

Emotional Interaction and Artificial Intelligence in Educational Research

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Abstract

The use of artificial intelligence in higher education has inspired this research, which aims to develop a theoretical approach to emotional interaction within the educational sphere. This study was conducted using a qualitative approach, rooted in the interpretative-humanistic paradigm. At the National University of Chimborazo in Ecuador, the research was carried out with a population of 310 students from the psychopedagogy program, selecting a homogeneous sample of twenty-eight ninth-semester students. Data collection tools included participatory observation guides and semi-structured interviews. The data obtained were analyzed using Atlas.Ti software, which enabled the triangulation of emotional inter-actions during the educational process and an exploration of how artificial intelligence can facilitate the understanding of these dynamics. Through this analysis, four main constructs were identified: cognitive influences of AI, emotional inter-action and artificial intelligence in educational research, social-affective bonds in educational research and AI, and AI as a facilitator of relationships. This approach underscores the importance of integrating the emotional dimension in education, suggesting that artificial intelligence can enhance not only academic learning but also enrich interpersonal relationships and emotional management within the educational environment. Thus, it aims to contribute to more meaningful learning that meets the emotional needs of students.

Keywords: *artificial intelligence; emotional interaction; social-affective bonds; educational research.*

Introduction

Education, as a dynamic and multifaceted process, has evolved significantly over recent decades, driven by advance-ments in information and communication technologies (ICT). In this context, artificial intelligence (AI) has emerged as a promising tool for transforming teaching and learning. However, the integration of AI in education should not solely focus on enhancing academic outcomes, but also on understanding and managing emotions, which play a crucial role in the ed-ucational process (González et al., 2023). This research focuses on the interaction between emotions and artificial intel-ligence, exploring how these dimensions can influence learning and interpersonal relationships in educational settings.

Emotional interaction refers to the affective and emotional dynamics established between students, teachers, and edu-cational content. These interactions not only affect students' motivation and engagement but also influence their ability to learn effectively. By offering tools that personalize the educational experience, AI can facilitate the identification and management of emotions, thereby fostering a more inclusive and empathetic learning environment (Hurtado et al., 2024).

One of the most significant aspects of this research is the analysis of the cognitive influences developed by students through the use of artificial intelligence. This approach allows for an understanding of how AI can be used to enhance educational cognition, providing students with resources tailored to their emotional and academic needs (Muñoz & Aquisé, 2023). AI has the potential to offer real-time feedback, adjust content according to the student's emotional state, and foster more effective and meaningful learning.

Additionally, the study will explore the social-affective bonds that emerge within the educational context. The creation of positive relationships between students and teachers is essential for effective learning. AI can help strengthen these bonds by facilitating communication and interaction, allowing educators to better understand the emotional needs of their students and adapt their teaching accordingly. This approach not

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only enriches the educational experience but also fosters a climate of trust and support, which is essential for students' holistic development (Mendoza-Zambrano et al., 2023).

This research proposes an approach that combines artificial intelligence with emotional interaction in education. By considering the cognitive influences of AI, emotional interaction, and social-affective bonds in educational research, it aims to contribute to a more comprehensive and human-centered educational model. Integrating the emotional dimension not only enhances academic learning but also enriches interpersonal relationships and emotional management within the educational environment (Tramallino & Zeni, 2024). In an increasingly digital world, the combination of technology and emotionality could shape the future of education, promoting meaningful learning that is adapted to students' needs.

Theoretical Foundation

Fundamental Principles of the Humanistic Paradigm

The humanistic paradigm emerges as a response to the limitations of previous educational approaches, such as behaviorism and positivism, which tend to depersonalize the educational experience. This approach focuses on the human being as a unique individual, with their own capabilities, emotions, and potential (Toscano & Estefanía, 2024). In the educational context, the humanistic paradigm promotes a holistic view of the student, considering not only their cognitive abilities but also their emotional and social dimensions.

One of the pillars of the humanistic paradigm is the belief in the innate capacity of human beings for growth and personal development. This approach is based on the idea that all individuals possess intrinsic potential that can be nurtured in an appropriate educational environment. Humanistic education focuses on self-exploration and self-awareness, allowing students to discover their interests, values, and skills (Cervantes, 2023). This process of self-exploration is fundamental for the development of self-esteem and self-confidence, essential elements for effective learning.

