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Perceptions of ChatGPT and the Complexity of Its Impact Among Higher Education Students: Evidence Across Ten Countries of Latin America and Europe

Carlos Enrique George-Reyes, Raidell Avello-Martínez, Mariana Buenestado-Fernández

Research Article

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Author for correspondence:
Carlos Enrique George-Reyes
cgeorge@tec.mx
Instituto para el Futuro de la Educación, Tecnológico de Monterrey. Monterrey, México, & Universidad Politécnica Metropolitana de Hidalgo, México.

Abstract

Background/purpose. ChatGPT, an AI-based tool, has significantly impacted higher education by enhancing the learning and teaching experience. This study aimed to analyze students' perceptions of ChatGPT's role in higher education, focusing on five dimensions: perceived abilities, ethical concerns, satisfaction, academic impact, and skills development. Understanding these perceptions is crucial to harnessing their potential while addressing associated challenges.

Materials/methods. The study surveyed 4,005 university students from ten countries in Latin America and Europe using a structured questionnaire. Data collection focused on quantitative measures, including correlations between ChatGPT usage and academic performance, skills development, and ethical concerns.

Results. The findings revealed a generally positive assessment of ChatGPT's capabilities. A strong correlation was found between using ChatGPT and improved academic performance ($r=0.845$, $p<.001$) as well as the development of advanced skills like academic writing and critical thinking ($r=0.720$, $p<.001$). Satisfaction varied by institutional context, with private universities reporting higher satisfaction levels. Ethical concerns, such as plagiarism and misinformation, exhibited more dispersed responses, highlighting the need for strategies promoting responsible use.

Conclusion. The study underscores ChatGPT's potential as a transformative resource in higher education, particularly in enhancing academic outcomes and skill development. However, ethical and pedagogical challenges remain critical to ensuring its responsible integration into educational practices.

1. Introduction

Higher education faces constant challenges adapting to a continuously changing environment driven by technological advances and the growing demands of digital learning. Implementing Artificial Intelligence (AI) in higher education promises to transform the educational landscape by offering key benefits such as personalizing and adapting educational content to each student's needs and preferences (Endris et al., 2024; Johnston et al., 2024). This personalization allows for more effective attention to various forms of learning, ensuring that each student receives the appropriate support and resources for their academic development (Kim et al., 2022).

Thus, higher education institutions (HEIs) have adopted innovative AI-based tools, which are essential in modernizing educational processes (Perezchica-Vega et al., 2024; Wale, 2024). These technologies facilitate teaching and learning by generating academic material and optimizing communication between teachers and students (Michels, 2023). The adoption of AI has revolutionized how students interact with educational content and has streamlined how teachers manage the teaching-learning process (Abdalgane & Othman, 2023; Chan & Tsi, 2023).

Natural language models have become useful AI tools to enrich the educational experience (Esplugas, 2023), offering students instant feedback and personalized support to develop autonomous learning (Daniel et al., 2023). In particular, ChatGPT allows teachers to optimize the preparation of teaching materials and respond efficiently to student queries, improving the teaching-learning dynamics (Tomar & Verma, 2021). However, this entails significant challenges, especially for institutions and users just beginning to explore and adopt these technologies, as they face barriers related to technological infrastructure, training, and ethical concerns (Johnston et al., 2024).

This study explored how ChatGPT influences students' perception of academic performance and satisfaction in digital learning environments. In addition, it identified the key factors contributing to the successful adoption of these technologies and their impact on the quality of teaching and learning. The research questions were:

R.Q.1: What is the correlation between the students' perceived ChatGPT capabilities and their satisfaction in different higher education contexts?

R.Q.2: How do ChatGPT ethical concerns impact students' perceptions of their academic performance and skills development?

R.Q.3. Do students from public and private institutions differ in their perceived abilities, ethical concerns, satisfaction levels, academic impact, and skills development related to ChatGPT?

Based on research on students' perceived use of ChatGPT in the university environment (Ravšelj et al., 2025), this article explores how they perceived this tool in European and Latin American countries. The study used data from the multinational research study "Students' Perception of ChatGPT," coordinated by the Faculty of Public Administration at the University of Ljubljana, Slovenia. This study contributes significantly to understanding the capabilities that students consider inherent to the tool, the ethics associated with its use, the levels of satisfaction they experience when using it, and how they perceive its impact on developing key skills. The research findings may interest higher education planners, teachers, support services, and students worldwide.

2. Literature Review

AI applications have emerged as highly effective tools to transform education, benefiting both teachers and students as they not only enrich the teaching process but also allow educators to optimize their time and focus on more strategic aspects of learning, such as personalized tutoring and academic guidance (Shi & Xuwei, 2023). Their ability to foster dynamic and participatory environments positions them as catalysts for collaborative learning, promoting interaction between

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students and facilitating team problem-solving. In this context, these tools contribute to developing students' critical skills, such as analytical thinking, creativity, and adaptability, which are essential in current and future labor markets (McInnes et al., 2023).

ChatGPT, as an AI-powered tool, has proven to be versatile in higher education, with applications ranging from personalizing learning and academic writing assistance (Alafnan & Mohdzuki, 2023; Tossell et al., 2024) to promoting creativity (Tsao & Nogues, 2024) and automating administrative processes (Vecchiarini & Somià, 2023). Besides optimizing educational processes, this technology significantly prepares students to develop essential competencies to confront the challenges of emerging labor markets (Crompton & Burke, 2023).

ChatGPT can boost academic performance by implementing data-driven pedagogical strategies, allowing students to spend more time on deep learning (Rad et al., 2023). In addition, its use helps increase motivation and engagement, creating a more participatory and dynamic learning environment (Duah & McGivern, 2024). This is possible thanks to its ability to personalize educational experiences, offering instantaneous and adaptive feedback that supports students with learning difficulties as well as those who can advance at a faster pace (Yang et al., 2022).

One of the most popular uses of ChatGPT is in assisting scientific writing, helping in the preparation of initial drafts, and providing authors with a structured, coherent starting point (Alkamel & Alwagieh, 2024; Asad et al., 2024; Efebeh et al., 2024; Emenike & Emenike, 2023). This application is widely used to generate preliminary texts and organize ideas efficiently, which optimizes workflow in the early stages of the writing process (Gomes et al., 2023). In addition, it significantly facilitates the search and synthesis of information during the literature review, helping researchers to integrate key concepts quickly and accurately (Torres-Gómez, 2024). For these reasons, it is considered an exceptionally powerful and versatile chatbot to support scientific writing (Altmäe et al., 2023).

Likewise, this tool has been recognized for its ability to promote digital literacy by integrating users into interactive, dynamic technological environments that foster the practical learning of essential digital skills (Bender, 2024). In the same way, it is relevant in strengthening academic communication by facilitating access to resources, improving linguistic accuracy, and promoting the exchange of ideas in educational and professional contexts (Liu et al., 2024). ChatGPT can offer individualized student support, answer questions, provide instant feedback, and suggest personalized learning strategies (Demartini et al., 2024).

These capabilities allow for the design of personalized adaptive approaches that improve academic outcomes (Wang, 2022). In assessment, ChatGPT has facilitated automated processes that offer objective and rapid grading, optimizing teachers' time and allowing them to focus on creative pedagogy (Jiang et al., 2023). This increases efficiency and elevates educational quality through activities oriented toward pedagogical innovation (Chauke et al., 2024).

Despite its advantages, integrating ChatGPT into education requires thoroughly analyzing its acceptance by students and teachers. While many recognize its potential to enrich the learning experience, concerns remain related to privacy and potential over-reliance on this technology (George & Wooden, 2023) as well as ethical aspects because its use in tasks such as academic writing may fall into irresponsible practices (Currie, 2023; Dergaa et al., 2023; Kim, 2024; Sarfo, 2023; Ivanov, 2023).

Therefore, it is essential to explore users' perceptions of ChatGPT, examining multiple dimensions, including the tool’s inherent capabilities, the ethics associated with its use, and the students’ perceived satisfaction levels. Examining how students perceive ChatGPT’s impact on the development of academic and professional skills, its influence on the learning process, and the results obtained is equally relevant. Understanding these perspectives not only optimizes the design and use

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of the tool but also contributes to establishing ethical practices, looking to responsible employment, and maximizing its potential as a comprehensive educational resource.

