquez-Cano (2022) add that emotional well-being is an inseparable dimension of techno-pedagogical design, especially in hybrid or virtual settings. From this humanistic approach, digital ecosystems are configured as inclusive, flexible, and emotionally sustainable spaces, capable of integrating diversity and promoting active participation. In this way, innovation ceases to be an end in itself and becomes a means of reestablishing the connection between technology, learning, and humanity.

MATERIALS AND METHODS

The study was conducted using a qualitative approach with an exploratory-descriptive design, aimed at understanding the perceptions, knowledge, and forms of technological appropriation of primary school students in relation to the use of digital tools. This approach allowed us to analyze both the meanings attributed to the use of technologies and the changes observed in their pedagogical application throughout the school year.

Context and participants

The research was conducted in a public primary school in the state of Aguascalientes, Mexico, during the 2024–2025 school year. The sample consisted of 28 sixth-grade

students, selected through purposive sampling based on their active participation in technology-mediated school activities. The group was chosen because it represented a transitional educational level toward academic autonomy and reflective thinking, which allowed for the observation of processes of technological appropriation for pedagogical purposes.

Instrument and data collection

A digital form was designed and applied in Google Forms (Figure 1), used as a diagnostic and comparative instrument. It included multiple-choice questions and practical situations on the use of Google ecosystem tools (Drive, Docs, Slides, Forms, and others). The application was carried out at two points in time:

1. **At the beginning of the school year**, to identify prior knowledge and technological habits.
2. **At the end of the school year**, to assess progress in the functional, creative, and pedagogical use of digital tools.

Figure 1. Form designed as a diagnostic tool.

In addition, academic products created by students—such as presentations, digital stories, and forms—were collected as complementary evidence that allowed for triangulation of information and assessment of the level of technological appropriation from a comprehensive perspective.

Procedure and analysis of information

The methodological process was carried out in three phases:

1. **Initial diagnosis**, aimed at recognizing students' digital knowledge and experiences.
2. **Pedagogical implementation**, which consisted of the progressive integration of Google tools into school projects, some of them with a STEAM focus.
3. **Comparative evaluation and analysis**, based on a review of the form responses and the products developed.

The data analysis combined descriptive quantitative strategies (frequencies and proficiency levels) and inductive qualitative strategies, using a thematic coding process that identified patterns of improvement, strengths, and areas of opportunity. The results were grouped into three proficiency levels—high, medium, and low—taking into account the technical, pedagogical, and emotional dimensions of digital tool use.

Ethical considerations

During the study, the ethical principles of educational research were respected, ensuring voluntary participation, informed consent from guardians, confidentiality of personal data, and anonymity of participants. Likewise, care was taken to ensure

that all activities had an educational purpose and were carried out in a safe and respectful environment, in accordance with international recommendations for research involving minors.

RESULTS AND DISCUSSION

The results obtained from the digital diagnosis and the products developed by the students show significant transformations in the pedagogical use of digital tools throughout the school year. In the initial assessment, most participants demonstrated basic and limited knowledge of the Google ecosystem, focusing on mechanical actions such as searching for information or writing simple texts. This instrumental use reflected low technological autonomy and poor creative integration of digital resources into school tasks.

During the implementation of the project, students participated in activities based on active methodologies—mainly project-based learning and the STEAM approach—in which they used Google Drive, Docs, Slides, and Forms to design materials, record observations, and communicate findings. These experiences allowed digital tools to move beyond being an isolated medium to become structural supports for collaborative learning. Figures 2 and 3 illustrate examples of these practices, where students work in teams to develop digital products linked to curriculum content.

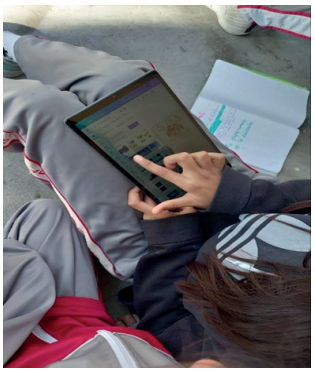

Figure 2. Students creating visual materials in Google Slides.

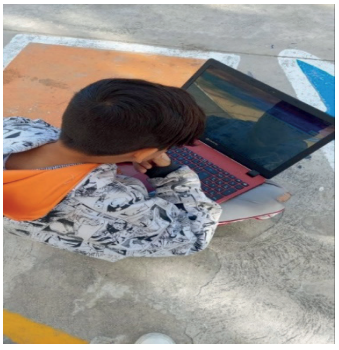

Figure 3. Collaborative work on STEAM projects using tablets and laptops.

