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CHATGPT AND CREATIVE THINKING IN UNIVERSITY STUDENTS

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Summary

The study examined the relationship between the use of ChatGPT and creative thinking in early education university students. 186 students from a private university in Trujillo, Peru were surveyed. The results revealed that the majority of students were located in the medium level of use of ChatGPT, followed by the low and high level, suggesting a generalized familiarity with this artificial intelligence tool. Regarding creative thinking, a more balanced distribution was observed between the levels, with a predominance in the medium level, followed by the high and low. This indicates that most students possess some degree of creative thinking, but there is still room for improvement. It is concluded that training students and teachers in the use of ChatGPT, as well as encouraging creative thinking in the classroom, could be beneficial to promote advanced cognitive skills and innovation in the educational field.

Keywords: ChatGPT, Generative Artificial Intelligence, creative thinking, university.

1. Introduction

In the context of the interaction between artificial intelligence (AI) and the educational process, creative thinking is presented as a crucial component worthy of analysis. According to the reflections of Flores-Vivar and García-Peñalvo (2023), the implementation of AI in educational environments entails the possibility of promoting and enhancing creative thinking in both teachers and students. AI systems, with their ability to engage in intelligent dialogue and analyze text, offer a conducive space for the expansion of creativity and the generation of new innovative perspectives. However, this integration raises relevant questions and challenges. Al Darayseh (2023) sheds light on the topic by suggesting that the continuous progress of AI, represented by technologies such as ChatGPT, raises debates about the role of creative thinking in an increasingly digitalized environment. Thus arises the need to reflect on how AI can influence human creative thinking, either enhancing it or displacing it. In this panorama of analysis and discussion, creative thinking emerges as a fundamental pillar, leading to new dimensions of innovation and adaptation in the educational field and beyond.

The main function of the artificial intelligence instance developed by OpenAI, known as ChatGPT, is to answer questions and generate texts at the request of users, using generative language models based on artificial intelligence (Navarro-Dolmetch, 2023). Through its ability to process and understand human language, it can generate a variety of content, including poems, essays, computer codes, images, speeches, projects, reports and other administrative, academic and artistic texts Darvishi (2023) . Its implementation has had a significant impact in various sectors, including education, politics and the business world, being used by a wide range of users around the world (Essel et al., 2023). However, its adoption has also generated changes in the workplace, with reports suggesting that its use has contributed to the replacement of jobs in certain industries due to the automation it provides (Smink, 2023).

Artificial intelligence (AI) is positioned as an unavoidable response to technological advancement, facilitating the creation of necessary tools that are accessible to everyone, and as an effective solution to the progress of autonomous learning (Sarkovaite, 2023). In this panorama, ChatGPT emerges as an essential tool to enhance human creativity, by providing quick responses in the text generation process, which leads to notable savings in time and effort (Rodrigo-Martín et al., 2022). However, it is important to highlight that, although this technology can be of great help, it cannot completely replace the capacity for analysis or critical reflection on the topics, data and literature (Dwivedi et al., 2023). Therefore, its integration requires continuous development of creative thinking by students, as well as specialized and constant monitoring by teachers, both in virtual and in-person environments within the university environment.

In the context of university education in Peru, it is imperative to address the challenges facing the promotion of creative thinking, especially in a scenario marked by the pandemic, which has negatively impacted the social and communication skills of many young people and adolescents (Ricardo , 2022). It is alarming that 90% of university students in the country show poor levels of creative thinking, both in state and private institutions (Mamani, 2021). This situation is exacerbated by the rigidity of university curricula, the lack of preparation of teachers to use tools such as ChatGPT in their teaching, and the controversies surrounding its integration as an educational resource (Zapata Ros, 2024). It is evident that urgent and creative measures are required to address this reality and promote an educational environment that encourages innovation and creativity among Peruvian university students.

The exploration of ChatGPT and its relationship with creative thinking is a topic of great relevance, especially given its initial impact, which is reflected in the impressive achievement of reaching 100 million users in just two months (Selwyn et al., 2022). Despite this milestone, it is evident that this generative artificial intelligence system has not yet been significantly integrated into the university educational system, since many perceive it more as a threat than as an opportunity (Firat,2023). However, it is essential to recognize that ChatGPT has the potential to improve productivity and generate important advances in a wide range of disciplinary and business fields (Kasneci et al.,2023). Therefore, the question of its legal use or the need to restrict it generates divergent opinions and ongoing debates. It is imperative to deepen and expand research on the impact of ChatGPT on teaching-learning processes, as well as on the promotion of creativity and innovation (Kooli, 2023). This inquiry will enrich our understanding and allow us to more informedly address the challenges and opportunities posed by the integration of artificial intelligence into university education.

