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The impact of AI tools on undergraduate students' academic performance: A case study of Peru

Valeria Lozano-Gomez, *Universidad del Pacífico, Lima-Peru, vp.lozanog@alum.up.edu.pe*
Christian Fernando Libaque-Saenz, *Universidad del Pacífico, Lima-Peru, cf.libaques@up.edu.pe*

Abstract

This study examines the impact of ChatGPT as a study tool on undergraduate academic performance in Peru, aiming to identify the effect of specific usage patterns. Considering the increasing adoption of AI in education, assessing ChatGPT's potential to enhance learning experiences is imperative. Using a structural equation model, this research analysed survey data from 263 students, examining the relationship between ChatGPT usage patterns—such as idea generation, research support, and writing assistance—and academic performance, in addition to the impact of students' characteristics, university support, and professors' skills. The findings indicate that students' skills and stress levels are significant predictors of performance. ChatGPT's idea generation feature positively influenced academic outcomes by fostering creativity, whereas research support had a negative impact, likely due to outdated information, emphasising the importance of responsible AI usage. These findings offer practical guidance for students, educators, and policymakers on effectively integrating AI tools into education. Implications will be discussed, focusing on practical strategies for maximising ChatGPT's benefits and addressing its limitations.

Keywords: ChatGPT, AI in education, academic performance, higher education, Peru

Introduction

Education is recognised globally as a fundamental human right for societal development and well-being (United Nations, 1948; World Bank, 2024a). In Peru, however, challenges within the higher education sector limit the this right being fully exercised. Undergraduate programs, crucial in shaping professionals who meet market needs, often fall short of quality standards. Therefore, this study focuses on the academic performance of undergraduate students, a critical area for improving both individual and societal prospects (La Paz Lillo et al., 2023; UNESCO, n.d.).

The current regulatory system for undergraduate programs in Peru establishes two key processes to ensure quality: licensing and accreditation. The licensing procedure, mandatory and regulated by the National Superintendency of Higher Education (SUNEDU, its acronym in Spanish), assesses the minimum standards required for operation, including infrastructure and faculty (La Paz Lillo et al., 2023). According to the latest data, there are 143 universities in Peru as at July 2024 (SUNEDU, 2024). Forty five of these do not hold a license because they failed to meet one or more of the criteria set by the Peruvian Ministry of Education (MINEDU, its acronym in Spanish). In contrast, the accreditation process is voluntary and recognizes universities that meet high quality standards. This process is managed by the National System

of Evaluation, Accreditation, and Certification of Educational Quality (SINEACE, its acronym in Spanish) (La Paz Lillo et al., 2023). According to the latest SINEACE report, there are only 11 accredited universities in Peru (SINEACE, n.d.), highlighting the educational situation in the country.

The repercussions of this inadequate educational quality extend beyond academia, impacting Peru's socio-economic landscape. Ipsos (2023) found that 61% of respondents rated education mediocre, reflecting real socio-economic challenges. High unemployment, widespread informal employment, and elevated poverty rates are some outcomes associated with an underperforming education system (Gedro, 2021; Majid Khan et al., 2023). The National Institute of Statistics and Informatics (INEI, its acronym in Spanish) reported a 5.4% unemployment rate in 2023 in Peru (INEI, 2024), showing an increase of 0.7% compared to the previous year, and 71.65% of employment was informal (Statista, 2024b). With a poverty rate of 29% (INEI, 2024) and a decrease of 0.6% in its GDP, Peru ranks 49th out of 208 countries (World Bank, 2024b), highlighting the urgent need for an educational reform to enhance Peru's economic stability and growth in the long term (Goczek et al., 2021; Valero, 2021).

Given these educational challenges, there is a clear need for innovative strategies that can enhance academic quality. Education systems worldwide, including Peru's system, were significantly impacted by the COVID-19 pandemic, which accelerated the adoption of digital tools in teaching and learning environments (Haleem et al., 2022). This shift highlighted the transformative potential of artificial intelligence (AI)—the capacity of machines to mimic human thought, learn from experience, and perform tasks that typically require human intelligence (Russell and Norvig, 2009). AI and data-driven platforms have since become integral to improving educational access and enhancing learning outcomes (Chen et al., 2020; Yao et al., 2020). These technologies have demonstrated the ability to support students and educators, enabling rapid adaptation to new educational models and enriching learning processes (Kerres and Buchner, 2022).

