Integration of artificial intelligence and socio-emotional development in university students from southern Peru

Integração da inteligência artificial e do desenvolvimento socioemocional em estudantes universitários do sul do Peru

Integración de la inteligencia artificial y el desarrollo socioemocional en estudiantes universitarios del sur del Perú

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ABSTRACT

This research aimed to determine whether there is a relationship between the integration of artificial intelligence and socio-emotional development in university students from southern Peru. A quantitative, non-experimental, correlational, and cross-sectional study was conducted. The sample consisted of 1,172 students of both sexes, selected through non-probabilistic sampling, administered the Artificial Intelligence Integration in Learning Questionnaire and the Socio-Emotional Development Questionnaire, instruments with adequate psychometric properties. The results indicate that the integration of artificial intelligence was moderately adequate, and socio-emotional development was rated moderately. On the other hand, it was determined that Spearman's rho correlation coefficient between both variables was 0.352 (p<0.05). Finally, it was concluded that there is a direct and significant relationship between integrating artificial intelligence and socio-emotional development in university students from southern Peru. This implies that the appropriate use of artificial intelligence tools can enhance socio-emotional skills, fostering a more inclusive and dynamic academic context. Likewise, its implementation could serve as a strategic resource to improve students' social interaction and emotional well-being, contributing to the achievement of comprehensive development in the university setting.

Keywords: artificial intelligence; socio-emotional development; well-being; university students; comprehensive development.

RESUMO

O objetivo desta pesquisa foi determinar se existe uma relação entre a integração da inteligência artificial e o desenvolvimento socioemocional em estudantes universitários do sul do Peru. Foi realizado um estudo quantitativo, não experimental, correlacional e transversal. A amostra foi composta por 1.172 estudantes de ambos os sexos, selecionados por meio de uma amostragem não probabilística, aos quais foram aplicados o Questionário de Integração da Inteligência Artificial na Aprendizagem e o Questionário de Desenvolvimento Socioemocional, instrumentos com propriedades métricas adequadas. Os resultados indicam que a integração da inteligência artificial foi moderadamente adequada, e o desenvolvimento socioemocional foi avaliado em um nível moderado. Além disso, foi determinado que o coeficiente de correlação rho de Spearman entre as duas variáveis foi de 0,352 (p<0,05). Por fim, concluiu-se que existe uma relação direta e significativa entre a integração da inteligência artificial e o desenvolvimento socioemocional em estudantes universitários do sul do Peru. Isso implica que o uso adequado de ferramentas de inteligência artificial pode potencializar habilidades socioemocionais, favorecendo um contexto acadêmico mais inclusivo e dinâmico. Além disso, sua implementação pode servir como um recurso estratégico para melhorar a interação social e o bem-estar emocional dos estudantes, contribuindo para a conquista de um desenvolvimento integral no ambiente universitário.

Palavras-chave: inteligência artificial; desenvolvimento socioemocional; bem-estar; estudantes universitários; desenvolvimento integral.

RESUMEN

El objetivo de la presente investigación fue determinar si existe relación entre la integración de la inteligencia artificial y el desarrollo socioemocional en estudiantes universitarios del sur del Perú. Se desarrolló un estudio cuantitativo, no experimental, correlacional y transversal. La muestra estuvo conformada por 1172 estudiantes de ambos sexos seleccionados mediante un muestreo no probabilístico a quienes se les administró Cuestionario de Integración de la Inteligencia Artificial en el Aprendizaje y el Cuestionario de Desarrollo Socioemocional, instrumentos con adecuadas propiedades métricas. Los resultados indican que la integración de la inteligencia artificial era medianamente adecuada y el desarrollo socioemocional fue valorado en un nivel moderado. Por otro lado, se determinó que el coeficiente de correlación rho de Spearman entre ambas variables fue de 0.352 (p<0.05). Finalmente, se concluyó que existe una relación directa y significativa entre la integración de la inteligencia artificial y el desarrollo socioemocional en estudiantes universitarios del sur del Perú. Esto implica que el uso adecuado de herramientas de inteligencia artificial puede potenciar habilidades socioemocionales, favoreciendo un contexto académico más inclusivo y dinámico. Asimismo, su implementación podría servir como un recurso estratégico para mejorar la interacción social y el bienestar emocional de los estudiantes, contribuyendo al logro de un desarrollo integral en el ámbito universitario.