3. Methodology

3.1. Participants

The global project "Student Perceptions of ChatGPT" is a collaborative initiative designed to investigate and understand students' perceptions worldwide about their experiences with this tool (COVID-19 Social Science Lab, 2024a). This project brings together educational institutions, researchers, and partners from various countries to gather valuable information on how students perceive and interact with ChatGPT in an educational setting. To this end, the Faculty of Public Administration at the University of Ljubljana (Slovenia), in collaboration with international partners, launched a large-scale online survey carried out internationally between October and December 2023.

Respondents were not required to complete the questionnaire in its entirety, which meant that the number of responses varied between questions. Consequently, a whole-case analysis approach was applied to mitigate missing data issues (Pigott, 2001; Little & Rubin, 2019). This meant that the complete cases were a random sample of the initially identified set of cases. Under this criterion, 4,005 participants in Latin America and Europe were selected discretionarily, comprising a diverse sample in terms of geographical location and demographic and academic characteristics. Latin America contributed 60.3% of the participants (n=2,413), while Europe accounted for 39.7% (n=1,592). In Latin America, the countries represented included Chile (10.9%), Colombia (2.7%), Ecuador (30.9%), Guatemala (1.4%) and Mexico (14.2%). In Europe, students came from Estonia (7.2%), Italy (28.2%), Poland (8.5%), Serbia (7.0%), and Spain (42.8%).

Regarding academic status, 86.6% of participants (n=3,469) were full-time, and 13.4% (n=536) were part-time students. Regarding the level of education, 85.6% of the participants (n=3,426) were undergraduate students, followed by 10.0% (n=399) in master's degree programs and 3.2% (n=130) in doctoral studies. As for gender, 60.1% (n=2,407) of the participants identified as female, 39.0% (n=1,884) as male, and 0.5% (n=22) as gender-diverse. Table 1 shows the sociodemographic characteristics of the participants.

Table 1. Sociodemographic characteristics of participants by country

Variables	Latin America (n=2,413)					Europe (n=1,592)				
	Chile	Colombia	Ecuador	Guatemala	Mexico	Estonia	Italy	Poland	Serbia	Spain
	440	109	1,238	56	570	115	449	136	111	681
Student status										
Full-time	403	101	1136	12	402	115	465	128	107	599
Part-time	37	8	102	44	44	0	34	8	4	2
Level of studies										
Bachelor's	412	91	1,231	54	510	112	301	123	80	562
Master's	25	12	4	0	38	1	153	12	22	82
Doctorate	3	6	3	2	22	2	45	1	9	37
Field of studies										
Arts and humanities	62	1	223	2	80	0	48	6	0	23

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Social sciences	184	1	316	3	230	2	200	108	37	382
Applied sciences	162	104	492	6	169	111	190	22	69	236
Natural and life sciences	32	3	207	45	91	2	61	0	5	40
Gender										
Male	24	93	650	25	261	41	242	63	29	321
Female	194	16	586	31	303	74	253	71	82	355
Gender diverse	3	0	2	0	6	0	4	2	0	5

All participants were informed about the details of the study. Participation was anonymous and voluntary; students could withdraw from the study without consequences. The online survey was only open to people over 18 enrolled in a higher education institution for data protection reasons. The procedures of this survey complied with the provisions of the Declaration of Helsinki (World Medical Association, 2024) for research with human participants and were approved by the ethics committees of several higher education institutions involved (COVID-19 Social Science Lab, 2024b).

3.2. Instrument

The data was collected through an online questionnaire called “Students' Perception of ChatGPT” (Ravšelj et al., 2024). The survey used the 1KA (One Click Survey; https://www.1ka.si/d/en) web application. Since the questionnaire required participants to have previous experience with ChatGPT, it was offered in its entirety only to those who reported using ChatGPT. Participants who had not used it were offered only questions about sociodemographic characteristics, additional study information, and the option to agree to receive the survey results. The instrument was validated by experts in the field, obtaining an Aiken's V coefficient of 0.942, which is considered an acceptable level of validity for this type of study.

The data were collected from the dataset of the “Students' Perception of ChatGPT” questionnaire. This study included five dimensions, and 53 items related to students’ perceived abilities in using ChatGPT, ethical concerns, satisfaction with the tool, impact on academic results, and skills development. This approach made it possible to discern nuances in the students’ perceptions and experiences, ensuring a detailed evaluation of each dimension. Table 2 provides a detailed description of the items.

Table 2. Questionnaire

Construct	Code	Item
Capabilities (ChatGPT can…)	Q19a	ChatGPT can understand instructions given in human language.
	Q19b	respond in human language.
	Q19c	hold a pleasant conversation.
	Q19d	provide information efficiently.
	Q19e	provide reliable information.
	Q19f	summarize extensive information.
	Q19g	simplify complex information.
	Q19h	facilitate traditional learning (in a classroom).
	Q19i	facilitate online learning (using digital technologies)
	Q19j	facilitate blended (hybrid) learning (a mix of traditional and online learning).

Ethical concerns (ChatGPT might…)	Q22a	encourage unethical behavior.
	Q22b	encourage students to cheat.
	Q22c	encourage students to plagiarize.
	Q22d	threaten the ethics of the study.
	Q22e	mislead through inaccurate information.
	Q22f	invade privacy.
	Q22g	reduce human interaction.
	Q22h	replace formal education.
	Q22i	increase social isolation.
	Q22j	hinder learning by doing the work for students.
Satisfaction and attitude (How much do you agree…)	Q24a	I find ChatGPT more useful than Google or other web search engines.
	Q24b	It is easier for me to interact with ChatGPT than with my professors.
	Q24c	It is easier for me to interact with ChatGPT than with my colleagues.
	Q24d	The information I get from ChatGPT is clearer than the one provided by my professors.
	Q24e	I am satisfied with the level of assistance provided by ChatGPT.
	Q24f	I am satisfied with the quality of information provided by ChatGPT.
	Q24g	I am satisfied with the accuracy of the information provided by ChatGPT.
Study issues and outcomes (ChatGPT can…)	Q26a	enhance my access to the sources of knowledge.
	Q26b	improve my general knowledge.
	Q26c	improve my specific knowledge.
	Q26d	provide me with personalized education.
	Q26e	increase my study efficiency.
	Q26f	increase my motivation to study.
	Q26g	facilitate completing my studies.
	Q26h	improve my engagement in class discussions.
	Q26i	enhance my ability to meet assignment deadlines.
	Q26j	improve the quality of my assignments.
	Q27a	improve my readiness for exams.
	Q27b	improve my grades.
	Q27c	facilitate completing my activities outside of the classroom.
	Q27d	facilitate completing my internships.
	Q27e	enhance my learning experience.
	Q27f	improve my skills.
	Q27g	facilitate my personal development.
	Q27h	facilitate my academic development.
	Q27i	increase my satisfaction with the study.
	Q27j	improve my employability.
Skills development (ChatGPT can improve my…)	Q28a	academic writing proficiency.
	Q28b	professional writing proficiency.
	Q28c	typing proficiency.
	Q28d	native language proficiency.
	Q28e	foreign language proficiency.
	Q28f	interpersonal communication skills.
	Q28g	digital communication skills.
	Q28h	information literacy skills.
	Q28i	digital content creation skills.
	Q29a	numeracy proficiency.

	Q29b	decision-making skills.
	Q29c	problem-solving skills.
	Q29d	analytical skills.
	Q29e	critical thinking skills.
	Q29f	creativity skills.
	Q29g	data analysis skills.
	Q29h	programming skills.
	Q29i	artificial intelligence literacy skills.

3.3. Procedure

In the dataset, a coding system assigned numerical values to the responses. Each response choice had a specific numerical value. Binary responses were coded with 1 and 2, while Likert scale questions used a range of values from 1 (strongly disagree) to 5 (strongly agree) to represent frequency levels. Since the questionnaire was prepared in seven different languages, information was added to the dataset identifying the linguistic survey version (source), i.e., English (EN), Italian (IT), Spanish (ES), Turkish (TR), Japanese (JP), Arabic (AR), and Hebrew (HE).