ChatGPT has rapidly become one of the most widely used of the emerging AI tools globally, including in Peru. ChatGPT achieved over one million users within five days of its release and now serves more than 546 million users worldwide (Semrush, 2024). ChatGPT offers students diverse support as a study guide, personal tutor, and collaborative assistant. It enables roles like idea generation, debate facilitation, group collaboration, curriculum design, and personalised feedback (Diaz Vera et al., 2023). Studies suggest that AI tools like ChatGPT can improve learning outcomes by fostering engagement, providing access to personalised learning resources, and delivering immediate feedback, all of which contribute to a more tailored educational experience (Rasul et al., 2023; Sullivan et al., 2023). Due to ChatGPT's popularity and utility, this study aims to assess its impact as a study tool on undergraduate students' academic performance. This research aims to provide evidence-based recommendations to the government and universities on the responsible and effective integration of AI tools into higher education.

Literature Review

Previous studies have reported mixed findings on the causes and effects of the use of AI tools in education. To better understand these divergent outcomes, the literature review is organised into two sections: (1) studies examining the causes and effects of AI implementation for educators and (2) studies exploring the causes and effects of AI implementation for students. Regarding the first research stream, the literature reveals several critical factors. Research by Haleem et al. (2022) highlights that AI tools can substantially ease the educational process by automating routine tasks, such as lesson planning, content customization, and tracking student progress. This automation reduces administrative loads and enables educators to develop more tailored teaching strategies. Rasul et al. (2023) noted that ChatGPT provides innovative assessment methods and administrative support, motivating educators to incorporate these tools into their

practices. Despite these advantages, the effects of AI tools present challenges. For example, Dempere et al. (2023) and Singh et al. (2023) discussed the benefits of improved research support, automated grading, and enhanced human-computer interaction but also raised concerns about online testing security, potential plagiarism, and broader societal impacts, such as job displacement and the digital literacy gap. Singh et al. (2023) emphasise the need for more robust guidelines to maximise the benefits of AI tools while addressing potential issues. Similarly, Popenici and Kerr (2017) contend that universities must rethink their pedagogical models in response to AI's transformative effects. They argue that while higher education institutions should embrace these advancements, they must also confront substantial challenges.

In the case of studies on students' use of AI tools (second research stream), the literature identified several motivations, such as time pressure and workflow demand (Abbas et al., 2024). For instance, Abbas et al. (2024), in a study conducted in Pakistan, highlight that heavy workloads and time constraints encourage students to use ChatGPT, underscoring the need for improved time management in academic settings. Additionally, the attributes of AI, particularly ChatGPT, enhance students' inclination to use these tools due to the breadth and depth of information available, perceived usefulness, and the provision of personalized and rapid feedback (Abdaljaleel et al., 2024; Rasul et al., 2023). Velasquez-Astuhuaman and Libaque-Saenz (2024) analysed factors that motivate students in Peru to use ChatGPT, finding that variables like perceived usefulness, writing capacity, and variety of information significantly influence their intention to use the tool. Lee et al. (2022) further demonstrate that AI chatbots like ChatGPT can increase student engagement through continuous feedback and interactive learning, positively impacting academic performance. In the Peruvian context, Aguilar et al. (2023) suggest that students who frequently use ChatGPT for information acquisition and creative exercises report a marked improvement in academic efficiency, as the tool aids in refining students' writing, linguistic, and analytical skills. In a study conducted in Australia, Sandu et al. (2024) found a direct correlation between ChatGPT usage frequency and students' perceived academic benefits, noting that students who incorporate ChatGPT into their academic routines feel more prepared and confident in their studies. Singh et al. (2023), in the United Kingdom, report that while students are familiar with ChatGPT, its irregular use and a lack of university guidelines limit its full potential as an educational tool, suggesting the need for structured implementation to maximise benefits.

While AI demonstrated significant potential for a positive impact on academic performance, as noted by Al Shloul et al. (2024), Castillo-Martínez et al. (2024), and Dempere et al. (2023), the full extent of its effects has not been extensively studied due to its relatively recent and growing influence. For example, recent studies predominantly focus on the factors driving AI tool use, emphasising time savings, ease of access, and perceived usefulness (Niloy et al., 2024). Quantitative and qualitative research has been conducted to identify the factors that increase the intention to use AI. However, there is a distinct lack of quantitative studies investigating specific ways these tools are used and their direct impact on academic performance. While there is some information on ChatGPT's use as a support tool, such as writing assistance for generating summaries and correcting grammar, generating ideas, personalised feedback and tutoring, research support, and study planning and monitoring (Chauke et al., 2024; Črček and Patekar, 2023; Lin et al., 2024; Mahsun et al., 2024; You, 2024), detailed quantitative data on these specific applications is still missing. This gap makes it difficult to determine the precise effects of AI, particularly ChatGPT, on students' academic outcomes.