Al Afnan et al. (2023) specify that ChatGPT is a tool that can replace search engines, as it provides accurate and reliable information, helps in searching for answers to theoretical questions and provides ideas in developing practical questions; allows the integration of technology in classrooms. Lo (2023) concludes that it is relevant to train students and teachers in the use of ChatGPT, run workshops for the discussion and evaluation of responses, update institutional policies and evaluation methods in universities and educational institutions. Zohery (2023) points out that ChatGPTperfects supervised learning, improves performance and quality of academic and scientific composition.Rospigliosi, (2023). He concludes that as the use of ChatGPT increases, the value of the scientific production variable increases proportionally.

According to Atencio et al. (2023), ChatGPT has the potential to be an invaluable tool in educational environments, as long as its application focuses on stimulating motivation to encourage critical and creative thinking. Furthermore, Sullivan et al. (2023) have confirmed that the use of ChatGPT leads to significant improvements in self-efficacy for solving tasks, as well as in the quality, elaboration and originality of the proposed solutions. Likewise, Jungherr (2023) highlights that ChatGPT facilitates the execution of tasks by students, assists them in the writing process and contributes to the construction and codification of knowledge. Its proper and effective use not only promotes the development of creative and scientific skills, but also the mastery of knowledge. These findings pose a significant challenge for teachers, who must rethink the foundations of university education, adopt a resilient attitude and adapt to the contributions of artificial intelligence, integrating it effectively into the educational system to enhance creativity and facilitate acquisition. of knowledge (Jofre, 2023).

The conceptualization of ChatGPT is rooted in the general theory of the object of study of computational thinking, introduced by Wing in 2006. This theory postulates the understanding of human behavior through computing, highlighting the human capacity to use abstract thinking in the resolution of a wide range of situations. From identifying problems to developing models, generating process sequences, proposing solutions and deepening research, human beings use technology and computer systems in various contexts, including the work, economic, political, social, cultural and educational spheres (Mantilla Guiza and Negre Bennasa, 2021). This perspective reflects a comprehensive vision of the interaction between humans and technology, highlighting its role in expanding knowledge and interaction with the

environment in multiple dimensions of daily life.

The theoretical basis that supports the empirical object of ChatGPT as a Generative Artificial Intelligence tool is found in the connectivist approach developed by Siemens. This approach posits that learning and knowledge acquisition take place in interconnected networks, where technology plays an integral role in cognition and knowledge construction (Tang et al. 2023). In this context, learning in the digital age involves the active search for information on the Internet, the exchange of knowledge between users and participation in virtual communities, which encourages the development of technological skills, the stimulation of autonomous learning, creativity in solving problems and identifying relevant connections for the educational process (Putra et al., 2023; Mollick and Mollick., 2022). This perspective recognizes the transformative role of technology in the learning process, promoting a comprehensive and dynamic vision of education in the digital age.

The thematic theory that supports the creative thinking approach is based on the human ability to generate new ideas, keep an open mind and seek multiple solutions to problems (Kulmuminov,2023). This approach is not only crucial to improve academic performance, but is also essential in everyday life by adopting an innovative perspective (Kiraga, 2023; Luckin et al., 2022). From the perspective of the Structure of Intellect proposed by Guilford, divergent production is emphasized, which is characterized by the generation of logical alternatives from the available information. This divergent production is distinguished by its attributes of originality, fluidity, flexibility and elaboration (Liang, 2023; Mukhammedovich, 2023). This integration of theories provides a solid framework for understanding and promoting creative thinking, highlighting its importance both in academia and in everyday life.

The main objective of the study is to investigate the interaction between ChatGPT and creative thinking in university students in Trujillo, Peru, during the year 2023. It aims to answer the question: How is the use of ChatGPT intertwined with the development of creative thinking in Trujillo university students during the aforementioned period? This research seeks to deepen the understanding of how the use of this artificial intelligence tool impacts the ability to generate innovative ideas and the open-mindedness of university students, thus contributing to a more complete and detailed analysis of educational dynamics in the era digital.