3.4. Preliminary analyses

Table 3's descriptive analysis indicates that the Capabilities dimension showed moderate variability (CV between 0.217 and 0.309), highlighting the Q19f item as the most consistent (CV=0.217). This dimension's reliability was high (ω=0.849, α=0.860), confirming the items' coherence when assessing the perceived capabilities. Ethical Concerns displayed more dispersion (CV between 0.348 and 0.477); however, the dimension maintained high reliability (ω=0.891, α=0.903). The Satisfaction and Attitude dimension (indicating QoL - Quality of Life) showed QoL between 0.252 and 0.481, with a lower dispersion in Q24e (QoL = 0.252), suggesting a uniform perception of satisfaction. Despite some variability in items such as Q24c (CV=0.481), the reliability coefficients (ω=0.807, α=0.831) reflect stability in the responses.

In Study Issues and Outcomes, CVs ranged from 0.226 to 0.349, with Q26b standing out for its low variability (CV=0.226). This dimension showed high reliability (ω=0.918, α=0.956), although items such as Q27g spotlighted contextual differences in perceptions. Finally, CVs ranged from 0.284 to 0.381 in Skills Development, with more consistent responses in Q28i (CV=0.284) and greater dispersion in Q29e (CV=0.381). This dimension maintained high reliability (ω=0.892, α=0.939), indicating consistent measurement of perceived skills development. These findings underscore the instrument's value as a reliable and useful tool for exploring relevant aspects of students' perspectives on using ChatGPT in their educational trajectories.

Table 3. Descriptive statistics: mean (M), standard deviation (SD), Coefficient of variation (CV), variance (V), McDonald's coefficient (ω), and Cronbach's alpha (α).

Construct	Code	*Mean*	*SD*	Coefficient of variation	*Variance*	*ω*	α
Capabilities	Q19a	3.700	0.013	0.227	0.708	0.849	0.860
	Q19b	3.672	0.015	0.250	0.841		
	Q19c	3.380	0.016	0.294	0.985		
	Q19d	3.708	0.013	0.225	0.694		
	Q19e	3.206	0.014	0.278	0.796		
	Q19f	3.869	0.013	0.217	0.706		
	Q19g	3.832	0.013	0.220	0.711		

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	Q19h	3.249	0.016	0.309	1.008		
	Q19i	3.588	0.015	0.267	0.917		
	Q19j	3.523	0.015	0.271	0.913		
Ethical concerns	Q22a	3.006	1.153	0.383	1.328	0.891	0.903
	Q22b	3.158	1.242	0.393	1.543		
	Q22c	3.130	1.242	0.397	1.543		
	Q22d	2.985	1.198	0.401	1.435		
	Q22e	3.316	1.154	0.348	1.331		
	Q22f	2.645	1.137	0.430	1.293		
	Q22g	2.795	1.203	0.430	1.447		
	Q22h	2.519	1.201	0.477	1.443		
	Q22i	2.573	1.181	0.459	1.395		
	Q22j	3.006	1.153	0.392	1.328		
Satisfaction and attitude	Q24a	3.293	1.065	0.323	1.134	0.807	0.831
	Q24b	2.789	1.178	0.422	1.388		
	Q24c	2.390	1.149	0.481	1.320		
	Q24d	2.781	1.052	0.378	1.107		
	Q24e	3.567	0.897	0.252	0.805		
	Q24f	3.327	0.916	0.275	0.839		
	Q24g	3.118	0.956	0.306	0.913		
Study issues and outcomes (ChatGPT can…)	Q26a	3.656	0.897	0.245	0.805	0.918	0.956
	Q26b	3.785	0.855	0.226	0.730		
	Q26c	3.630	0.926	0.255	0.858		
	Q26d	3.189	1.068	0.335	1.140		
	Q26e	3.542	0.976	0.276	0.953		
	Q26f	3.170	1.082	0.341	1.171		
	Q26g	3.488	1.014	0.291	1.027		
	Q26h	3.159	1.060	0.336	1.124		
	Q26i	3.496	1.044	0.299	1.090		
	Q26j	3.528	1.001	0.284	1.001		
	Q27a	3.390	1.009	0.298	1.018		
	Q27b	3.333	1.022	0.307	1.044		
	Q27c	3.487	0.995	0.285	0.990		
	Q27d	3.008	1.039	0.345	1.079		
	Q27e	3.485	0.963	0.276	0.927		
	Q27f	3.326	1.014	0.305	1.029		
	Q27g	3.071	1.073	0.349	1.152		
	Q27h	3.410	0.997	0.292	0.994		

	Q27i	3.327	1.027	0.309	1.055		
	Q27j	3.035	1.051	0.346	1.105		
Skills development (ChatGPT can improve my…)	Q28a	3.333	1.016	0.305	1.032	0.892	0.939
	Q28b	3.316	1.024	0.309	1.049		
	Q28c	3.061	1.027	0.336	1.055		
	Q28d	3.010	1.046	0.347	1.094		
	Q28e	3.341	0.994	0.298	0.988		
	Q28f	2.833	1.040	0.367	1.081		
	Q28g	3.389	0.976	0.288	0.953		
	Q28h	3.309	0.950	0.287	0.903		
	Q28i	3.431	0.976	0.284	0.952		
	Q29a	2.983	1.030	0.345	1.061		
	Q29b	2.794	1.052	0.377	1.107		
	Q29c	3.090	1.067	0.345	1.138		
	Q29d	3.172	1.047	0.330	1.096		
	Q29e	2.878	1.096	0.381	1.201		
	Q29f	3.039	1.095	0.360	1.200		
	Q29g	3.319	1.024	0.309	1.049		
	Q29h	3.437	1.049	0.305	1.101		
	Q29i	3.476	1.005	0.289	1.009		

4. Results

The results are organized by responses to the research questions.

R.Q.1: What is the correlation between the students' perceived ChatGPT capabilities and their satisfaction in different higher education contexts?

The first study analyzed the means, dispersions, and correlations between the different dimensions. Figure 1 shows a histogram showing that the students presented generally favorable evaluations of perceived abilities (PQ19), with means close to 3.5. However, regarding ethical concerns (PQ22), the scores were lower and more dispersed, reflecting diversity in opinions on aspects such as the risk of misinformation or plagiarism associated with ChatGPT. The satisfaction dimension (PQ24) had more varied responses, suggesting that students' experiences interacting with the tool were contextually dependent and might have been influenced by factors such as access to technological infrastructure or institutional policies for using ChatGPT.

The dimensions related to the impact on study results (PQ26 and PQ27) spotlight a more positive perception, with means above 3.5, which suggests that the students considered ChatGPT as a resource that improves their efficiency, commitment, and academic performance. However, the scores were slightly lower in developing specific skills (PQ28 and PQ29), such as critical thinking, writing skills, or literacy in artificial intelligence. The differences in distributions among countries, such as Mexico, Spain, and Italy, with more consistent concentrations compared to Chile and Poland, with greater dispersion, could reflect the institution's influence on the promotion, use, and regulation of ChatGPT as a training tool. Although the overall assessment was positive, ethical concerns and variability in developing specific skills are highlighted, especially regarding the ethical and pedagogical integration of the tool in higher education.

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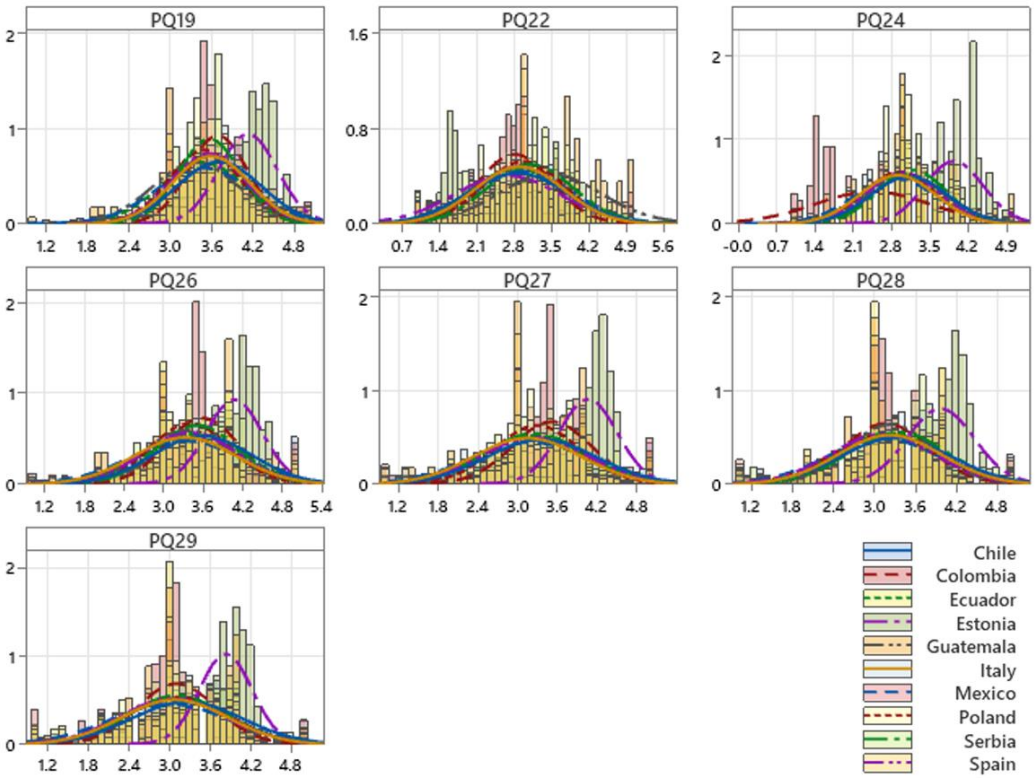

Figure 1. Histogram by dimension and country.