Palabras clave: inteligencia artificial; desarrollo socioemocional; bienestar; estudiantes universitarios; desarrollo integral.

INTRODUCTION

Artificial intelligence (AI) refers to the ability of computational systems to perform tasks that require human skills such as reasoning, decision making, pattern recognition and continuous learning (Russell & Norvig, 2021). This concept, which originated in the 1950s, has evolved to include advanced technologies such as machine learning, deep neural networks, and natural language processing, among others (Chan & Zary, 2019). Currently, AI is applied in diverse areas, from medicine and industry to education, where it has shown a significant impact on process optimization and learning personalization (Estrada et al., 2024a).

In education, AI has transformed the way universities interact with students and manage their resources. In particular, these technologies are facilitating teaching and learning, with tools that adapt to the individual needs of students and improve decision-making by teachers (Estrada et al., 2024b).

In universities, AI is used to enhance both administrative management and the teaching-learning process (Kamalov et al., 2023). For example, intelligent tutoring systems offer personalized student support, identifying aspects that could be improved and suggesting specific learning strategies (Fernandez, 2024). Likewise, educational chatbots provide immediate responses to administrative or academic queries, easing the workload of teachers and administrative staff (Estrada et al., 2024c). Another prominent use is predictive analytics, which uses data on student performance to anticipate potential academic difficulties or dropout risks (Shoaib et al., 2024). This allows universities to implement early interventions, promoting better educational outcomes. These applications show that AI not only optimizes processes, but also contributes to improving the educational experience of students and institutional efficiency (Ali et al., 2024).

AI offers numerous benefits to the university sector. One of the most prominent is the personalization of learning, which adapts content and pedagogical strategies to the individual needs of students (Gligorea et al., 2023). This allows for inclusive and effective teaching, especially in diverse groups. In addition, AI facilitates the automation of administrative tasks, such as enrollment management or scheduling, freeing up time for teachers and administrators to focus on more strategic activities (George & Wooden, 2023). Likewise, AI-based learning platforms, such as Coursera or Khan Academy, offer interactive educational resources that help students learn autonomously and flexibly (Rahiman & Kodikal, 2023). On the other hand, intelligent tutoring systems provide immediate feedback, allowing students to adjust their study strategies in real time (Lin et al., 2023). These benefits position AI as an effective tool for improving both educational quality and operational efficiency in universities.

Despite its advantages, the integration of AI in university education faces several barriers. One of them is the technology gap, as many institutions, especially in developing countries, do not have the necessary resources to acquire and implement these technologies (Khan et al., 2023). This can exacerbate educational inequalities between universities in different contexts. Another major challenge is the dehumanization of teaching, as over-reliance on AI could limit interpersonal interaction between teachers and students, affecting socioemotional learning (Zhai et al., 2024). In addition, algorithmic biases represent a latent risk, as AI systems may perpetuate biases present in the data they were trained on, which could influence academic assessments (Hermann & Weigert, 2024). Finally, there is some resistance to change on the part of teachers and students, who may perceive AI as a threat or as a complex technology that is difficult to integrate into their daily practice (Michel et al., 2023).

The use of AI in higher education poses ethical challenges that must be carefully addressed (Al-Zahrani & Alasmari, 2024). One of them is student privacy and data protection, as AI systems process large amounts of personal information that must be safeguarded with strict security measures (Al-Zahrani, 2024). It is also essential to ensure the transparency of algorithms, so that the decisions made by these systems are understandable and reliable for both students and teachers (Balasubramaniam et al., 2024). In addition, AI integration needs to promote educational equity, ensuring that all students have equal access to the benefits of these technologies (Chan, 2023). In this regard, universities should adopt clear ethical policies and train their communities in the critical and responsible use of AI (Nguyen et al., 2022).