Within the humanistic paradigm, education is conceived as a transformative process that goes beyond mere knowledge transmission. The aim is to form individuals who are capable of critical thinking, making informed decisions, and contributing positively to society. This approach promotes comprehensive education, encompassing not only intellectual development but also emotional, social, and ethical growth (Contreras-Sánchez et al., 2023). In this sense, humanistic education is geared towards forming responsible citizens who are engaged with their environment, valuing the diversity of experiences and perspectives, and recognizing that each student has a unique background that influences their learning. By fostering an inclusive environment, educators can help students develop a deeper understanding of themselves and their place in the world.

Cognitive Influences of Artificial Intelligence

Artificial intelligence (AI) has transformed various sectors of society, and education is no exception. AI's ability to process vast amounts of data, learn from it, and offer personalized solutions has led to new forms of teaching and learning. In this context, it is crucial to explore the cognitive influences of artificial intelligence in the educational process (Vega et al., 2023). This analysis focuses on how AI affects the way students learn, process information, and develop critical and creative skills.

AI is used in various educational modalities, from adaptive learning platforms to virtual assistants and data analysis tools. These technologies have enabled educators to tailor their teaching to the individual needs of students, facilitating more personalized learning. For example, adaptive learning systems analyze students' performance and preferences to offer content and activities that align with their level of understanding. This not only enhances learning effectiveness but also helps students develop greater confidence in their abilities (González & Bonilla, 2022).

One of the most significant aspects of AI's cognitive influence is its capacity to enhance information processing (Lopezosa et al., 2023). AI systems can help students organize and analyze data more efficiently.

AI can provide immediate and personalized feedback, allowing students to adjust their study approaches in real-time. This feedback not only helps students correct mistakes but also gives them the opportunity to reflect on their own learning process. The ability to receive instant information about their performance can motivate students to take a more proactive approach to their education.

AI also has the potential to stimulate creativity in the classroom. Tools that use AI algorithms can help students generate ideas, explore new perspectives, and develop innovative solutions to complex problems. Despite its benefits, the integration of AI in the educational field also presents cognitive challenges. One of the main risks is excessive reliance on these technologies. If students become accustomed to depending on AI for answers and solutions, they may develop a reduced capacity for independent and critical problem-solving (Juca-Maldonado, 2023). Therefore, it is essential for educators to find a balance between using AI and fostering critical thinking and problem-solving skills.

Moreover, AI can present biases in information processing, which can affect the quality of learning. If AI algorithms are trained with biased data, they may perpetuate stereotypes or provide erroneous information, potentially negatively influencing students' understanding and critical analysis. Therefore, it is crucial for educators to be aware of these limitations and actively work to mitigate their effects (Salmerón et al., 2023).

To maximize the benefits of AI in the classroom, it is essential for educators to become active mediators in the learning process, using technology as a tool to enrich the educational experience. They should foster a cognitive approach that combines technological innovation with the development of critical and creative skills, preparing students to face future challenges in an increasingly digital world (Linares et al., 2023).

Emotional Interaction and Artificial Intelligence in Educational Research

Education, as a dynamic and multifaceted process, has evolved significantly over recent decades, driven by the advancement of information and communication technologies (ICT). In this context, artificial intelligence (AI) has positioned itself as a promising tool for transforming teaching and learning (Lledó et al., 2024). However, the integration of AI in educational research should not focus solely on improving academic outcomes but also on understanding and managing emotions, which play a crucial role in the educational process.

Emotional interaction refers to the affective and emotional dynamics established between students, teachers, and educational content. These interactions not only affect students' motivation and engagement but also influence their ability to learn effectively. By offering tools that personalize the educational experience, AI can facilitate the identification and management of emotions, thereby fostering a more inclusive and empathetic learning environment (Mendoza, 2020).

One of the most significant aspects of this research is the analysis of the cognitive influences of artificial intelligence. This approach allows for an understanding of how AI can be used to enhance educational cognition, providing students with resources tailored to their emotional and academic needs (Montesdeoca et al., 2024). AI has the potential to offer real-time feedback, adjust content according to the student's emotional state, and foster more effective and meaningful learning.

Moreover, AI can help strengthen these bonds by facilitating communication and interaction, allowing educators to better understand their students' emotional needs and adapt their teaching accordingly. This approach not only enriches the educational experience but also fosters a climate of trust and support, which is essential for students' holistic development (Flores, 2023).