Despite the potential of AI in education, its impact on academic performance remains insufficiently studied. While existing literature has explored AI's role in education across various contexts, there is a notable lack of quantitative research focused on specific AI applications in higher education and their impact on students' academic performance. This study seeks to fill the identified gap by quantitatively assessing how ChatGPT's most common usage patterns impact students' academic performance.

Theoretical Framework and Hypotheses

Factors affecting academic performance

Academic achievement, a key outcome of formal education processes, is significantly influenced by various factors. Understanding these factors is essential for comprehending the broader impact of educational interventions and tools, including AI (Chan and Dai, 2023). The variables for this study were identified through a review of 15 academic papers. Table 1 summarizes the most frequently mentioned variables, which were then selected for further analysis.

Table 1. The Most Common Factors That Affect Academic Performance

Source	DEM	PP	SS	UI	ST
Cao et al. (2024)	X				X
Chan and Dai (2023)	X		X		
Lee et al. (2023)	X	X			
Lucey and Grydaki (2023)	X	X	X		
Sun and Liu (2023)					
Yusof et al. (2023)				X	
Dagdagui (2022)	X		X		
Alani and Hawas (2021)				X	
Gopal et al. (2021)	X	X			
Maqableh et al. (2021)	X	X			
Yavuzalp and Bahcivan (2021)			X		
Abuhassna et al. (2020)			X		
Thu et al. (2020)		X		X	
Soomro et al. (2019)	X	X		X	X
Rosander et al. (2011)			X		

Note: DEM = Demographics, PP = Professor Performance, SS = Student Skills, UI = University Infrastructure, ST = Stress

ChatGPT usage by undergraduate students

Recent studies reveal various ways in which students are utilising ChatGPT's capabilities. Participants in the Črček and Patekar (2023) study reported using ChatGPT for written assignments and idea generation. This latter task refers to activities such as summarising, paraphrasing, proofreading, and even writing parts of assignments. The study also noted that generating ideas was perceived as the most ethically acceptable use. Beyond writing assistance, ChatGPT's potential extends to research support and information synthesis. As You (2024) highlighted, ChatGPT is an effective research aid, helping students synthesise information and summarise vast amounts of text data. This capability significantly contributes to academic writing and idea generation by allowing students to process information more quickly.

In addition to its role in writing and research, ChatGPT provides personalised feedback and adaptive learning experiences. It functions as a personal tutor by offering real-time feedback to track students' understanding and progress (Lin et al., 2024; Mahsun et al., 2024). Chauke et al. (2024) found that ChatGPT helps students identify grammatical errors and improve academic writing skills through paraphrasing. Furthermore, Lin et al. (2024) explore this tool's utility in study planning and monitoring, where students use it to set learning goals, design personalised study plans, and even create self-assessment tools to monitor

their learning outcomes. Accordingly, this study posits five tasks: Writing Assistance, Generating Ideas, Personalised Feedback and Tutoring, Research Support, and Study Planning and Monitoring.

Activity theory framework

Activity Theory (AT) is a framework developed by Vygotsky and later expanded by Leont'ev, which provides a lens for analysing the complex interactions between individuals and their environment (Nikou, 2024). It establishes that human activities are collective and socially mediated processes, and divides these activities into several components: subject, object, artefact, rules, community, and division of labour. The subject is the individual or group whose activity is being studied, while the object is the goal or outcome they are working towards. The artefact refers to the tools that mediate the interaction between the subject and the object. The extended context in which this activity takes place includes the rules that govern behaviour, the division of labour that defines roles and responsibilities, and the community that connects the subject to others involved in the activity (Liaw et al., 2010; Nikou, 2024; Pettersson, 2021).