While AI has proven to be a powerful tool for transforming educational processes, its impact is not limited only to academic learning or the improvement of technical skills (Rojas et al., 2024). In the university context, the use of AI can also influence relevant aspects of human development, such as socioemotional development (SD) (Aure & Cuenca, 2024). The latter constitutes a fundamental dimension in the comprehensive training of students, as it encompasses essential competencies for emotional management, interpersonal relationships and responsible decision making, which are indispensable for personal and social well-being at this stage (Kim et al., 2024).

SD refers to a person's ability to recognize, understand and manage their emotions, establish healthy interpersonal relationships and make responsible decisions that allow them to interact effectively in different social contexts (Goleman, 1995). This concept, linked to integral development, is fundamental in the different stages of life, as it influences personal

well-being, academic success and social adaptability (Mendoza et al., 2024). In the university environment, SD becomes relevant, given that this stage involves emotional and social challenges that demand a high level of socioemotional competencies to face them successfully (Villarroel et al., 2024).

SD is the result of the interaction of various internal and external factors that influence how people manage their emotions and relate to their environment (Bautista et al., 2024). Individual factors include personality, emotional intelligence and life experiences, which largely determine emotional and interpersonal skills (Gómez et al., 2024). Added to this are family factors, where household dynamics and relationships with parents and siblings play a determining role in the early stages of development (McHale et al., 2012). In the educational setting, institutions become scenarios for fostering interpersonal skills and emotional management, especially during the university stage (Yoel et al., 2023). Finally, cultural and social factors, such as societal norms, values and expectations, shape the way people express and manage their emotions, reflecting a constant interaction between the individual and his or her context (Immordino et al., 2016).

SD in college students is essential, as this stage of life is marked by significant transitions, such as the search for independence, adaptation to a demanding academic environment, and the construction of a professional identity (Duche et al., 2020). Students with developed socioemotional competencies tend to have better academic performance, greater resilience to stress, and healthier interpersonal relationships (Huerta et al., 2022). In addition, SD promotes critical skills for success in work life, such as teamwork, effective communication, and problem solving (Chowkase, 2023). In a university environment, these competencies also foster harmonious coexistence and contribute to an inclusive and respectful educational environment (López et al., 2023).

Universities play a fundamental role in strengthening the SD of their students, implementing strategies that address their emotional and social needs in a comprehensive manner (Mira et al., 2017). Among these, socioemotional education programs stand out, such as courses and workshops designed to teach students to identify and manage their emotions, improve their interpersonal relationships, and make responsible decisions (Benício et al., 2021). Likewise, psychological support services offer counseling to cope with emotional challenges such as stress and anxiety (Park et al., 2020). Extracurricular activities are also necessary, as they promote skills such as teamwork, empathy, and leadership through student groups, sports, and volunteering (Cortellazzo et al., 2021). Similarly, the integration of these competencies in the academic curriculum allows linking them with regular content, ensuring that SD is a central part of university education (Elmi, 2020).

Currently, SD in the university setting faces challenges and opportunities derived from rapid changes in society and technological advances (Wang et al., 2024). Higher education institutions increasingly recognize the importance of fostering socioemotional competencies as part of the comprehensive training of their students, due to their impact on well-being, coexistence and professional success (Rojas et al., 2023). Likewise, the incorporation of innovative technological tools, such as digital platforms and AI-based systems, offers new possibilities for personalizing socioemotional support and fostering positive interaction among students (Changoluisa, 2024). These dynamics pose the challenge of integrating educational strategies that consider both individual needs and the demands of the global context, ensuring that SD is a central axis in university education (Alvarez, 2024).