The importance of integrating the emotional dimension into education has become increasingly evident. Research has shown that emotions influence how students process information, solve problems, and interact with others. Therefore, it is crucial for educators to recognize and address these emotional dimensions in their pedagogical practice (Márquez & Sandoval, 2024). AI can be an ally in this process, providing tools that facilitate the identification and management of emotions in the classroom. The

combination of technology and emotionality could shape the future of education, pro-moting meaningful learning that is tailored to students' needs.

Social-Affective Bonds in Educational Research and AI

Social-affective bonds in educational research are fundamental for the holistic development of students and the crea-tion of a positive learning environment. These bonds refer to the emotional and social relationships established among students, teachers, and the educational setting (Cochancela & Flores, 2024). In a context where artificial intelligence (AI) is beginning to play a crucial role, it is essential to explore how this technology can influence the building and strength-ening of these bonds. Social-affective bonds are essential for effective learning.

When students feel emotionally connected to their peers and educators, an environment of trust and safety is created that fosters active participation and engagement. Research has shown that a positive emotional climate can enhance aca-demic performance, motivation, and satisfaction with the educational experience. Such connections also contribute to the development of social skills, such as empathy and collaboration, which are essential in today's world (Baldinelli, 2023).

In the educational context, social-affective bonds manifest in different forms: peer relationships, teacher-student con-nections, and interaction with educational content. These relationships not only affect classroom dynamics but also in-fluence how students perceive their own learning and personal development (Fajardo et al., 2024). Therefore, it is crucial for educators to actively foster these bonds through inclusive and empathetic pedagogical practices.

Social-affective bonds have a direct impact on the learning process. An environment where students feel valued and supported allows them to explore new ideas and take risks in their learning. The creation of positive relationships be-tween students and teachers can facilitate open dialogue, where students feel comfortable sharing their thoughts and emo-tions. Additionally, affective bonds can influence students' resilience. In moments of challenge or difficulty, having an emotional support system can be crucial for overcoming obstacles (Álvarez et al., 2024). Students who develop strong relationships with their peers and educators are more likely to seek help and support when needed, enabling them to face adverse situations with greater confidence.

AI as a Facilitator of Emotional Bonds.

Artificial intelligence is transforming the educational landscape, and its impact on social-affective bonds is an area of growing interest. As AI becomes integrated into the classroom, it can offer new opportunities to strengthen these connec-tions. For instance, AI systems can facilitate personalized learning, enabling educators to adapt their teaching to the emo-tional and social needs of their students. This can lead to a greater sense of belonging and connection among students and their educational environment (Vargas, 2020).

Adaptive learning systems can personalize each student's learning experience by considering their emotions, interests, and individual needs (Romero, 2024). This personalization not only enhances academic engagement but can also help students feel understood and supported, thereby strengthening their relationships with educators and peers.

Moreover, AI can promote collaboration among students through online learning platforms and communication tools (Zavala et al., 2023). These technologies enable students to interact, share ideas, and work together on projects, regardless of their physical location. Such virtual interactions can be especially valuable in distance education contexts, where es-tablishing an emotional connection can be challenging.

By facilitating teamwork and the exchange of experiences, AI can contribute to the creation of a more cohesive and supportive learning community. Social-affective bonds are essential for learning and the

holistic development of students. In an educational context increasingly influenced by artificial intelligence, it is crucial to explore how this technology can strengthen these connections (Goenechea & Valero, 2024).

Materials and Methods

Research Approach

In terms of methodology, it was deemed appropriate to conduct the research within a qualitative approach, which is characterized by its intent to understand phenomena through the exploration of participants' perspectives in their natural environment and in relation to their context (Navas et al., 2022).

From this same investigative perspective, the study is based on the qualitative method, defined as one in which 'the researcher seeks to explore, describe, and gain in-depth knowledge of the perceptions, emotions, feelings, experiences, approaches, and viewpoints of individuals from the perspective of the participants themselves, in their natural environment, and in a more open manner' (Hernández & Mendoza, 2018, pp. 114).

As part of the research platform at UNACH, researchers have the opportunity to observe, organize, and relate students' research activities with the use of artificial intelligence (AI). This approach allows for addressing identified issues by establishing connections between theory and technological practices, aiming to generate premises and criteria within the emotional and affective context of students.

Participants and Key Informants

In this study, informants were selected using the 'homogeneous sampling' approach, which aims to provide an in-depth description of a specific group (Fernández et al., 2006). The National University of Chimborazo (UNACH) has a total of 310 students in the Pedagogical Sciences of Education program. From this group, 28 informants from the ninth cycle were selected, applying the homogeneous sampling methodology. This approach is justified by the homogeneity of the group, as the selected participants share similar characteristics in terms of their training and educational context.