When applying AT in this study, the subject is the university student, and the object is satisfactory academic performance, which is influenced by various factors, including demographic characteristics, student skills, and stress levels, as well as student characteristics. These variables are part of the category of student characteristics that shape how the subject (student) engages with their educational tasks. The artefact in this study is ChatGPT, a technological tool that mediates the student's learning activity. The rules represent the institutional guidelines that shape the relationships between the university, professors, and students (Liaw et al., 2010; Pettersson, 2021). These rules govern how teaching, learning, and institutional support interact, creating the structure of academic activities (Akpan and Kennedy, 2020; Nikou, 2024). The division of labour refers to how tasks and responsibilities are divided between students, professors, and the university (Akpan and Kennedy, 2020; Pettersson, 2021). Professors play a critical role in teaching, while the university provides the necessary infrastructure and support for these activities. The community consists of the broader educational environment, including peers, faculty, and institutional structures, all of which contribute to the student's learning experience (Liaw et al., 2010; Nikou, 2024). For effective learning, alignment between the rules, division of labour, and community is crucial, ensuring that the infrastructure and professor support are optimally integrated to aid the student's engagement (Hair et al., 2017).

In line with this theoretical perspective, ChatGPT functions as a central mediating artefact that interacts with various components of the learning environment. Depending on the usage type—whether through writing support, idea generation, personalised feedback, research assistance, or study planning—ChatGPT has the potential to reshape academic tasks by extending cognitive capacities, promoting learner autonomy, and facilitating access to relevant knowledge. Based on this discussion, this study hypothesized:

H1: *Student skills positively influence academic performance*

H2: *Stress negatively influences academic performance*

H3: *University infrastructure positively influences academic performance*

H4: *The professor's performance positively influences academic performance*

H5: *ChatGPT as a writing assistance tool positively influences academic performance*

H6: *ChatGPT for generating ideas positively influences academic performance*

H7: *ChatGPT for tutoring and giving personalised feedback positively influences academic performance*

H8: *ChatGPT as a research support tool positively influences academic performance*

H9: *ChatGPT as a study planning and monitoring tool positively influences academic performance*

Research Methodology

Each variable was measured with multiple items (see Appendix), except for the five variables measuring each ChatGPT usage type and academic performance, which were measured with a single item each. All were contextualised to fit this study's research and were rated on a 5-point Likert scale. The target population of this study comprises current undergraduate students from Lima, Peru, who are ChatGPT users. Data was collected through a survey administered via Google Forms, an online platform, allowing participants to self-administer the questionnaire. The survey was provided in Spanish, and the participants were recruited through social media using the snowball sampling technique, enabling the study to reach ChatGPT-using undergraduate students, as this group typically engages with the internet and social media (Leighton et al., 2021). All variables were based on participants' perceptions, and thus, they were considered latent variables, which are unobservable and unmeasurable directly, representing abstract concepts without direct means of measurement (Moustaki, 1996). Given the nature of these variables and the research objective focused on a hypothesized dependence relationship, structural equation modelling (SEM) was employed to evaluate the research model, as it addresses a cause-and-effect relationship between latent variables (Hair et al., 2017). SmartPLS was utilised as the analysis tool.

Sample

Data collection was conducted in October and November 2024. After removing the answers of participants who did not meet the eligibility criteria, 263 valid responses were included for further analysis. The sample consists of 56.7% female and 41.4% male participants. Regarding age, 42.2% of participants are between 18 and 20 years old, 50.2% are between 21 and 23 years old, 6.5% are between 24 and 26 years old, and 1.1% are 27 years old or above. Finally, regarding academic progress, the sample primarily comprises fourth-year students (28.52%), followed by fifth-year students (27.38%).

Results

Analysis of reliability and validity

The validity of the measurement model was assessed through construct reliability, convergent validity, and discriminant validity. Item reliability loadings, internal consistency, and average variance extracted (AVE) were used to assess reliability and convergent validity. The item reliability was assessed by examining each item's loading on its corresponding latent variable. This study found that all item loadings exceeded the criterion recommended threshold of 0.7 (see Appendix), as suggested by Barclay, Higgins, and Thompson (1995). The internal consistency (reliability) was assessed by using Cronbach's alpha (α) values and examining the composite reliability (CR), which ranged from 0.877 to 0.951 for composite reliability and from 0.827 to 0.933 for Cronbach's alpha (see Table 2). CR and α values exceeded the recommended threshold of 0.7 (Nunnally, 1978). Additionally, all AVE values were above the 0.5 criterion, ranging from 0.590 to 0.831 (see Table 2), as Hu et al. (2004) recommended. These results suggest that the measurement model demonstrates acceptable levels of reliability and convergent validity, indicating it is adequate.