This study is relevant due to the growing prominence of AI in the educational environment, where its integration is transforming the way students interact with content, teachers and peers. In a university context, SD is very important, as it directly influences students' academic performance, social adaptation, and overall well-being. However, the implications of AI on this fundamental human aspect have not yet been explored in depth. In social terms, this research is important because it addresses a current issue: the need to integrate advanced technologies without compromising the development of basic socioemotional competencies. In practical terms, the results of this research can guide decision makers in the implementation of strategies that use AI as a resource to strengthen the integral development of students. Likewise, it is hoped that the findings will serve as a reference for designing interventions that promote a balance between technological innovation and the strengthening of socioemotional skills in higher education.

Finally, the objective of the present research was to determine whether there is a relationship between AI integration and SD in university students in southern Peru.

METHODS

Design

The research was conducted under a quantitative approach, allowing the collection and analysis of numerical data with the purpose of exploring and describing the relationship between the variables studied. A non-experimental design was used, since no intentional manipulation of the variables was carried out, but rather they were observed and recorded as they were in their natural context. In addition, a cross-sectional correlational design was used, which made it possible to identify

and analyze the relationship between AI and SD by collecting data at a single point in time.

Population and sample

The population consisted of 2429 students enrolled in the 2024 II cycle of the Faculty of Educational Sciences of the Universidad Nacional del Altiplano, while the sample consisted of 1172 students selected by non-probabilistic convenience sampling. Table 1 shows that, of the total number of participants, 53.2% were men and 46.8% were women. With respect to the major, 30.4% were from Language, Literature, Psychology and Philosophy, 27.8% from Social Sciences, 22.4% from Mathematics, Physics, Computer Science and Informatics, while 19.4% from Science, Technology and Environment.

Table 1. Distribution of the sample

Variables	Sociodemographic characteristics	n= 1172	%
Sex	M	623	53.2
	F	549	46.8
Field	Science, Technology and Environment	227	19.4
	Mathematics, Physics, Computer Science and Informatics	262	22.4
	Social Sciences	326	27.8
	Language, Literature, Psychology and Philosophy	357	30.4

Source: Author's development based on the research data

Instruments

Two instruments were used for data collection: the Artificial Intelligence Integration in Learning Questionnaire and the Socioemotional Development Questionnaire.

The first, developed by Guerra & Tass (2024), assesses the perception and level of integration of AI technologies in the educational process. It is composed of 20 Likert-type items with five response alternatives (never, rarely, sometimes, frequently, and always) distributed in five dimensions: use of AI applications for learning personalization (4 items), use of AI tools for academic content creation (5 items), interaction with virtual assistants and AI-based support systems (3 items), perceptions about the impact of AI on the educational experience (5 items), and ethical concerns about the use of AI in education (3 items). In this study, the questionnaire showed a high level of internal consistency ($\alpha = 0.893$)

Regarding the Socioemotional Development Questionnaire, developed by Calderón (2024), its purpose is to evaluate the socioemotional competencies of students in the academic environment. This questionnaire consists of 20 Likert-type items with five response alternatives (never, rarely, sometimes, often and always), distributed in five dimensions, each with 4 items: self-knowledge and emotional self-regulation in learning, empathy and social skills in the educational environment, resilience and adaptability in the face of academic challenges, stress management and emotional well-being in university life, and development of socioemotional intelligence through learning. In this study, the questionnaire showed an excellent level of internal consistency ($\alpha = 0.922$).

Procedures

For data collection, an organized and systematic process was carried out in a face-to-face manner. First, authorization was obtained from university authorities to conduct the study. Once approved, the students were convened in their respective classrooms or designated spaces within the university. During the session, the purpose of the research was explained in detail, clear instructions were given on how to answer the survey, and the questionnaires were handed out to each participant. After ensuring the participation of the 1172 students required to make up the sample, the instruments were collected and verified that they were correctly completed, thus guaranteeing the quality of the data obtained.

Data analysis

Data analysis was performed in three stages to ensure an accurate evaluation of the results. In the first stage, tables representing the distribution of frequencies and percentages of the study variables and dimensions were generated. In the second stage, an inferential analysis was performed to explore the associations between the study variables and the sex of the participants using the Chi-Square test (X^2) and Cramer's V coefficient to measure the magnitude of the associations. In the third stage, correlations were calculated using Spearman's rho coefficient, given that the variables and dimensions did not have a normal distribution. Correlations were considered significant when the p value was less than 0.05.