The selection of key informants was a meticulous process aimed at ensuring the quality of the information collected. To facilitate participation, a workshop was designed with simple and clear questions that encouraged students to share their experiences and opinions (Rebollo & Ábalos, 2022). This approach not only promoted accessibility to information but also fostered an environment of trust where informants felt comfortable expressing their thoughts. The focus group technique was implemented for selection, contextualized as a methodology involving workshops or meetings with a selected group of individuals to gather information about their views and experiences regarding events, expectations, and knowledge on a subject (Medina et al., 2023).

Data Analysis

The data collection involved various techniques and instruments designed to develop the necessary information systems for the research, effectively addressing the identified problem. An observation guide was used in which the researcher participated in daily dynamics, systematically interacting with and observing all events, situations, or phenomena presented by students when applying AI in their investigative practices (Inga et al., 2022).

Additionally, a semi-structured interview was conducted with a focus group, allowing for greater freedom and flexibility in obtaining information, contributing to the construction of a rich and complex informational base.

For this research, the following questions were structured for the students:

1. How do you believe the use of artificial intelligence has influenced your ability to understand and solve problems during your educational research process? Could you share a specific example?
2. In what way do you feel that artificial intelligence affects your emotions when interacting with educational resources? How does this influence your motivation and commitment to learning?
3. How has the integration of artificial intelligence impacted your relationships with peers and teachers during research activities? Do you feel it has facilitated or hindered collaboration?
4. To what extent do you believe that artificial intelligence can strengthen emotional ties with your peers and/or teachers when participating in academic activities? Why?
5. How would you describe the role that artificial intelligence plays in your overall educational experience? What emotional and/or cognitive aspects do you think should be improved?

The collected data were analyzed through theoretical triangulation and a continuous comparison method, using the most recent version of Atlas.Ti, which facilitated the categorization of results (Rojano-Alvarado et al., 2021).

The inclusion of all social workers attending adolescent pregnancies in hospitals in Portoviejo as the study population ensures that the results are representative, and a complete view of the intervention models applied and reasons for attendance in this locality is obtained.

Categorization

Once all the information was transcribed, the data were reviewed and organized using criteria of interpretative logic. Information obtained from the semi-structured interviews and participatory observation was integrated into Atlas.Ti, where relevant categories were formed. These categories are defined as concepts derived from the data that represent specific phenomena (Sánchez et al., 2023).

The concepts and themes that emerged from the research established the units of analysis, allowing for a more precise description of the results. The abundant information was simplified into more manageable parts, facilitating a better understanding of the analyzed material. To structure and interpret the data, researchers employed the information collected in the study. For this purpose, it was necessary to organize and schematize the dimensions in flow diagrams or conceptual and structural networks, enabling the initiation of analysis based on categorization. From this approach, networks of subcategories and dimensions emerged, supported by Atlas.Ti, while maintaining the integrity and originality of the information at all times (Sánchez et al., 2023).

This process allowed for the identification of possible linkages or relationships, thus approaching a more robust theoretical interpretation of the object of study, generating the following table (see Table 1) containing the coding of the information:

Table 1. Categories, subcategories and dimensions

Categories	Subcategories	Dimensions
Cognitive Influences of TIC	Development of Cognitive Skills	Information Processing
	Access to Digital Resources	Problem Solving
Emotional Interaction and Artificial Intelligence in Educational Research	Emotion Management with AI	Motivation and Commitment
	Emotional Perception of Technology	Emotional Regulation Strategies
Social-Affective Bonds in Educational Research and AI	Collaboration Among Students	Interpersonal Relationships
	Emotional Support Provided by AI	Inclusive Classroom Climate

	AI-Mediated Digital Communication	Sense of Belonging
AI as a Facilitator of Emotional Bonds	Personalization of Learning	Quality of Emotional Feedback

Analysis of Results

Based on the information obtained from the observations made in the focus group and interviews with students, in response to the study objectives, the categorizations were taken as constructs for the theoretical approach, which include cognitive influences of ICT, emotional interaction and artificial intelligence in educational research, social-affective bonds in educational research and AI, and AI as a facilitator of emotional bonds. The following are the constructs according to each category:

Category 1: Cognitive Influences of Artificial Intelligence

The results obtained in the research highlight the importance of information and communication technologies (ICT) in the cognitive development of students, particularly in the context of educational research. The incorporation of artificial intelligence (AI) has had a significant impact on how students process information, solve problems, and develop critical skills.