The line graphs of means presented in Figure 2 display different variations, one of the most significant being in PQ22, which assesses the ethical concerns regarding ChatGPT. This dimension had the lowest scores in most countries, particularly Poland and Mexico, with averages close to 2.5-3.0. This suggests that the students were concerned about plagiarism, misinformation, or the ethical impact on learning. In contrast, countries such as Guatemala and Spain had slightly higher scores, which could reflect a lower perception of ethical risks or greater confidence in the tool.

Regarding perceived capabilities (PQ19), Guatemala stands out as the country with the highest average, exceeding 4.0, which suggests a positive assessment of ChatGPT by the students as a useful and efficient tool. Chile and Serbia had more moderate values, which may indicate skepticism or less familiarity with using the tool. The dimensions related to the impact on academic results (PQ26 and PQ27) were the best evaluated, with means above 3.5 in most countries. Spain and Guatemala again led in these dimensions, indicating that the students considered ChatGPT to improve their academic performance, motivation to study, and task efficiency. This contrasts with Poland and Ecuador, which had lower means.

Concerning the skills development dimensions (PQ28 and PQ29), Spain and Mexico presented the most consistent scores, with means close to 3.5, indicating a positive perception of ChatGPT's potential to improve specific skills, such as academic writing, critical thinking, and artificial intelligence literacy. While perceptions were primarily positive, differences between countries underscore the need to implement context-specific strategies to maximize ChatGPT's educational impact.

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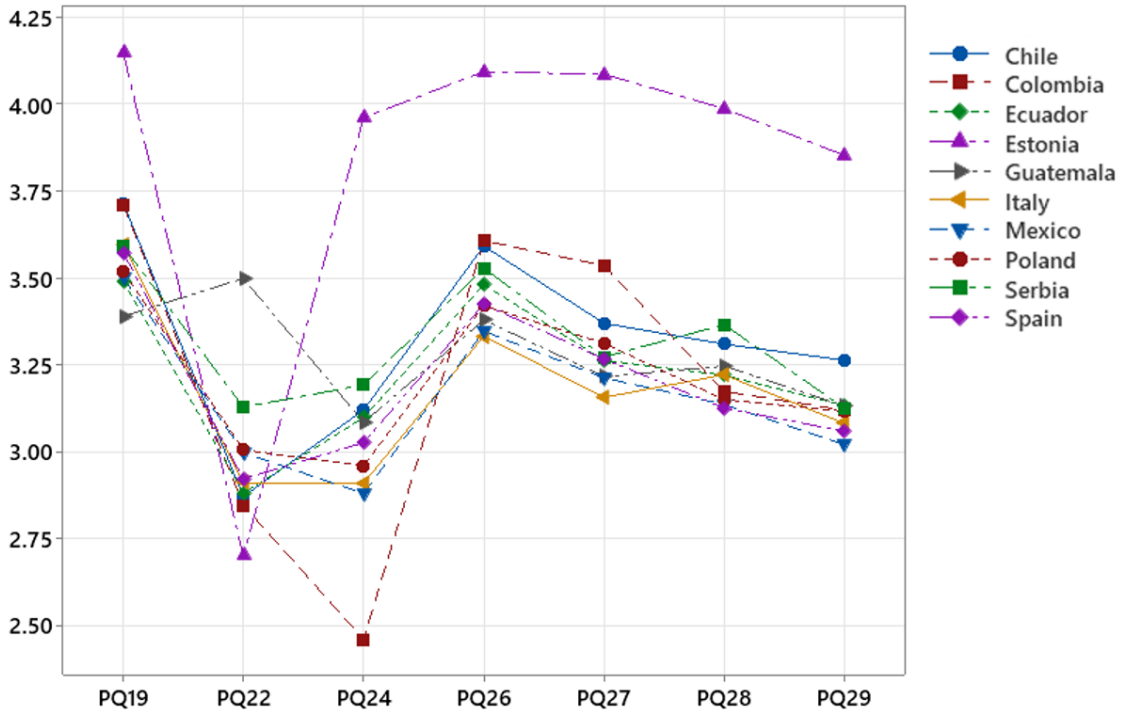

Figure 2. Line graphs of means by country.

A matrix graph was developed to identify key response patterns and how the dimensions correlated. Consistent trends between PQ26 (academic impact) and PQ27 (academic performance) in all countries reflect a solid and universally positive correlation, indicating that the students, regardless of country, considered ChatGPT to influence their performance, perceiving a positive direct academic impact. Another finding is the strong positive correlation in all countries between PQ28 (development of specific skills) and PQ29 (advanced skills), suggesting that ChatGPT fosters both operational and advanced cognitive competencies consistently, reinforcing its role as a versatile tool for learning.

In contrast, the students' ethical concerns (PQ22) varied greatly between countries. In Estonia and Spain, these negatively correlated with dimensions such as PQ26 and PQ27, indicating that students in these countries may be more aware of the ethical risks associated with using the technology. The correlation between PQ19 (perceived abilities) and PQ24 (satisfaction) is a notable aspect of the data heterogeneity. Students in Mexico and Chile showed a more marked positive correlation, indicating they valued more directly the connection between the tool's practical capabilities and their satisfaction, which could be related to the institutional implementation of ChatGPT in education.

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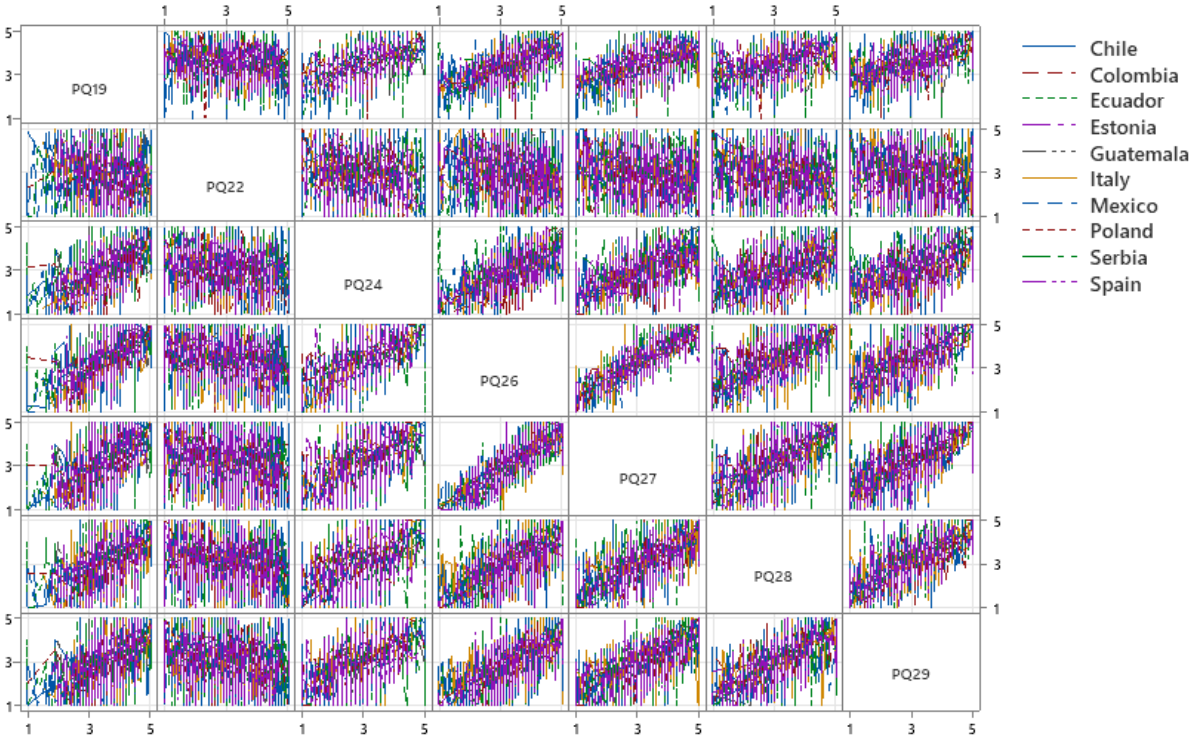

Figure 3. Matrix Graph by country.