Ethical aspects

This research was conducted in accordance with the ethical principles established in the Declaration of Helsinki. The students received clear and detailed information on the objectives and nature of the study, ensuring their full understanding before requesting their informed consent, which was given voluntarily. Their autonomy was respected and their right to withdraw from the study at any time without repercussions was guaranteed. Likewise, strict protection measures were implemented to safeguard the privacy and confidentiality of the data, ensuring the anonymity of the participants and a safe and responsible handling of the information collected.

RESULTS AND DISCUSSION

Table 2 shows that, in the AI Integration variable, the "moderately adequate" level predominated, with a high concentration of responses in this category in several dimensions, such as the use of AI applications (39.1%) and perceptions about the impact of AI (38.6%). However, there are dimensions with less favorable evaluations, such as the use of AI tools and interaction with virtual assistants, where the levels "inadequate" (29.4% and 35.4%, respectively) and "very inadequate" (18.1% and 18.2%) are more frequent. In contrast, the dimension ethical concerns and considerations was the highest rated, with 30.8% at the "adequate" level and 20.2% at the "very adequate" level.

Table 2. Descriptive results for the artificial intelligence integration variable and its dimensions

Dimensions of AI	Very inadequate	Inadequate	Moderately adequate	Suitable	Very suitable	Total
AI integration	2.0%	19.8%	44.8%	27.2%	6.1%	100.0%
Use of AI applications	4.2%	25.3%	39.1%	24.7%	6.7%	100.0%
Use of AI tools	18.1%	29.4%	31.5%	16.6%	4.4%	100.0%
Interaction with virtual assistants	18.2%	35.4%	32.5%	9.9%	4.0%	100.0%
Perceptions on the impact of AI	7.3%	23.5%	38.6%	23.7%	7.0%	100.0%
Ethical concerns and considerations	2.5%	11.8%	34.7%	30.8%	20.2%	100.0%

Source: Author's development based on the research data

Table 3 shows that, in the SD variable, the "high" level predominated, with 48.2% of responses in this category, followed by the "very high" level (22.5%). Regarding its dimensions, self-knowledge and emotional self-regulation and resilience and adaptability also showed a high concentration in the "high" level (35% and 36.9%, respectively), although with a lower percentage in the "very high" level. On the other hand, the empathy and social skills dimension stood out as the best rated, with 37.5% at the "high" level and 26.1% at the "very high" level. In contrast, stress management and emotional well-being presented a less favorable distribution, with 36.8% at the "moderate" level and relatively high percentages at the "low" (21.4%) and "very low" (4.7%) levels.

Table 3. Descriptive results for the socioemotional development variable and its dimensions

Dimensions of SD	Very low	Under	Moderate	High	Very high	Total
Socio-emotional development	0.6%	3.6%	25.1%	48.2%	22.5%	100.0%
Self-knowledge and emotional self-regulation	1.6%	12.6%	31.9%	35.0%	18.9%	100.0%
Empathy and social skills	0.9%	6.9%	28.6%	37.5%	26.1%	100.0%
Resilience and adaptability	1.5%	11.4%	30.5%	36.9%	19.6%	100.0%
Stress management and emotional well-being	4.7%	21.4%	36.8%	28.2%	9.0%	100.0%
Development of socioemotional intelligence	1.1%	8.5%	26.9%	38.0%	25.5%	100.0%

Source: Author's development based on the research data

Table 4 shows the comparison of the AI integration variable according to sex. Both men and women presented a higher concentration of responses in the "moderately adequate" level, with 44.3% and 45.4%, respectively. The "adequate" and "very adequate" levels also showed similar percentages between both groups, with 27.1% and 7.2% in men, compared to 27.3% and 4.9% in women. The "inadequate" and "very inadequate" levels are slightly more frequent in women (21.3% and 1.1%) compared to men (18.5% and 2.9%). However, the Chi-Square test indicated that there are no statistically significant differences between the two groups (p> 0.05), and the effect size (Cramer's V = 0.085) suggests a weak effect size between sex and AI integration.