Table 2. Reliability and Convergent Validity

Construct	α	CR	AVE
University Infrastructure (UI)	0.933	0.951	0.831
Professor Performance (PP)	0.855	0.888	0.665
Student Skills (SS)	0.891	0.924	0.752
Stress (ST)	0.827	0.877	0.590

Discriminant validity was evaluated using the heterotrait-monotrait ratio (HTMT). According to current literature, HTMT values should be below 0.85 if constructs are conceptually different, or below 0.90 if they are conceptually similar (Kline, 2011). Table 3 shows that all HTMT values are under 0.85, indicating adequate discriminant validity across constructs. Collectively, the results support the reliability, convergent validity, and discriminant validity of the measurement model.

Table 3. Heterotrait-Monotrait Ratio (HTMT)

Construct	1	2	3	4	5	6	7	8	9	10	11	12
1.AG	---											
2.UC2	0.124	---										
3.UC3	0.122	0.531	---									
4.UC4	0.115	0.499	0.434	---								
5.UC5	0.091	0.368	0.485	0.381	---							
6. UI	0.071	0.422	0.447	0.428	0.647	---						
7.AC	0.116	0.019	0.026	0.064	0.010	0.028	---					
8.PP	0.101	0.162	0.171	0.064	0.010	0.027	0.218	---				
9.SX	0.034	0.029	0.030	0.065	0.070	0.133	0.403	0.165	---			
10.SS	0.022	0.041	0.019	0.116	0.036	0.020	0.025	0.032	0.050	---		
11.ST	0.176	0.142	0.192	0.080	0.132	0.054	0.367	0.403	0.576	0.078	---	
12.YR	0.038	0.100	0.097	0.135	0.167	0.214	0.090	0.273	0.138	0.063	0.122	---

Note: AG = Student Age; UC2 = Use of ChatGPT for Generating Ideas, UC3 = Use of ChatGPT for Personalised Feedback and Tutoring; UC4 = Use of ChatGPT as a Research Support; UC5 = Use of Chat GPT for Study Planning and Monitoring; UI = University Infrastructure; AC = Academic Performance; PP = Professor Performance; SX = Student sex; SS = Student Skills; ST = Stress; YR = Current year of study

Structural model

To evaluate the explanatory power of the proposed structural model, this study examined the R^2 values of the dependent variables along with the paths between them (see Figure 1). The model explains 26.4% of the variance in academic performance. The results demonstrate that student skills have a significant positive impact on academic performance (H1, β=0.296, p=0.001), while stress significantly negatively influences academic performance (H2, β=-0.244, p=0.000). Additionally, the use of ChatGPT for generating ideas shows a marginally significant positive effect on academic performance (H6, β=0.126, p=0.086). The use of ChatGPT as research support was found to have a significant negative impact on academic performance (H8, β=-0.150, p=0.050), which is an interesting result considering that it was expected to have a positive effect. However, other uses of ChatGPT, including writing assistance (H5, β=0.098, p=0.194), personalised feedback and tutoring (H7, β=-0.019, p=0.769), and study planning and monitoring (H9, β=0.071, p=0.385), showed no significant association with the dependent variable. Furthermore, university infrastructure (H3, β=0.091, p=0.152) and professor performance (H4, β=0.023, p=0.763) also showed non-significant effects, suggesting a limited impact on academic outcomes.

Discussion and implications

This study aimed to assess ChatGPT's impact as a study tool on undergraduate academic performance and identify specific usage patterns with significant effects. The results suggest that academic performance is primarily influenced by individual characteristics, particularly student skills and stress levels, indicating that stronger skills enhance academic outcomes while high-stress levels impede them. Additionally, ChatGPT's

use for generating ideas emerged as a positive factor, supporting creative thinking and allowing students to explore perspectives beyond traditional study methods, improving students' academic performance.