The correlational analysis of Table 3 shows that the strongest positive correlations were between PQ26 (academic impact) and PQ27 (academic performance), with a value of r=0.845 ($p < .001$), meaning that students who perceived that ChatGPT improves their access to knowledge also considered that it contributes significantly to their academic performance. Another notable correlation was that of PQ28 (development of specific skills) and PQ29 (advanced skills), with r=0.720 ($p < .001$). This implies that students who discerned improvements in practical skills, such as writing or digital communication, also perceived progress in advanced cognitive skills, like critical thinking and analysis. These dimensions show how ChatGPT can broadly impact operational skills and more abstract and complex competencies.

On the other hand, the negative correlations, although weaker, were significant and reflected an interesting contrast, especially in terms of ethics. PQ22 (ethical concerns) negatively correlated with all other dimensions, most strongly with PQ26 ($r=-0.179$, $p < .001$) and PQ27 ($r=-0.172$, $p < .001$). This suggests that students with more ethical concerns valued the academic impact and performance associated with ChatGPT less. These negative correlations highlight the significance of addressing ethical concerns to facilitate acceptance of this technology. On the other hand, the correlation between PQ19 (perceived abilities) and PQ24 (satisfaction) (r=0.512, $p < .001$) suggests that the students who perceived ChatGPT as a capable and efficient tool were more satisfied with its use. This connection reinforces the importance of demonstrating its practical capabilities to improve the user experience and increase its acceptance in educational contexts.

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Table 3. Correlations between dimensions.

Variable		PQ19	PQ22	PQ24	PQ26	PQ27	PQ28	PQ29
PQ19	Pearson's r	—						
	p-value	—						
PQ22	Pearson's r	-0.142***	—					
	p-value	< .001	—					
PQ24	Pearson's r	0.512***	-0.106***	—				
	p-value	< .001	< .001	—				
PQ26	Pearson's r	0.608***	-0.179***	0.614***	—			
	p-value	< .001	< .001	< .001	—			
PQ27	Pearson's r	0.568***	-0.172***	0.561***	0.845***	—		
	p-value	< .001	< .001	< .001	< .001	—		
PQ28	Pearson's r	0.478***	-0.099***	0.449***	0.639***	0.678***	—	
	p-value	< .001	< .001	< .001	< .001	< .001	—	
PQ29	Pearson's r	0.481***	-0.143***	0.481***	0.646***	0.687***	0.720***	—
	p-value	< .001	< .001	< .001	< .001	< .001	< .001	—

** p < .05, ** p < .01, *** p < .001*

Figure 4's matrix graphs show in greater detail the most prominent correlations. A notable observation is the correlation between PQ19 (perceived abilities) and PQ28 (development of specific skills) with a coefficient of r=0.608. This indicates that students who perceived ChatGPT as a capable tool tended to identify significant improvements in practical skills, such as writing and digital communication, which reinforces the tool's ability to strengthen technical skills. Another positive correlation was with PQ26 (r=0.459), suggesting that favorable perceptions of ChatGPT's capabilities correlate with a higher valuation of its academic impact.

In contrast, the most prominent negative correlation involved PQ22 (ethical concerns) and PQ29 (advanced skills), with r=−0.143. This suggests that ethical concerns could limit the perception of progress in more complex cognitive skills, such as critical thinking and analysis, which highlights the need to consider these aspects when integrating the tool in educational contexts. Finally, it is notable that PQ24 (satisfaction) maintained positive correlations with several dimensions, highlighting its link with PQ27 (academic performance) (r=0.561). This implies that satisfaction with using ChatGPT may mediate its positive impact on academic performance.

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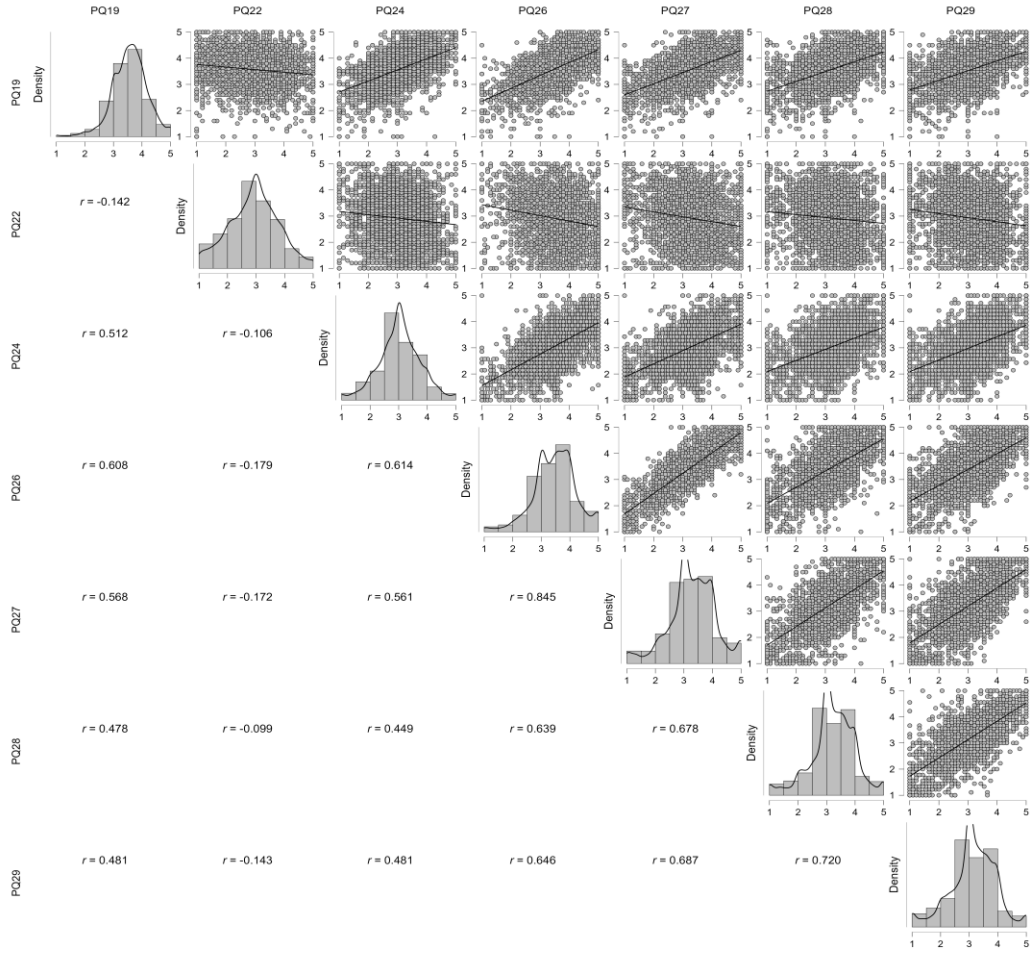

Figure 4. Correlations Graphs.

R.Q.2: How do ChatGPT ethical concerns impact students' perceptions of their academic performance and skills development?

As a second part of the study, an analysis was carried out based on the connections between the dimensions. Edge thicknesses indicate the strength of connections between nodes, while colors reflect the type of relationship (blue=positive or red=negative). Figure 5 allows us to interpret the structural differences in each country's networks. In terms of density, Ecuador and Guatemala had the most connected networks, with 19 and 18 non-zero edges, respectively. These networks had a low dispersion (sparsity of 0.095 and 0.143), which indicates a strong integration between the variables. This may suggest that perceptions about ChatGPT in these countries were more closely related, reflecting a stronger consensus on the dimensions assessed. In contrast, Colombia and Serbia had the least dense networks, with only 10 and 11 non-zero edges and a greater dispersion (sparsity of 0.524 and 0.476, respectively).