Table 5 shows the comparison of the SD variable according to sex. In both men and women, the "high" level predominated, with 46.1% and 50.6%, respectively, followed by the "very high" level, with 23.9% in men and 20.9% in women. The "moderate" levels also have a similar distribution, with 26.5% in men and 23.5% in women. The "low" and "very low" levels present low percentages in both groups, with slight differences between them. According to the Chi-Square statistical test, no statistically significant differences were found between men and women in SD (p> 0.05), and the effect size (Cramer's V = 0.064) indicates a very weak effect size between sex and this variable.

According to Table 6, the p-values of the Kolmogorov-Smirnov normality test for the study variables and dimensions were less than the significance level (p< 0.05), indicating that the scores did not follow a normal distribution. Therefore, it was decided to use Spearman's Rho nonparametric test to assess whether there is a significant relationship between these variables and study dimensions.

Table 7 shows that the Spearman's rho correlation coefficient between the AI integration and SD variables was 0.352, while the p-value was below the significance level (p<0.05). This indicates that there is a direct and significant relationship between both variables, although of low intensity.

Similarly, it was found that there was a direct and significant relationship between the integration of AI and the dimensions self-knowledge and emotional self-regulation in learning (rho= 0.274, p<0.05), empathy and social skills in the educational environment (rho= 0.235, p<0.05), resilience and adaptability in the face of academic challenges (rho= 0.313, p<0.05), stress management and emotional well-being in university life (rho= 0.321, p<0.05) and development of socioemotional intelligence through learning (rho= 0.291, p<0.05).

Table 4. Comparison of artificial intelligence integration according to sex

Sociodemographic variable		Integration of artificial intelligence					p	Cramer's V
		Very inadequate	Inadequate	Moderately adequate	Suitable	Very suitable		
Sex	M	18 (2.9%)	115 (18.5%)	276 (44.3%)	169 (27.1%)	45 (7.2%)	p > 0.05	0.085
	F	6 (1.1%)	117 (21.3%)	249 (45.4%)	150 (27.3%)	27 (4.9%)		

Source: Author's development based on the research data

Table 5. Comparison of socioemotional development according to sex

Sociodemographic variable		Socio-emotional development					p	Cramer's V
		Very low	Under	Moderate	High	Very high		
Sex	M	3 (0.5%)	19 (3.0%)	165 (26.5%)	287 (46.1%)	149 (23.9%)	p > 0.05	0.064
	F	4 (0.7%)	23 (4.2%)	129 (23.5%)	278 (50.6%)	115 (20.9%)		

Source: Author's development based on the research data

Table 6. Kolmogorov-Smirnov normality test for the study variables

Variables and dimensions	Kolmogorov-Smirnov .		
	Statistic	gl	p
AI integration.	0.035	1172	0.002
Use of AI applications for learning personalization.	0.079	1172	0.000
Use of AI tools for academic content creation.	0.054	1172	0.000
Interaction with virtual assistants and AI-based support systems.	0.084	1172	0.000
Perceptions of the impact of AI on the educational experience.	0.055	1172	0.000
Concerns and ethical considerations about the use of AI in education.	0.126	1172	0.000
Socioemotional development.	0.040	1172	0.000
Self-awareness and emotional self-regulation in learning.	0.089	1172	0.000
Empathy and social skills in the educational environment.	0.095	1172	0.000
Resilience and adaptability in the face of academic challenges.	0.089	1172	0.000
Stress management and emotional well-being in college life.	0.081	1172	0.000
Development of socioemotional intelligence through learning.	0.108	1172	0.000

Source: Author's development based on the research data

Table 7. Correlation matrix between the variables and dimensions of the study.