During the interviews, it was observed that the majority of participants acknowledge that the use of AI tools, such as adaptive learning platforms and virtual assistants, has improved their ability to understand complex topics and access re-sources more efficiently. This perception aligns with existing literature, where authors like Aparicio & Aparicio (2024) highlight AI's capacity to facilitate personalized learning and promote a deeper understanding, as shown in Figure No. 1.

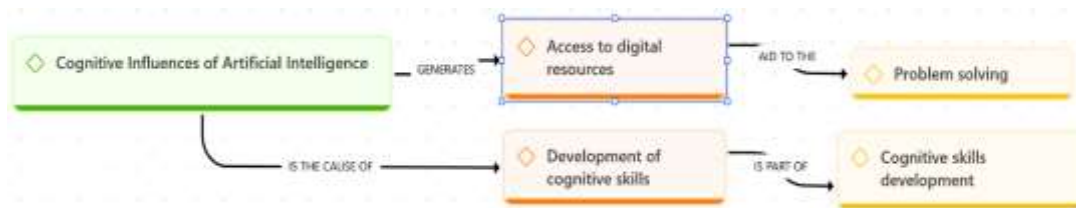


Figure No. 1. Cognitive Influences of Artificial Intelligence

The cognitive influence of ICT is also reflected in the way students approach problem-solving. Several testimonies indicated that AI-based tools not only facilitate the visualization of difficult concepts but also provide immediate feedback that helps them adjust their study approaches in real time. For example, six students commented, 'AI allows me to quickly identify my mistakes and learn from them without having to wait until the next class.' This capacity of AI to offer per-sonalized feedback is viewed as a key facilitator for the development of more advanced cognitive skills, such as analytical thinking and creativity, as stated by González and Bonilla (2022).

In the analysis of the interviews, two key dimensions were identified in the cognitive influence of ICT: information processing and problem-solving. The former refers to students' ability to organize, analyze, and synthesize large volumes of data, an aspect that has been significantly enhanced through the use of AI technologies. Data visualization tools and adap-tive learning systems were frequently mentioned as resources that help students identify patterns and relationships in the presented information, which is essential for meaningful learning (Lopezosa et al., 2023).

On the other hand, problem-solving stands out as a dimension where AI has facilitated the construction of effective strategies. By receiving automatic suggestions or alternative paths to solve a problem, students feel more empowered to tackle complex challenges. However, some participants expressed the need to balance the use of AI with the development of independent skills. As several students articulated, 'Sometimes I

worry that I rely too much on AI's suggestions and don't think for myself.' This comment resonates with the concerns raised by Juca-Maldonado (2023), who warns of the risk of excessive dependence on automated technologies.

In this category, the collected data suggest that the cognitive influences of ICT, specifically through AI, have enriched the educational experience by providing tools that optimize learning and cognitive development. However, educators must be aware of the potential risks and promote a balanced use of technology that enhances both cognitive abilities and autonomy in problem-solving. The integration of these tools should be viewed as a complement that enriches, but does not replace, the fundamental skills of critical thinking and creativity.

Category 2: Emotional Interaction and Artificial Intelligence in Educational Research

The research revealed that emotional interaction in the educational environment is significantly affected by the incorporation of artificial intelligence (AI). The students interviewed expressed that the use of AI tools not only facilitates access to academic content but also influences their emotions during the learning process, as shown in Figure No. 2.

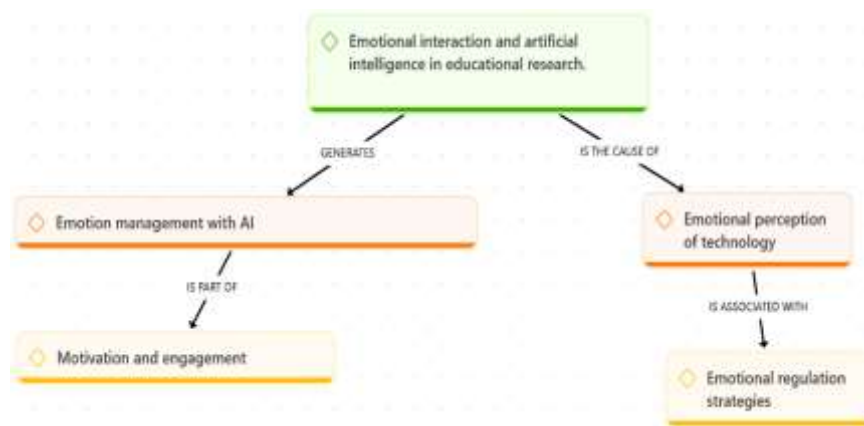


Figure No. 2. Emotional Interaction and Artificial Intelligence in Educational Research

In particular, it was observed that adaptive learning platforms and virtual assistants contribute to greater motivation and engagement. Several students expressed, 'When AI helps me understand a complicated topic, I feel an immediate satisfaction that drives me to continue studying.' This statement reflects the importance of AI in managing emotions during the educational process, as noted by Márquez and Sandoval (2024), who argue that adaptive technologies can foster an emotionally positive environment.