In the **final assessment**, administered at the end of the school year, a notable increase in the functional and pedagogical mastery of digital tools was observed. Approximately 40% of students achieved a high level of mastery, demonstrating autonomy, creativity, and the transfer of digital knowledge to real-life situations; 45% achieved an intermediate level, with significant technical progress but still with limitations in pedagogical integration; and 15% remained at a low level, mainly due to difficulties in navigation and collaborative work. This classification is represented in Figure 4.

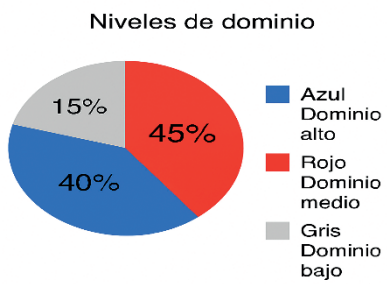

Figure 4. Percentages of technological mastery achieved by students at the end of the school year.

These results coincide with those reported by Zavala, González, and Rojas (2023), who highlight that the flipped classroom and the use of digital ecosystems favor the construction of knowledge from experience, as well as with Flores-Flores (2025), who observes improvements in autonomy and positive perception of learning when ICTs are used for pedagogical purposes. In the case of this study, students not only acquired digital skills, but also expressed an emotional reconnection with learning, expressed in enthusiasm, curiosity, and satisfaction when sharing their digital creations.

From an emotional and motivational perspective, the incorporation of Google tools helped strengthen the digital presence of teachers by enabling immediate communication, empathetic feedback, and continuous collaboration. This aspect coincides with the observations of García Aguado (2024), who states that empathy on digital platforms is key to avoiding isolation and promoting intrinsic motivation. Students positively valued the opportunity to show their progress in real time, receive comments, and actively participate in safe and accessible virtual environments.

One of the most significant experiences was the closing school exhibition, where students publicly presented their projects. This activity served as a space for social validation of learning, in which participants demonstrated communication skills, autonomy, and pride in their achievements. It also strengthened their sense of belonging by integrating teachers, families, and peers into the same educational environment. Figure 4 illustrates this moment, considered by teachers as concrete evidence of the reconstruction of the pedagogical bond.

Figure 5. Final project exhibition: social validation and pedagogical reconnection.

In summary, the results confirm that the intentional and contextualized use of digital ecosystems contributes to the development of technological, cognitive, and emotional skills, and that technology, when integrated for educational purposes, can reconfigure pedagogical relationships that have been damaged by digital dispersion. The findings of this research support the premise that the connection between technology and pedagogy must be mediated by human accompaniment, empathetic feedback, and didactic sensitivity, elements that transform educational practice into a comprehensive and meaningful process.

CONCLUSIONS

This theoretical-exploratory study allowed us to understand that digital disconnection in school contexts does not originate in technology itself, but in its fragmented,

decontextualized use that lacks pedagogical intent. The results show that when digital ecosystems are designed with educational purpose, flexibility, and attention to diversity, they can become catalysts for pedagogical reconnection, strengthening student autonomy, collaboration, and motivation.

From an empirical perspective, the progressive integration of Google ecosystem tools promoted the development of meaningful digital skills, as well as an improvement in students' autonomy and creativity. The comparison between the beginning and end of the school year showed a clear evolution in the conscious use of technologies, moving from an instrumental approach to a reflective and participatory one, focused on collaborative learning and personal expression. This process confirms that the teacher's pedagogical intentionality and emotional mediation are determining factors in achieving a solid educational bond.

On a theoretical level, the findings support the postulates of Cabero-Almenara and Llorente-Cejudo (2021) and González-Sanmamed et al. (2023), who argue that the effectiveness of digital ecosystems depends on their contextualized and humanistic design. Likewise, the value of emotional support and digital teacher empathy is reaffirmed, as these are essential components for rebuilding trust, motivation, and a sense of learning in today's educational environments.

Among the main practical implications, the need to train teachers in techno-pedagogical skills that integrate technical, ethical, and emotional aspects stands out. Experience shows that technology can be a bridge rather than a barrier when used with pedagogical sensitivity. Therefore, educational innovation should not be understood as the adoption of new tools, but rather as the conscious transformation of the relationship between teacher, student, and knowledge.

Finally, the design and evaluation of adaptive digital ecosystems capable of responding to different learning styles, levels of autonomy, and sociocultural contexts is proposed as a future line of research. Exploring how these ecosystems can be integrated with active methodologies—such as project-based learning or the STEAM approach—will expand the possibilities for rebuilding the pedagogical link and strengthening humanistic education in the digital age.

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