	IIA	UA	UH	IAV	PI	PC	DS	AU	EM	RE	GE	DE
IIA	1											
UA	0.762**	1										
UH	0.833**	0.547**	1									
IAV	0.805**	0.507**	0.693**	1								
PI	0.855**	0.573**	0.602**	0.649**	1							
PC	0.394**	0.255**	0.120**	0.114**	0.290**	1						
DS	0.352**	0.426**	0.186**	0.197**	0.307**	0.278**	1					
AU	0.274**	0.375**	0.064*	0.108**	0.235**	0.241**	0.823**	1				
EM	0.235**	0.304**	0.127**	0.100**	0.225**	0.283**	0.757**	0.567**	1			
RE	0.313**	0.372$^{(*)(*)}$	0.180**	0.179**	0.272**	0.226**	0.853**	0.642**	0.598**	1		
GE	0.321**	0.349**	0.247**	0.249**	0.263**	0.124**	0.760**	0.531**	0.394**	0.567**	1	
DE	0.291**	0.336**	0.134**	0.163**	0.255**	0.297**	0.828**	0.604**	0.564**	0.648**	0.588**	1

*$p < 0.05$; ** $p < 0.01$

Note: IIA= AI integration; UA= Use of AI applications for personalization of learning; UH= Use of AI tools for academic content creation; IAV= Interaction with virtual assistants and AI-based support systems; PI= Perceptions about the impact of AI on the educational experience; PC= Concerns and ethical considerations about the use of AI in education; SD= Social-emotional development; AU= Self-awareness and emotional self-regulation in learning; EM= Empathy and social skills in the educational environment; RE= Resilience and adaptability in the face of academic challenges; GE= Stress management and emotional well-being in university life; DE= Development of social-emotional intelligence through learning.

Source: Author's development based on the research data

Discussion

In recent years, AI has significantly transformed various areas of university higher education, from the personalization of learning to the automation of administrative processes. The integration of technologies such as intelligent tutoring systems, chatbots and adaptive platforms has enabled a more student-centered approach, promoting a more flexible and accessible education. However, despite the advances in the use of these technological tools, the emotional aspect of students remains an area that requires further research. In that sense, the present research focused on determining whether there is a relationship between the integration of AI and SD in university students in southern Peru.

Preliminarily, it was identified that students perceive the integration of AI in the educational environment as moderately adequate. This finding suggests the existence of certain limitations in the use of AI tools and in the interaction with virtual assistants. However, it also highlights favorable perceptions regarding the concerns and ethical considerations associated with their implementation. In general terms, the results indicate that, in the targeted university, AI is being progressively incorporated into the teaching-learning process. However, barriers persist that could limit the potential advantages of these technologies.

Similar results were reported by Chan et al. (2023) in research conducted in Hong Kong, where they concluded that students' perceptions were partially favorable. They recognized the potential of AI to provide personalized learning support, writing assistance, idea generation, and research and analysis capabilities. However, they also expressed concerns about accuracy, privacy, ethical issues, and the impact on their personal development, career prospects, and social values. Similarly, Almassaad et al. (2024) found that a sample of students in Saudi Arabia valued the advantages of AI, such as ease of access, time savings, and instant feedback. However, they identified significant challenges, including subscription fees, unreliable information, plagiarism, decreased interpersonal interaction, and negative effects on learning autonomy.

Another emerging finding reveals that students perceive a high level of SD, which suggests a favorable development in aspects such as self-knowledge, self-regulation, adaptation to different circumstances and the ability to face adverse situations effectively. Likewise, they demonstrate abilities to relate adequately and express empathy towards others. However, limitations were identified in some socioemotional aspects, such as stress management and maintaining a positive mood. These results reflect that, although the general perception of SD is favorable, there is a need to reinforce aspects related to emotional well-being.

Some studies support the findings described above. In Peru, Pajares et al. (2022) identified that students present a high level of development in their socioemotional competencies. Similarly, a multicenter study conducted in Argentina, Chile and Colombia by Lagos et al. (2022) found that students had a favorable perception of their emotional competencies. However, they highlighted that emotional regulation was the competence perceived as the least developed, while social competence reached the highest achievement levels in the three groups analyzed. Both investigations suggest that, despite progress, the path to a complete and balanced SD remains an ongoing process.