The most relevant dimensions in this category are motivation and engagement, as well as emotional regulation strategies. The first dimension refers to how AI can generate a sense of achievement and satisfaction in students. For example, systems that provide real-time feedback allow students to see their immediate progress, which has a motivating effect. The majority of participants mentioned that 'receiving personalized feedback on their performance increases their interest in the subject and motivates them to continuously improve.' This finding is consistent with studies by Hurtado et al. (2024), which highlight AI's capacity to personalize the educational experience and adapt it to students' emotional needs, crucial for effective learning.

On the other hand, the dimension of emotional regulation is linked to AI's ability to help students manage stress and anxiety related to educational research. Several interviewees stated that 'AI tools, such as chatbots and online tutoring platforms, provide valuable support by offering immediate answers to their doubts and concerns.' This creates an environment where they feel supported and less overwhelmed. Eight students expressed, 'When I feel stressed, knowing that I can access a virtual tutor at any time gives me peace of mind.' However, some participants noted that while AI 'provides useful emotional support, it cannot

completely replace the empathy and support provided by teachers.' This aspect is emphasized by Mendoza (2020), who argues that human interaction remains fundamental for emotional management in the educational context.

A significant finding is that students experience a positive emotional impact when they perceive that AI not only assists them in acquiring knowledge but also shows an 'interest' in their emotional well-being. This perception may result from the personalization of interactions, where technological tools respond to the specific needs of the student, adjusting content and difficulty based on their emotional state. Montesdeoca et al. (2024) highlight the importance of adapting teaching to students' emotional states to optimize learning, reinforcing the need to integrate artificial intelligence in emotional management within the educational context.

The analysis in this category suggests that emotional interaction mediated by artificial intelligence in educational research presents both benefits and challenges. AI can enhance students' motivation and engagement, as well as provide emotional support, provided it is used as a complement to traditional educational practices. The key lies in achieving a balance where technology enhances positive emotions and emotional management without losing sight of the importance of personal interaction and empathy in the educational process.

Category 3: Social-Affective Bonds in Educational Research and AI

The results of the research indicate that artificial intelligence (AI) has a considerable impact on the social-affective bonds established in the educational context. The students interviewed emphasized that the use of AI-based tools has facilitated communication and collaboration among peers, as well as their relationship with teachers, as shown in Figure 3.

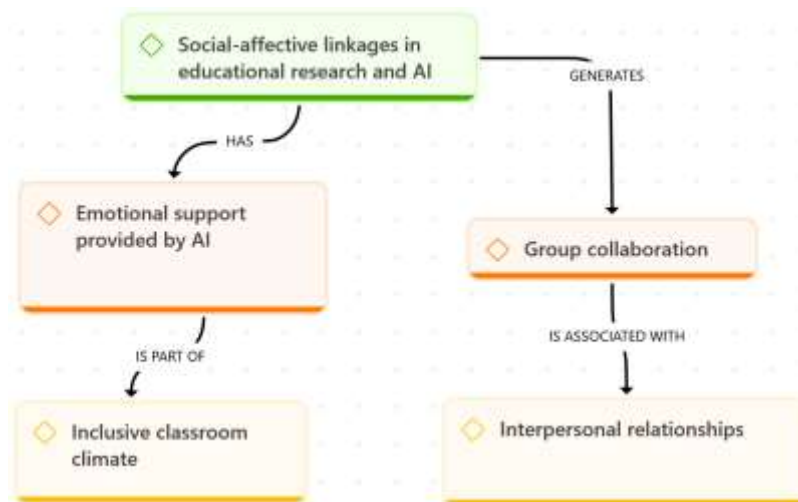


Figure No. 3. Social-affective linkages in educational research and AI.