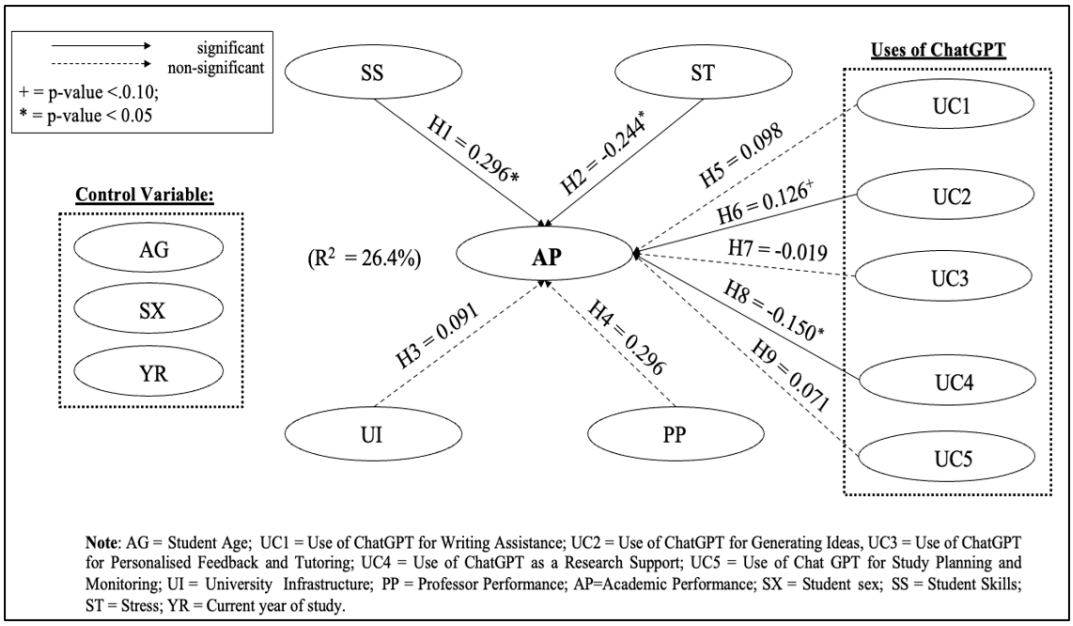

Figure 1. Structural Equation Model Assessment

Conversely, several variables, such as university infrastructure and professor performance, showed no significant effects on academic performance. These factors contribute more to student satisfaction than to directly influencing academic outcomes, serving as supportive elements within the learning environment rather than as primary drivers of performance. Similarly, applications of ChatGPT for writing assistance, feedback, and study planning play more of a supplementary role and may depend on usage intensity to be effective. However, the negative impact of ChatGPT as a research support tool is interesting, and it may be explained by the fact that the free version of ChatGPT, which undergraduate students use, does not have access to updated sources, which can lead to inaccuracies and hinder academic outcomes. These findings emphasise the need for cautious, purposeful use of ChatGPT in higher education.

Theoretical implications

Previous research has primarily focused on the general use of AI tools like ChatGPT in education, often highlighting broad benefits or limitations without distinguishing specific types of usage or their direct effects on academic performance. This study addresses this gap by examining how distinct applications of ChatGPT—such as idea generation, writing assistance, research support, feedback and tutoring, and study planning—affect academic outcomes differently. By identifying the unique impacts of each type of use, this study provides nuanced insights that enhance the understanding of ChatGPT's role in academic performance. Notably, the findings reveal that while ChatGPT can positively influence educational outcomes, this effect is conditional upon how the tool is used, with certain functions proving more beneficial than others. This specificity supports a more targeted integration of AI in education, guiding educators and policymakers in leveraging AI tools to maximise academic benefits.

Practical implications

Based on the findings of this study, recommendations for students, professors, universities, and government institutions were developed, aiming to promote the effective and responsible use of AI tools like ChatGPT

in higher education. Targeted workshops and structured training sessions would be valuable for students, particularly in areas where ChatGPT demonstrated a positive impact, such as idea generation. Seminars on "Maximising Creativity Through AI" could provide students with strategies to explore innovative ideas responsibly, enhancing their learning experiences without compromising academic integrity. Similarly, sessions on "Critical Use of Research Support Tools" could educate students on assessing the accuracy and relevance of AI-generated information, addressing the study's finding that the research support feature had a negative impact due to outdated or incomplete information. By focusing on ethical and practical skills in AI use, students could become more informed users enhancing their academic performance while reducing the risks associated with over-reliance on AI.