An interesting finding shows that there is direct and significant relationship AI integration and student SD. This means that by incorporating AI tools in the educational setting, students can improve important skills such as empathy,

emotional self-regulation and conflict resolution skills. In addition, the use of these technologies can provide them with personalized support, helping them to better identify and manage their emotions, which contributes to their overall well-being and better interaction with peers and teachers. However, it is important to note that the implementation of AI in the educational environment also presents challenges, such as the need to ensure the privacy of student data, adequate training of teachers to use these tools effectively, and the possibility that some technologies may not be accessible to all students due to economic or technological limitations. In addition, while AI can facilitate SD, its use must be complemented by human interaction, as direct emotional connection with other humans remains critical to students' personal and social growth.

There is research that reported similar results. Sethi & Jain (2024) conducted a study and concluded that AI implementation was associated with creating inclusive and supportive learning environments that foster students' social-emotional competencies. According to their research, by integrating AI in the classroom, educators could offer a more personalized approach tailored to the emotional needs of each student, promoting a more equitable and empathetic environment. On the other hand, Mosleh et al. (2024) reported in their research that the use of chatbots and other AI-based applications could significantly contribute to the development of students' emotional intelligence. Chatbots, by interacting with students in a constant and adaptive manner, offered a safe platform for the practice of emotional skills such as self-regulation, empathy, and conflict resolution. This demonstrates that, when properly implemented, AI not only supports cognitive learning, but can also be an effective tool in students' SD, helping them to better manage their emotions in academic and social contexts.

Among the strengths of this research is its relevance in the current context, as it addresses an emerging issue. By focusing on how the use of advanced technological tools, such as AI, may relate to students' socioemotional competencies, this research offers an innovative perspective that brings together two important areas of the educational process: technology and emotional well-being. Moreover, it provides initial empirical evidence on how interaction with AI could enhance or modify aspects such as emotional self-regulation, empathy and social skills, which is very important in an increasingly digitized academic environment. Thus, this research contributes significantly to an expanding field, laying the groundwork for future research that delves deeper into the effects of AI on students' SD, and its effective integration into educational processes.

Limitations and future research

Finally, it is important to note that this study has some limitations that should be taken into account when interpreting the results. First, the study was conducted at a single university, which limits the generalizability of the findings to other institutions or educational contexts. In addition, self-administered instruments were used, which could have generated biases in participants' responses, such as a tendency to respond in a way that is socially acceptable or favorable. Also, the cross-sectional design of the study provides a view of students' perceptions and behaviors at a given point in time, without allowing us to observe how they evolve over time or how the integration of AI affects their SD in the long term.

To overcome these limitations, it would be beneficial to expand the sample and include universities from different contexts, as well as to employ a combination of data collection methods, such as qualitative interviews or longitudinal studies, that provide a deeper and more detailed understanding of the relationship between AI and university students' SD.

CONCLUSIONS

The findings allow us to conclude that there is a direct and significant relationship between AI integration and SD in university students in southern Peru. This means that as the integration of AI-based tools and technologies increases, a greater development of socioemotional skills, such as empathy, emotional self-regulation and conflict resolution, is also observed. Conversely, less integration of these technologies could be associated with less pronounced development of such socioemotional competencies, which could limit students' ability to manage their emotions, understand others' perspectives, and resolve conflicts effectively in educational and social settings.

Therefore, it is recommended that higher education institutions consider the implementation of AI-based technologies as part of their pedagogical strategies, focusing on those tools that promote the development of socioemotional skills, such as empathy, emotional self-regulation and conflict resolution. Likewise, it is suggested to design training programs for students that include the ethical and responsible use of these technologies, fostering a balance between technological competencies and socioemotional well-being. This could contribute to a comprehensive training that prepares students to face academic and social challenges effectively.

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