By providing digital platforms that enable real-time interaction and personalized learning experiences, AI has created new opportunities to strengthen interpersonal connections in the classroom. A considerable number of students commented, 'AI has made it easier to work as a team, even when we are not physically together. I feel more connected and supported.' This testimony highlights the role of technology in creating a collaborative environment, something that Co-chancela and Flores (2024) also emphasize by noting that AI can enrich interpersonal relationships by facilitating constant communication.

Two fundamental dimensions emerge in this category: interpersonal relationships and an inclusive classroom climate. The first dimension refers to how AI facilitates the building of emotional bonds among students by providing tools that allow for smoother and continuous communication, regardless of physical

or temporal barriers. The majority of inter-viewees expressed that, thanks to AI-powered digital platforms, they have been able to interact more frequently with their peers, strengthening their sense of community. This finding aligns with research by Fajardo et al. (2024), which highlights the importance of emotional connections in fostering active and collaborative learning.

The inclusive classroom climate, on the other hand, relates to AI's ability to create an environment where all students feel valued and supported. During the interviews, several students mentioned that AI tools allow them to actively participate in group activities, as the digital platforms are accessible and flexible. Twelve students stated, 'AI platforms have leveled the playing field. Now we can all participate and be heard, regardless of whether we are at home or on campus.' This inclusive approach not only encourages participation but also promotes an emotionally safe environment where students feel motivated to share their thoughts and experiences, a crucial aspect highlighted by Baldinelli (2023).

However, the analysis of the testimonies also revealed some limitations in the creation of socially mediated bonds through technology. Despite AI facilitating interaction, some students noted that relationships established through digital platforms lack the emotional depth experienced in face-to-face contact. Eight (8) students from those interviewed pointed out that, although AI has helped them stay connected, interactions often feel impersonal and limited in expressing complex emotions. This aspect coincides with the concerns raised by Lopezosa et al. (2023), who warn that while AI is useful for communication, it cannot fully replace the affective qualities of human interactions.

Despite these limitations, the data suggest that AI has the potential to complement traditional pedagogical practices and enrich social-affective bonds in education. To achieve this, it is important for educators to integrate technology in ways that enhance the quality of interpersonal relationships, combining the use of digital tools with activities that promote empathy, cooperation, and mutual understanding. For example, using platforms that allow for open discussions of emotional topics can be an effective strategy to deepen relationships between students and teachers.

In this third category, it is determined that AI can be a powerful tool for strengthening social-affective bonds in educational research, as long as it is used as a complement to face-to-face interactions. The appropriate use of technology can foster an inclusive and collaborative environment that promotes the holistic development of students. However, it is crucial for educators to recognize the limitations of AI in terms of deep emotional expression and to continue prioritizing human connection as the foundation of the educational process.

Category 4: AI as a Facilitator of Emotional Bonds

The research showed that artificial intelligence (AI) can play a significant role in facilitating emotional bonds in the educational environment, particularly by personalizing the learning experience and enhancing communication. The students interviewed indicated that AI-based tools have contributed to creating an environment where they feel more understood and emotionally supported, as shown in Figure 4.

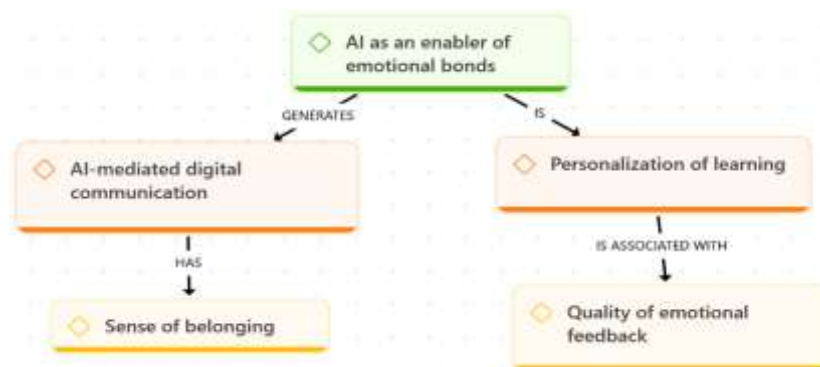


Figure No. 4. AI as an enabler of emotional bonds.

By providing specific feedback tailored to individual needs, AI can strengthen the sense of belonging in the classroom. Several students commented, 'When I receive personalized feedback through the AI platform, I feel there is a genuine in-terest in my learning. It motivates me to keep improving.' This testimony highlights AI's ability to create a perception of personalized attention, which can foster an emotionally positive environment, as noted by Wehr & Baluis (2023).

