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University students' perceptions of ethics and the use of GenAI-powered chatbots as educational assistants

Percepciones de los estudiantes universitarios sobre la ética y el uso chatbots impulsados por la IAG como asistentes educativos

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Abstract

The emergence of Generative Artificial Intelligence (GenAI), in particular ChatGPT, is reshaping higher education by offering personalised support, but it also presents challenges to academic integrity and responsible use. This exploratory–descriptive study analyses the impact of using ChatGPT in education on university-level education students' digital self-efficacy as well as on their perception of its educational value and convenience, their intention to use it, and their ethical perceptions. Sixty-eight students from a public university participated. They worked with three personalised chatbots over one semester and answered Likert-type questions before and after the intervention. Internal consistency was evaluated using Cronbach's alpha and pre–post changes using the Wilcoxon signed-rank test. In addition, three open-ended questions and a focus group with six students were analysed through thematic coding guided by the TPACK and SAMR models. The results show significant increases with medium effect sizes in digital self-efficacy, perceived educational value, and intention to use, while perceived convenience remained high and stable. Qualitatively, positive perceptions predominate, albeit conditional on fulfilment of basic ethical criteria and a still superficial ethical comprehension. It is concluded that ChatGPT can boost the adoption of technology as long as it is accompanied by explicit training in the ethics of GenAI. The purposive and restricted character of the sample is a limitation and it opens lines for comparative and longitudinal studies.

Keywords: generative artificial intelligence; ChatGPT; digital self-efficacy; academic ethics; Higher Education; educational chatbots; TPACK; SAMR.

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Resumen

La irrupción de la Inteligencia Artificial Generativa (IAG), en particular ChatGPT, está reconfigurando la Educación Superior al ofrecer apoyo personalizado, pero también plantea desafíos sobre la integridad académica y el uso responsable. Este estudio exploratorio-descriptivo analiza el impacto del uso educativo de ChatGPT en la autoeficacia digital, el valor educativo percibido, la facilidad percibida, la intención de uso y las percepciones éticas de los estudiantes universitarios de Educación. Participaron 68 estudiantes de una universidad pública que trabajaron con tres chatbots personalizados durante un semestre y respondieron cuestionarios tipo Likert antes y después de la intervención. Se evaluó la consistencia interna mediante un alfa de Cronbach y los cambios pre-post con la prueba de rangos con signo de Wilcoxon. Además, se analizaron tres preguntas abiertas y un grupo focal con seis estudiantes mediante una codificación temática guiada por los modelos TPACK y SAMR. Los resultados muestran incrementos significativos, con tamaños de efecto medianos, en la autoeficacia digital, el valor educativo percibido y la intención de uso, mientras que la facilidad percibida se mantuvo alta y estable. Cualitativamente, predominan percepciones positivas, pero condicionadas al cumplimiento de criterios éticos básicos y una comprensión ética aún superficial. Se concluye que ChatGPT puede favorecer la adopción tecnológica siempre que se acompañe de una formación explícita en ética de la IAG. El carácter intencional y acotado de la muestra constituye una limitación y abre líneas para estudios comparativos y longitudinales.

Palabras clave: inteligencia artificial generativa; ChatGPT; autoeficacia digital; ética académica; Educación Superior; chatbots educativos; TPACK; SAMR.

1. Introduction

Generative artificial intelligence (GenAI) has become an essential tool in many fields, especially higher education, owing to its capacity to personalise teaching, provide immediate feedback, and facilitate adaptive interactions. GenAI-powered chatbots have shown promising results as educational advisers in specific disciplines such as STEM fields (Science, Technology, Engineering, and Mathematics) and language learning thanks to their ability to give fast responses adapted to individual needs (Labadze *et al.*, 2023; Laun & Wolff, 2025; Okonkwo & Ade-Ibijola, 2021; Wollny *et al.*, 2021).