These characteristics indicate that the students' perceptions were less interconnected, possibly due to variability in their opinions. The edge thickness in specific variables, such as the strong connections between PQ26 (academic impact) and PQ27 (academic performance) in all countries, highlights a consistent and robust relationship, confirming that the students perceived a close correlation between these two dimensions. However, some countries, like Poland and Estonia, had weak negative connections in particular pairs, such as PQ22 (ethical concerns) with other dimensions, indicating greater differences in how the associated ethical risks were perceived. The networks of Italy, Mexico, and Spain displayed a balance between density and dispersion (17 non-zero edges and a sparsity of 0.190). These intermediate networks suggest a moderate integration of perceptions where positive relationships predominate.

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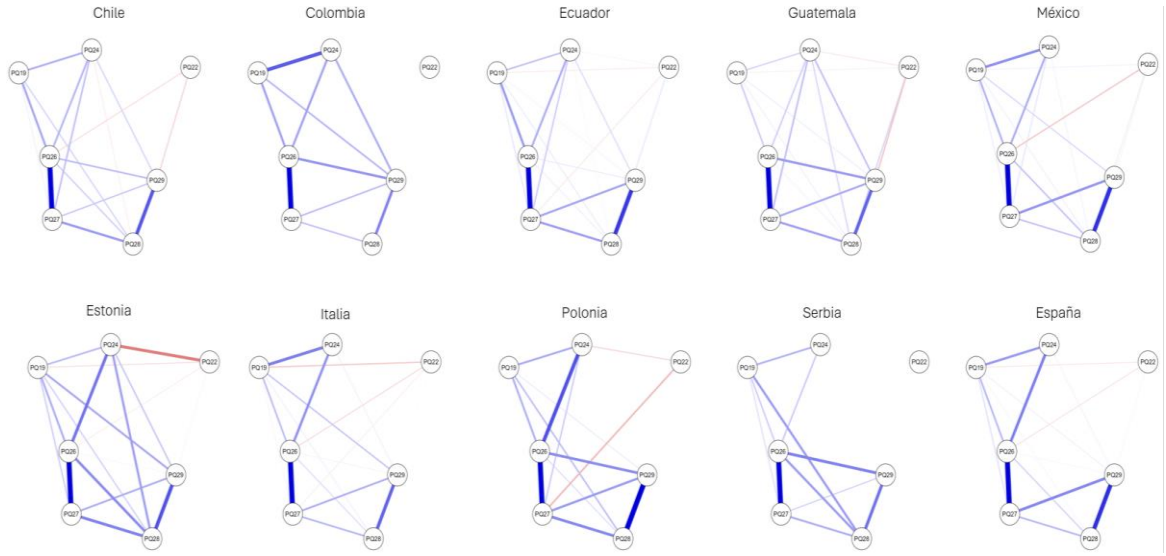

Figure 5. Network analysis by country.

The centrality measures (betweenness, closeness, strength, and expected influence) were analyzed by dimension to assess the behavior of the variables' structural relevance within the networks of the ten participating countries. Figure 6 shows the central role of the PQ26 (Academic Impact) dimension, which consistently presented high values in all centrality metrics. For example, betweenness attained values of 2.164 and 2.147 in Mexico and Spain, respectively, indicating that this variable is a critical network bridge, facilitating the connections between dimensions. Its behavior provides crucial insight into the integration and usefulness of ChatGPT in educational contexts.

The centrality analysis again verified that the PQ22 dimension (Ethical Concerns) consistently had low values in all metrics. In most countries, betweenness and expected influence were significantly below 0, with a value as low as -1.880 in Estonia. This suggests that this variable does not play an integrating role within the networks and, instead, reflects an isolated or disconnected perception of the other dimensions. This aligns with previous findings indicating that ethical concerns are often treated as standalone rather than intrinsically linked to other perceptions.

On the other hand, the PQ28 (Development of specific skills) and PQ29 (Advanced skills) dimensions presented moderate centrality values, especially in strength and expected influence, in Italy, Mexico, and Spain. Thus, these dimensions moderately impacted networks, with significant, but not dominant, contributions. PQ28 displayed a consistent trend toward positive influences in countries with denser networks, such as Guatemala and Ecuador. The betweenness and closeness metrics in the PQ27 dimension (Academic performance) revealed lesser prominence than PQ26, but they are still relevant variables in Ecuador and Spain, which had relatively high valuations. This reinforces the perception that the dimensions related to academic performance and impact are more interconnected and play more central roles in the structure of networks.

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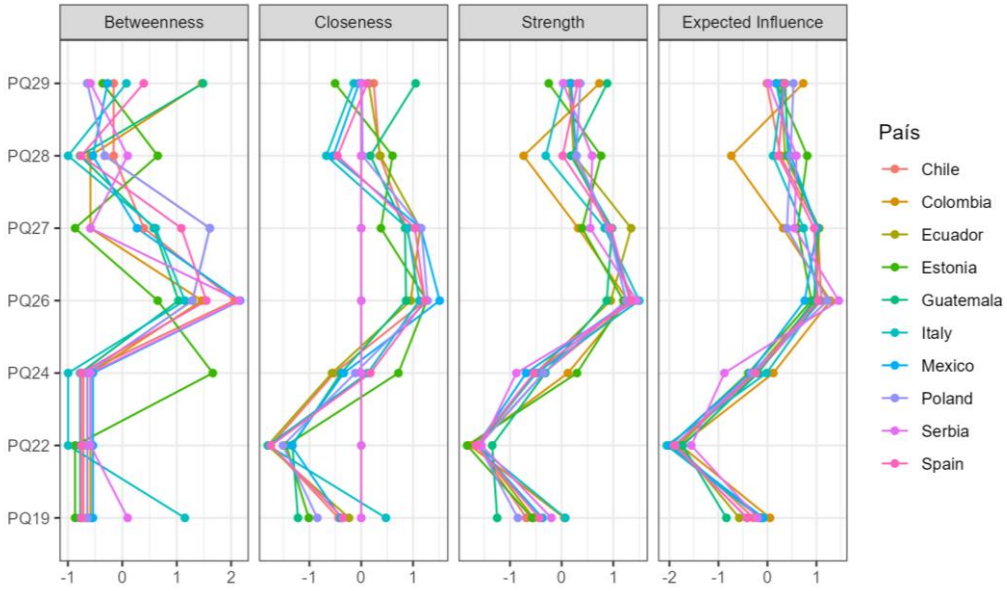

Figure 6. Centrality graphs by country.

Clustering by dimension is measured with metrics such as Barrat, Onnela, WS, and Zhang, which are key indicators of network cohesion and connectivity, providing information on how the variables are grouped and interact within each national context. PQ26 (Academic Impact) and PQ27 (Academic Performance) showed moderate to high positive values in most countries, indicating strong group cohesion within networks. For example, PQ26's WS values of 1.507 in Ecuador and 1.513 in Poland reflect its importance as a central node in the network of connections. Likewise, PQ27 had an outstanding Onnela value in Chile (1.763), highlighting its relevance in forming well-defined groups. These metrics reinforce the perception of these variables as structural axes in the networks studied.

On the contrary, PQ22 (Ethical Concerns) presented consistently negative values in most clustering metrics, especially in Colombia and Serbia, where the Barrat and Onnela values were -1.790 and -1.893, respectively. This indicates that this variable tends to be less connected to the rest of the network, reflecting a more isolated and less cohesive perception. This finding is consistent with previous analyses suggesting that ethical concerns are not uniformly integrated into the global perception of ChatGPT's impact.

PQ28 (Development of specific skills) had moderate positive values in Mexico and Italy. For example, in Mexico, Zhang attained 0.978, while in Italy, Barrat reached 0.906. This indicates that this variable is clustered more strongly in these contexts, which could reflect a higher valuation of practical skills developed using ChatGPT in these countries. An interesting case is PQ29 (Advanced Skills), which had a mix of negative and positive values depending on the country. In Ecuador and Spain, positive values are observed in WS metrics (1.069 and 1.506, respectively), suggesting that this variable is significant in network cohesion in these contexts. However, in Chile and Serbia, the negative Barrat values (-1.307 and -1.138, respectively) suggest that these skills are not as closely linked to other variables in the network.