2. Methodological process

Following the vision of Hernández and Mendoza (2021), the present study will opt for a fundamental quantitative perspective, aimed at investigating reality in a specific environment and proposing practical solutions. It will focus on the collection and analysis of numerical data that can be measured, with the purpose of understanding and explaining the relevant phenomena. This methodology will allow the posed research question to be addressed in a rigorous and systematic manner, which will represent a valuable contribution to knowledge within the field of study.

In the design of this research, a non-experimental approach has been considered, since there was no intervention in the manipulation of the variables, but rather the events were observed as they developed in their natural environment. Furthermore, regarding the temporality of the study, a cross-sectional approach has been adopted, given that the data were collected at a single point in time. This type of design involves the measurement of variables at a specific time, thus allowing us to obtain a representative snapshot of reality in that period (Hernández and Mendoza, 2021).

Within the framework of this research, 186 students belonging to a private university institution located in Trujillo participated. These participants were selected from among those enrolled for the 2023-2 academic period. To guarantee the representativeness and quality of the sample, exclusion criteria were applied that included students who declined to participate in the study, those who were not enrolled at the beginning of the semester, those with a non-attendance rate greater than 30%, as well as those who did not use ChatGPT and were minors. To select the sample, non-probabilistic convenience sampling was chosen, following the guidelines proposed by Hernández and Carpio (2019). This approach highlights the intentional selection of participants who present the characteristics of interest and who are easily accessible to the researcher, ensuring adequate representation of the student population in the study context.

In relation to the instruments used in the research, a questionnaire consisting of 30 items was used to evaluate the ChatGPT variable, while a questionnaire consisting of 25 items was used for the creative thinking variable. In order to ensure the reliability of the quantitative data collected, an exhaustive analysis was carried out which revealed a McDonald's Omega coefficient of 0.943. This value denotes high internal consistency in the responses provided by the participants, thus guaranteeing the reliability and validity of the instrument used. In this way, the questionnaire emerged as a reliable and solid tool to evaluate the impact of the intervention on the students' autonomous learning.

3. Results

The data presented in Table 1 shows the distribution of participants according to their level of use of ChatGPT and their level of creative thinking. Regarding the use of ChatGPT, it is observed that 17.20% of the participants are at the low level, 52.69% at the medium level and 30.11% at the high level. On the other hand, in relation to creative thinking, 15.05% of the participants exhibit a low level, 52.15% a medium level and 32.80% a high level. These data are based on a sample of 186 participants. Valid percentages indicate the proportion of participants in each category, while cumulative percentages show the cumulative sum of the percentages in each level.

Table 1 *ChatGPT levels and creative thinking in early education students at a private university in Trujillo*

Variables	Low level		Medium level		High level		Total	Valid percentage	Accumulated percentage
	F	%	F	%	F	%			
ChatGPT	32	17.20%	98	52.69%	56	30.11%	186	100.00%	100.00%
Creative thinking	28	15.05%	97	52.15%	61	32.80%	186	100.00%	100.00%

The data presented in Table 2 show the results of the correlation analysis between the variables "ChatGPT" and "Creative thinking". The Spearman correlation coefficient (Rho) between these two variables is 0.928, which indicates a positive and significant correlation between the use of ChatGPT and creative thinking. Furthermore, the bilateral significance value associated with this correlation is 0.000, which indicates that the observed relationship is statistically significant. These results are based on a sample of 186 participants. In summary, it can be

concluded that there is a positive correlation between the use of ChatGPT and creative thinking in the sample studied.

Table 2 *Spearman's Rho test for the ChatGPT and creative thinking variables of early education students*

				Creative thinking
	ChatGPT	Correlation coefficient	1,000	.928
Spearman's Rho		Sig. (bilateral)		0.000
		N		186
		Sig. (bilateral)	0.000	

**. The correlation is significant at the 0.01 level (two-sided).

4. Discussion

ChatGPT has played a crucial role in fostering creative thinking among university students during the year 2023 by facilitating the creation of various academic texts. According to the students' own responses, ChatGPT represents a versatile tool that not only offers accurate and reliable information, but also works as an effective substitute for conventional search engines. Furthermore, this chatbot helps to find answers to theoretical questions and provides inspiration to ask practical questions, which promotes the effective integration of technology in the educational environment (AlAfnan et al., 2023). In line with this perspective, Darvishi, (2023) argues that artificial intelligence (AI) systems provide highly specialized advice that goes beyond the limits of the teacher's knowledge and experience. On the other hand, according to the analysis of Smink (2023), ChatGPT, based on generative artificial intelligence, has the ability to answer questions and generate a wide variety of texts, ranging from poems, essays and computer codes, to images, speeches, projects and reports, both in the academic and artistic fields. This versatility makes ChatGPT an invaluable tool for enhancing creativity and learning in higher education.