For professors, integrating AI-awareness activities into the curriculum can bridge the gap between traditional and AI-supported learning methods. The findings suggest that ChatGPT can enhance performance as a supportive tool, but its effectiveness depends on how well students understand its appropriate use. Professors could benefit from specialised training on AI in education, equipping them to guide students through practical applications like feedback and study planning. For example, they could design assignments encouraging students to use ChatGPT for drafting and self-evaluation, enabling professors to evaluate AI-driven writing clarity and improve conceptual understanding. Additionally, by regularly incorporating ChatGPT-assisted activities aligned with course objectives, professors can foster a classroom environment that promotes independent thinking and technological proficiency.

At the institutional level, universities play a pivotal role in establishing AI resources and policies. Universities could collaborate with the Peruvian government's ChatGPT Edu initiative—a program developed to bring AI technology to academic settings across the country—by creating AI resource hubs accessible to both students and faculty. As highlighted by this study, ChatGPT Edu, explicitly designed for educational use, could offer a more secure and academically oriented version of ChatGPT, directly addressing the need for ethical guidelines and secure AI integration. Furthermore, institutions could adopt policies that promote a balanced approach to AI use, offering AI-enhanced study centres where students can engage with ChatGPT under supervised guidance. By supporting AI implementation, universities can foster responsible AI adoption, directly enhancing academic outcomes while respecting institutional values.

Conclusion

The Peruvian government can expand ChatGPT Edu to reinforce responsible AI usage nationally. By collaborating with universities, the government could facilitate workshops, create ethics courses on AI, and support the development of standardised guidelines for AI engagement. Through a national campaign, government-led initiatives could promote awareness of responsible AI use, echoing the study's findings that AI tools like ChatGPT hold transformative potential but require careful implementation. By advancing ChatGPT Edu and creating educational partnerships, the government can establish a unified approach to integrating AI with academic integrity, ethical standards, and digital literacy, empowering students to navigate AI responsibly in education and beyond.

Future Research

Future studies may gather larger and more diverse samples to increase the generalisability of results. Using probabilistic sampling techniques to capture a broader range of experience and including a control would allow for a comparative analysis between ChatGPT users and non-users, potentially assessing the tool’s impact on a particular course to accurately measure its educational effectiveness.

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Appendix: Survey Questions

Professor Performance (PP) - Reyes and Libaque-Saenz (2023)

PP1 (λ = 0.935)	The way my professors organise and structure the classes stimulates my desire to learn
PP2 (λ = 0.742)	In general, my professors respond promptly to my questions and concerns
PP3 (λ = 0.805)	In general, the materials used by my professors are suitable for the courses
PP4 (λ = 0.768)	In general, my professors are well-prepared and knowledgeable to deliver their course content

Stress (ST) - Anderson et al. (2015)

ST1 (λ = 0.891)	In general, my studies make me feel frustrated
ST2 (λ = 0.835)	In general, my studies make me feel angry
ST3 (λ = 0.725)	In general, my studies make me feel anxious
ST4 (λ = 0.641)	In general, my studies make me feel fatigued
ST5 (λ = 0.724)	In general, my studies make me feel bored

Student Skills (SS) - Alamin et al. (2020)

SS1 (λ = 0.793)	My interaction with my degree courses is clear and understandable
SS2 (λ = 0.903)	It is easy for me to become skilful in the topics of my degree courses
SS3 (λ = 0.874)	I find that I can easily learn and apply new information to achieve my academic goals
SS4 (λ = 0.895)	Learning and mastering new academic concepts of my degree is easy for me

University's Infrastructure (UI) - Alavi (2021)

UI1 (λ = 0.873)	The quality of my university's infrastructure is adequate
UI2 (λ = 0.905)	My university provides the spaces, technology, and Internet I need for my studies
UI3 (λ = 0.939)	My university's infrastructure provides good support for my studies
UI4 (λ = 0.927)	In general, I am satisfied with my university's infrastructure

Use of ChatGPT (UC)

UC1 (1 item)	Writing Assistance: How often do you use ChatGPT to improve the grammar and structure of your writing?
UC2 (1 item)	Generating Ideas: How often do you use ChatGPT to brainstorm ideas for academic projects?
UC3 (1 item)	Personalised feedback and Tutoring: How often do you use ChatGPT as a tutoring tool for understanding complex concepts?
UC4 (1item)	Research Support: How often do you use ChatGPT to find relevant sources or references for academic research?
UC5 (1 item)	Study Planning and Monitoring: How often do you use ChatGPT to plan and organise your study schedule?

Academic Performance (AP)

AC (1 item)	In general, how do you rate your academic performance?