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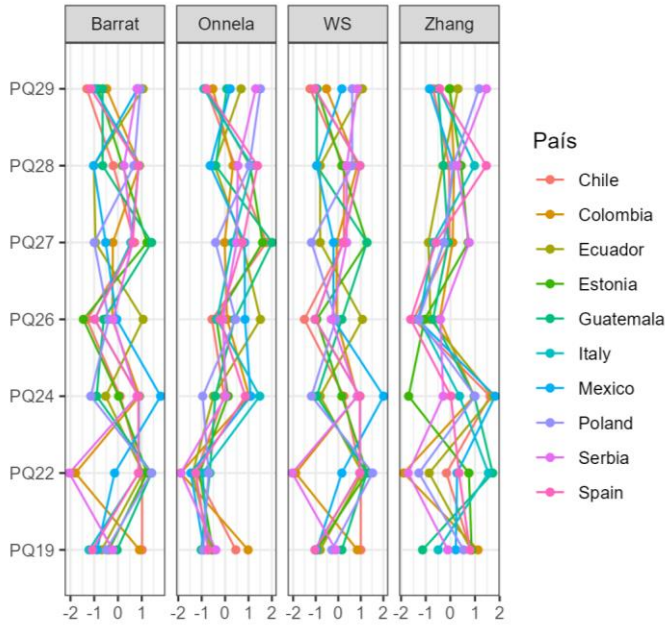

Figure 7. Clustering graphs by country.

R.Q.3. Do students from public and private institutions differ in their perceived abilities, ethical concerns, satisfaction levels, academic impact, and skills development related to ChatGPT?

The third analysis compared public and private universities. Table 4 shows the Student and Welch t-test results for significance, magnitude of effect (Cohen's d), and practical relevance. First, the most significant differences were observed in PQ24 (Satisfaction), where both tests reported highly significant values ($p<.001$) and a moderate effect size (Cohen's $d=-0.177$ in Student and Cohen's $d=-0.174$ in Welch). These results indicate that students from private universities reported higher satisfaction levels than those from public universities, with a statistically relevant difference.

On the other hand, PQ28 (Development of specific skills) also showed significant differences ($p<.001$) with a close to moderate effect size (Cohen's $d=-0.149$ in Student and Cohen's $d=-0.151$ in Welch). This finding suggests that private universities could provide a more favorable environment for developing these skills, highlighting the importance of analyzing the pedagogical strategies used in each context. In contrast, PQ22 (Ethical concerns) had no significant differences between types of universities ($p>0.05$), with very low effect sizes (Cohen's $d=-0.053$ in both tests). This indicates that ethical concerns about using ChatGPT were consistent in both contexts, suggesting a homogeneous perception among the students regardless of their educational institution.

In addition, the PQ26 (Academic Impact) and PQ27 (Academic Performance) dimensions presented statistically significant differences ($p<.001$ for PQ26 and $p=0.016$ for PQ27) but with small effect sizes (Cohen's $d=-0.131$ and Cohen's $d=-0.088$). Although these differences were significant, their practical impact was limited, indicating that perceptions of these dimensions were relatively similar among students at public and private universities. Finally, although PQ19 (Perceived Abilities) and PQ29 (Advanced Skills) also showed significant differences ($p<.001$ and $p=0.003$), the effect sizes were small (Cohen's $d=-0.137$ and Cohen's $d=-0.106$), implying that the differences in these perceptions were more subtle, although statistically relevant.

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Table 4. T-test between public and private universities.

Variable	Test	Statistic	df	p	Cohen's d	SE Cohen's d
PQ19	Student	-3.743	3953.000	< .001	-0.137	0.037
	Welch	-3.607	1617.302	< .001	-0.134	0.037
PQ22	Student	-1.444	3950.000	0.149	-0.053	0.037
	Welch	-1.464	1760.350	0.143	-0.053	0.037
PQ24	Student	-4.825	3949.000	< .001	-0.177	0.037
	Welch	-4.705	1644.621	< .001	-0.174	0.037
PQ26	Student	-3.572	3948.000	< .001	-0.131	0.037
	Welch	-3.595	1734.991	< .001	-0.131	0.037
PQ27	Student	-2.398	3948.000	0.017	-0.088	0.037
	Welch	-2.406	1725.761	0.016	-0.088	0.037
PQ28	Student	-4.075	3946.000	< .001	-0.149	0.037
	Welch	-4.140	1762.814	< .001	-0.151	0.037
PQ29	Student	-2.905	3946.000	0.004	-0.106	0.037
	Welch	-2.938	1747.792	0.003	-0.107	0.037

5. Discussion

Regarding the analysis of participants' perceptions, Figure 1 shows that ChatGPT is generally favorably accepted. However, some points still need to be explored in more detail, mainly the variation in acceptance between aspects of ethics compared to the practical support they signify. The assimilation of ChatGPT necessarily requires a new paradigm and a restructuring of expectations about digital information, as established by Currie (2023). The acceptance of ChatGPT as a support tool seems imminent, but there is still a long way to go. Establishing the balance between support and ethics in using these tools and even promoting the development of specific learning skills are issues to be resolved.

Students positively perceived the academic impact of using ChatGPT. Figure 1 shows a relatively high value for this, but different countries have variability regarding ethics or misinformation. This points to a still flimsy framework that must be considered by university administrators, as mentioned by George and Wooden (2023). ChatGPT is a commonly used tool among the student community, which perceives its reliability for a better academic impact on their education. However, discussion about excessive use and misuse continues, coupled with young people's ethical concerns.

Figure 3 and Table 3 analyze the patterns in the various participant responses, showing a positive perception of the impact and improvement in academic performance when using ChatGPT. This favorable perception also includes strengthening users' cognitive skills, which is an active and thoughtful use of the tool. According to Chan & Tsi (2023), factors like time savings, access to a wide variety of information, and the availability of immediate tutoring are key contributors to the positive impact on student learning. In this context, the proper use of ChatGPT, especially when accompanied by a pedagogical guide or teacher, is considered by students as a strategic tool to enhance their learning. However, concerns persist about the veracity and accuracy of the responses, highlighting the need for critical and supervised use of the tool in educational settings.

The correlational analysis of Figure 4 reinforces those students predominantly perceived the general use of ChatGPT positively, showing a high level of satisfaction that contributes to an

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environment conducive to improving their academic performance. As Tsao and Nogues (2024) pointed out, ChatGPT facilitates conditions where students improve their performance and progress toward more significant intellectual equity. In addition, there is an increase in the confidence of students who use the tool, as it provides them with resources that facilitate achieving better academic results and prepares them effectively to face new challenges and acquire knowledge autonomously.

The dimensions in this research were analyzed for their interconnections, evaluating the number of links (number of edges) and the intensity of the relationships between them. Although it was impossible to identify a common country-defined pattern in geographical distribution analyses, a moderate integration of perceptions was observed. Positive relationships, especially in European countries, predominated with variations and contrasts between the established links. This trend coincides with the findings reported in the "Global Survey of ChatGPT Students: Evolving Perceptions of Higher Education Students" (Ravšelj et al., 2024), which highlighted a similar analysis of the global perception of the tool. This study reaffirms that ChatGPT's use is evaluated by teachers and administrative staff and significantly by the students, who reflect on real and direct perspectives about their experience with this AI.

Figure 6, which groups the analysis variables, highlights a close correlation between Impact and Academic Performance, positioning them as crucial support for achieving academic objectives. This relationship aligns with previous findings that emphasize AI's role in optimizing educational processes by offering personalized learning experiences, improving student engagement, and enhancing academic efficiency (Crompton & Burke, 2023; Tomar & Verma, 2021). The ability of ChatGPT to provide immediate feedback, assist in structuring academic writing, and facilitate access to knowledge resources has been recognized as a key factor in improving academic performance (Yang et al., 2022).

In contrast, a negative correlation with the Ethical Concerns variable is observed in the general perception of using ChatGPT. This indicates that while students recognize the benefits of the tool, they also express reservations about its ethical implications, such as the potential for misinformation, academic dishonesty, and over-reliance on AI-generated content. These concerns echo previous research on the ethical challenges of AI in education, particularly regarding the risks of plagiarism and the erosion of critical thinking skills if students rely excessively on automated content generation (Kim, 2024; Dergaa et al., 2023; Ivanov, 2023).