The results obtained regarding the use of ChatGPT among early education students reveal a varied distribution in levels of familiarity with this artificial intelligence tool. It was observed that the majority of students were in the medium level (52.69%), followed by the low level (17.20%) and the high level (30.11%). These findings indicate that, although a considerable proportion of students have some experience with ChatGPT, there is still a significant group that is unfamiliar with its use.

In this sense, the findings corroborate the need to implement measures to train both students and teachers in the effective use of ChatGPT. As Lo (2023) suggests, holding workshops for the discussion and evaluation of the responses generated by this tool could be an effective strategy to improve its understanding and application. Furthermore, updating institutional policies and evaluation methods in universities and educational institutions could contribute to more effectively integrating ChatGPT into the teaching-learning process, thus encouraging greater use of its benefits.(Zohery, 2023).

These actions would not only promote greater familiarization with ChatGPT among students, but would also boost the development of skills related to critical and creative thinking, by allowing them to explore new ways of obtaining and processing information (Essel, 2023).

Ultimately, the implementation of these measures could help improve the quality of education and prepare students to meet the challenges of the ever-evolving digital world.

The results obtained regarding creative thinking revealed a more balanced distribution between the levels, with the medium level as the most predominant (52.15%), followed by the high level (32.80%) and the low level (15.05%). These findings indicate that the majority of students possess a certain degree of creative thinking, but there is still a considerable proportion that could improve in this aspect.

It is important to note that keeping an open mind and seeking multiple solutions to problems is not only crucial to improving academic performance, but is also essential in everyday life by adopting an innovative perspective (Putra, et al., 2022). In this context, the importance of divergent production is emphasized, which is characterized by the generation of logical alternatives from the available information. This divergent production is distinguished by its attributes of originality, fluidity, flexibility and elaboration (Firat, 2023).

Therefore, the results suggest that, although the majority of students exhibit some level of creative thinking, there is still room to improve and develop stronger skills in this aspect (Navarro-Dolmestch, 2023). This highlights the importance of implementing educational strategies that encourage creativity and divergent production among students, which could contribute not only to their academic success, but also to their ability to innovatively address challenges in various areas of life.

When analyzing the correlation between the use of ChatGPT and creative thinking, a highly significant positive correlation was found (Spearman's Rho = 0.928, p < 0.001). This indicates that there is a strong association between the level of use of ChatGPT and the degree of creative thinking of the students in the initial education program. That is, as students have a higher level of familiarity and use of ChatGPT, they tend to exhibit higher levels of creative thinking.

These findings suggest the importance of integrating artificial intelligence tools, such as ChatGPT, into the educational environment to foster students' creative thinking from an early stage of their academic training. Furthermore, they highlight the need to develop pedagogical strategies that promote a more effective and reflective use of these technologies, in order to enhance the comprehensive development of students in the field of creativity and innovation.

5. Conclusions

The results of the correlation analysis between ChatGPT and creative thinking revealed a strong positive correlation between both variables. This suggests that the use of ChatGPT could be significantly associated with the development of creative thinking in university students. Therefore, the importance of further exploring this relationship and considering the role of ChatGPT as a potential tool to stimulate and improve creativity in the educational field is highlighted.

The research revealed that the majority of early education university students at a private university in Trujillo, Peru, are at a medium level of familiarity and use of ChatGPT. This suggests that there is significant acceptance and adoption of this artificial intelligence tool among students, which may have both positive and negative implications on their learning process and academic development.

Regarding creative thinking, the findings show that the majority of students have a certain degree of creative thinking, with a balanced distribution between medium and high levels.

However, a considerable proportion of students was also identified at the low level, which indicates the need to implement educational strategies that promote and improve this skill in the university context.

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