The key dimensions in this category are the sense of belonging and the quality of emotional feedback. The first di-mension refers to how AI can create an emotional connection with students by offering personalized educational experi-ences. Many participants indicated that AI-based platforms allow them to feel valued, as the tools adapt to their learning paces and provide ongoing support. This personalized approach not only enhances academic performance but also con-tributes to creating an environment where students feel that their emotions and needs are considered. This aspect is sup-ported by Romero (2024), who emphasizes that personalizing learning through AI can enhance students' emotional en-gagement.

The quality of emotional feedback is another essential dimension in AI's facilitation of affective bonds. The inter-viewed students valued that AI systems not only provide feedback on academic performance but also consider the emo-tional aspects of learning. For example, several participants mentioned that AI tutoring platforms help them identify their emotional states and better manage stress and anxiety. Seven students shared, 'The platform not only gives me corrections, but it also asks me how I feel after each activity. It's as if it really cares about my well-being.' This type of interaction re-flects a holistic approach to education, where AI fulfills not only an academic role but also an emotional one, which is crucial for meaningful learning (Vargas, 2020).

Despite the noted benefits, some students expressed concerns about the lack of authenticity in AI-mediated interac-tions. Although the platforms are effective in providing personalized feedback, several participants indicated that, at times, communication with AI systems feels mechanical or lacking in human warmth. Sixteen students among those interviewed mentioned that they would prefer to receive emotional support directly from a teacher, especially in delicate or difficult situations. This finding suggests that while AI plays an important role in facilitating emotional bonds, it should not be considered a complete substitute for human interaction. Educators should combine technology with pedagogical ap-proaches that promote personal contact and empathy to maximize the positive impact of AI (Baldinelli, 2023).

In this category, it is concluded that AI can facilitate emotional bonds in the educational environment by personalizing the learning experience and providing feedback that considers the emotional aspects of students. However, it is crucial that its implementation is complementary to human interactions, especially in complex emotional matters. Educators should leverage AI's capabilities to strengthen the sense of belonging and improve the quality of feedback while continuing to prioritize human connection as a central element of the educational process.

Unified Theoretical Approach

The research determines that the combination of cognitive influences, emotional interactions, and social-affective bonds mediated by artificial intelligence can significantly enrich the educational experience, promoting a more meaningful learning process tailored to students' needs. When used appropriately, AI allows educational institutions not only to im-prove academic performance but also to support the holistic development of students by considering their emotional and social dimensions.

To achieve this, a balanced approach is necessary that combines technology with human interaction. AI should be used as a tool to enhance cognitive and emotional skills, while always keeping educators as active mediators in the learning process. This integral approach reinforces the idea that education is not merely the transmission of knowledge but a process in which emotions and human relationships play a crucial role.

The integration of AI in education should be viewed as an opportunity to transform the educational process into a more holistic model, in which technology and emotionality combine to create a more inclusive, human-centered learning envi-ronment adapted to the demands of the 21st century. This unified approach

not only addresses the academic aspect but also promotes the development of emotional and social competencies, preparing students to face the challenges of an increasingly digitalized world.

Conclusions

By contrasting the different categories, it is concluded that Emotional Interaction has been identified as an essential factor for success in students' professional and academic lives. Educational institutions have begun to recognize AI as a tool that aids in integrating competencies for developing educational research. Similarly, at universities like UNACH, Emotional Interaction has been established as an ideal to implement, complementing AI to favor the holistic development of students.

Researchers emphasize that Emotional Interaction acts as an effective predictor of academic performance. On the other hand, the university also requires educators who understand the relevance of technological competencies, which are crucial for achieving success in research.

By integrating the emerging elements from various categories, along with the appropriate theoretical framework and qualitative data provided by the students who participated in research activities at UNACH, a theoretical approach is developed that highlights how students' interaction with AI enhances their critical thinking capacity. This interaction allows them to work more easily and accessibly, where emotions play a fundamental role in connecting with a contemporary and dynamic educational environment.

AI has proven to be an effective tool for strengthening social-affective bonds by facilitating communication and collaboration between students and teachers. AI's ability to promote an inclusive climate has allowed students to actively participate and feel part of a learning community. However, the research also reveals limitations regarding the emotional depth of relationships established through digital tools. Therefore, technology should be used complementarily to face-to-face interactions to achieve a deeper and more meaningful connection. This promotes a more meaningful learning experience and holistic training for UNACH students, preparing them to face future challenges more effectively.

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