This finding coincides with the recommendations of Liu et al. (2024), who suggested the need to accompany the use of the tool with strategies that promote developing critical academic literacy among students to ensure more reflective and responsible learning. Other scholars have also emphasized the importance of embedding AI literacy within academic curricula to foster ethical and informed use, allowing students to critically assess AI-generated content rather than passively accepting it (Currie, 2023; Bender, 2024). Integrating digital literacy modules that teach students to recognize biases, validate sources, and apply AI ethically in their academic work could help mitigate these concerns while maximizing the tool's benefits.

Finally, Table 4 reveals that students attending private universities tend to perceive the use of ChatGPT more favorably than those in public institutions. This finding aligns with previous research suggesting that technological infrastructure, institutional policies, and faculty readiness significantly influence the adoption and perception of AI tools in educational settings (Crompton & Burke, 2023; Johnston et al., 2024). Private universities often have more resources to integrate AI-driven tools into their academic environment, providing structured training, dedicated support systems, and clearer policies on AI use (Perezchica-Vega et al., 2024; Michels, 2023). These factors may contribute to a higher acceptance and perceived usefulness of ChatGPT among students in private institutions.

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However, despite these differences, both populations share concerns about ethical issues, particularly regarding plagiarism, misinformation, and over-reliance on AI-generated content. These findings are consistent with prior studies that highlight the ethical dilemmas surrounding AI in academia, especially the risks of students misusing ChatGPT to generate assignments without proper attribution or critical engagement (Kim, 2024; Dergaa et al., 2023). Sarfo (2023) provide a preliminary analysis of these differences, noting that while ChatGPT is more commonly used in private institutions as a support tool for academic performance, ethical concerns remain a shared challenge across both public and private universities.

Moreover, the perception gap between public and private university students may also be influenced by pedagogical approaches and institutional culture. In some public institutions, where faculty may be more cautious about AI integration due to concerns over digital equity and access, students may perceive ChatGPT as a less structured or formally endorsed tool (Esplugas, 2023; George & Wooden, 2023). In contrast, private institutions may provide guidelines and frameworks for responsible AI use, helping students navigate ethical concerns while benefiting from the tool's capabilities (Alafnan & Mohdzuki, 2023; Liu et al., 2024).

6. Conclusion

This study shows a positive correlation between the perceived capabilities of ChatGPT and student satisfaction. Participants particularly valued the AI tool's advanced functionalities in tasks like academic writing and critical thinking development, contributing significantly to their perceived satisfaction. This positive effect is amplified when educational institutions provide adequate support and clear guidelines for using artificial intelligence tools, thus optimizing the training experience and promoting a more effective and responsible use.

Despite the identified benefits, like improved academic performance and the development of advanced cognitive skills, ethical concerns persist, mainly related to the risk of plagiarism and misinformation. These concerns generate a lot of distrust of the tool, limiting its full acceptance. This underscores the need to strengthen ethical digital literacy, ensuring that students can leverage the benefits of ChatGPT without compromising the principles of academic integrity.

The analysis also reveals significant differences in the perception of ChatGPT per the institutional and geographical contexts. Private university students expressed higher satisfaction and acceptance levels than public university students. This disparity appears to be linked to access to better technological infrastructure, clearer institutional policies on using AI, and more structured curricular integration of tools such as ChatGPT. Likewise, cultural and pedagogical differences between regions like Latin America and Europe influence these perceptions, highlighting the need to adapt implementation strategies to the particularities of each educational context.

This study reaffirms the transformative potential of ChatGPT in higher education, especially in boosting students' academic performance and developing specific competencies. However, ethical concerns and variations in the perception of its usefulness per the institutional context underscore the importance of designing inclusive pedagogical strategies and clear institutional policies for this tool's ethical and effective adoption. A balanced approach, addressing benefits and challenges, would be central to ensuring sustainable and positive use of ChatGPT in diverse educational settings.

Among the study's main limitations is the reliance on participants' self-reported data, which, while valuable for capturing personal experiences and perceptions, may introduce perception or interpretation biases when assessing the impact of ChatGPT on academic performance. Future research could complement this approach with objective performance metrics or longitudinal studies to better understand the tool's long-term effects on student learning outcomes.

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Additionally, although the sample is diverse in geographical and institutional terms—encompassing students from ten countries across Latin America and Europe—the findings cannot be fully generalized worldwide. Cultural, technological, and pedagogical differences influence students' perceptions and adoption of AI tools, highlighting the need for further studies in other regions and educational contexts. Moreover, the study primarily focuses on higher education students, meaning that the results may not fully capture the perspectives of educators, administrators, or students in other academic levels, such as secondary education or lifelong learning programs.

Despite these limitations, the study provides a solid foundation for understanding how ChatGPT is perceived across multiple educational environments. It offers valuable insights that can guide future research, policy decisions, and institutional strategies to optimize the responsible and effective integration of AI in education. Future studies could further explore the role of AI in different academic disciplines, compare its impact across various instructional settings, and examine the long-term implications of its use in shaping digital literacy and critical thinking skills among students.

For future research, it would be valuable to conduct longitudinal studies that assess the impact of using ChatGPT over time, allowing for a deeper analysis of the evolution of cognitive competencies and ethical perceptions. Additionally, it is recommended to explore the impact of ChatGPT in broader, more diverse academic settings, including different educational levels and non-academic contexts, like continuing professional training. Another promising approach would be to compare different pedagogical models of AI implementation to identify which institutional practices most effectively promote a critical and responsible use of this tool.

7. Suggestion

To address the ethical concerns highlighted in the study, educational institutions should implement comprehensive training programs focused on ethical digital literacy. These initiatives should teach students to use tools like ChatGPT responsibly, emphasizing the importance of academic integrity and critical evaluation of AI-generated content. Modules on recognizing and avoiding plagiarism, verifying the accuracy of information, and fostering original thinking could significantly reduce ethical risks. Additionally, clear institutional guidelines and readily available resources for responsible AI use would provide students with the framework to navigate these challenges effectively while fostering a culture of ethical digital practices.

Furthermore, institutions should enhance the integration of ChatGPT into academic curricula to maximize its positive impact on student performance and skill development. Providing access to robust technological infrastructure and offering tailored training sessions for students and educators would ensure equitable adoption across diverse educational contexts. Workshops and support systems could help users become proficient in leveraging ChatGPT for collaborative projects, research, and skill-building exercises. By embedding this tool into various academic tasks and addressing the disparities observed between public and private universities, institutions can create an inclusive environment where students fully benefit from ChatGPT's capabilities while minimizing challenges related to its adoption.

Additionally, institutions should explore the development of AI policies and best practices that balance innovation and academic integrity. This could include automated detection systems for AI-generated content, faculty training on AI-assisted teaching methodologies, and the creation of AI-supported learning environments that encourage interactive, student-centered education. Universities should also promote cross-disciplinary research on AI in education, fostering inter-institutional collaboration to ensure that ethical concerns are addressed at a systemic level.

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Declarations

Author Contributions. RAM: Literature review. CEGR: conceptualization. methodology, data analysis, review-editing and writing. MBF: original manuscript preparation. All authors have read and approved the published on the final version of the article.

Conflicts of Interest. The authors declare no conflict of interest.

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Ethical Approval. The information provided by the participants was collected with their consent (https://comiteinstitucionaletica.tec.mx/es/formatos). The implementation was regulated and approved by the Tecnológico de Monterrey Ethics Committee-IFE-2024-001 and supervised by the Interdisciplinary Research Group R4C with the technical support of the Writing Lab of the Institute for the Future of Education at Tecnologico de Monterrey, Mexico. All the information gathered was protected per the criteria established in the Federal Law on the Protection of Personal Data in the Possession of Private Parties in force in Mexico.

Data Availability Statement. The dataset used in this article must be explicitly requested by the authors.

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About the Contributor(s)

Carlos Enrique George-Reyes Instituto para el Futuro de la Educación. Tecnológico de Monterrey. Monterrey, México Universidad Politécnica Metropolitana de Hidalgo, México
Email: cgeorge@tec.mx

Raidell Avello Martínez CITIC Research Center Universidade da Coruña
Email: raidell.avello@udc.es

Mariana Buenestado Fernández Universidad de Córdoba
Email: marianabf@uco.es

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