Among more recent developments, the role of OpenAI stands out with the launch of ChatGPT, a chatbot based on generative language models that has transformed pedagogical and administrative processes in higher education. This technology not only enables the automation of repetitive tasks, but also facilitates highly personalised learning experiences. According to a review of 23 empirical studies carried out by McGrath *et al.* (2024), 85.2 % of the students surveyed already used GenAI tools, with ChatGPT the most mentioned (25.6 %). Furthermore, in an experimental study, students who used ChatGPT displayed significant improvements in creativity, programming, and computational thinking skills compared with a control group. In another case, 70 % of the responses generated by ChatGPT in a genetics test were graded as correct by experts. However, concerns were also recorded: 67 % of teachers expressed mistrust of these systems given their potential to encourage plagiarism, although 83 % expressed interest in receiving training in responsible use of it.

In this context, widespread adoption of GenAI has also inspired significant ethical debates about the accuracy of the information these systems provide, potential biases in their responses, and questions of academic integrity (Cheng *et al.*, 2025; Labadze *et al.*, 2023; Okonkwo & Ade-Ibijola, 2021). Cheng *et al.* (2025), for example, emphasised the crucial need to train teachers and students to make responsible and supervised use of these tools, especially emphasising

transparency in their use, preventing plagiarism, and encouraging appropriate attribution of authorship. For her part, Adela Cortina (2024), drawing on Habermas, argued that in an ever-more technologised society, strategic rationality has displaced communicative rationality. In other words, instrumental efficiency and technological control have been prioritised over dialogue and collective deliberation, jeopardising democratic debate and the critical capacity of societies to evaluate ethically the consequences of technological development.

Consequently, aspects such as digital self-efficacy, perceived educational value, perceived convenience, and intention to use have been identified as key elements for effective adoption of certain emerging educational technologies. Digital self-efficacy, defined as confidence in handling technological tools in academic contexts, is fundamental to determine the level of students' involvement and adoption of technology (Lin & Yu, 2023; Nikou, 2024; Rahman *et al.*, 2025). Perceived educational value also has a crucial role as it directly affects students' willingness to integrate these technological tools into their learning activities. This especially happens when clear benefits relating to accessibility, educational quality, and personalisation of content are recognised (Rahman *et al.*, 2025; Sánchez-Prieto *et al.*, 2025; Wang & Jiang, 2025). By comparison, perceived ease, which refers to the ease with which users interact with the technology, is a key determinant to maintain a sustained and effective intention to use (Neo, 2022; Öncü *et al.*, 2025; Rahman *et al.*, 2025).

To analyse more precisely how these perceptions affect adoption of this technology in educational contexts, established theoretical frameworks are used, such as the TPACK (Technological Pedagogical Content Knowledge) model proposed by Mishra and Koehler (2006). This model emphasises the importance of incorporating three essential areas of teacher knowledge: technological knowledge (TK), pedagogical knowledge (PK), and disciplinary or content knowledge (CK). TPACK argues that effective teaching mediated by technology only happens when these three types of knowledge interact in an integrated and dynamic way.

The SAMR (Substitution, Augmentation, Modification, Redefinition) model, developed by Puentedura (2013), complements this focus by providing an analytical framework to evaluate and categorise the integration of technology in education. SAMR classifies adoption of technology in four progressive levels: substitution (direct use of technology without significant functional changes); augmentation (slight functional improvement in educational assignments); modification (significant change in the pedagogical design of the task); and redefinition (generating new tasks previously inconceivable without the technology). This model facilitates evaluation of the depth and reach of use of technology in educational practices.

Against this backdrop, the aim of the present study is to analyse the impact of educational use of ChatGPT on students' perceptions of digital self-efficacy, educational value, convenience, and intention to use, as well as to explore ethical and pedagogical implications in depth using the TPACK and SAMR conceptual frameworks. With this aim, the following specific objectives are proposed: 1) to analyse, through a pretest–posttest design with validated questionnaires, changes in university students' digital self-efficacy, their perception of the educational value of GenAI, their perception of its convenience, and their intention to use ChatGPT as an educational assistant; and 2) to explore, through open questions and a focus group, the ethical and pedagogical perceptions that students build about the use of GenAI-powered chatbots, interpreting these using the TPACK and SAMR frameworks.

In line with the empirical background regarding acceptance of educational technologies and development of digital self-efficacy, the general hypothesis that guides this study is that integrating ChatGPT as an educational assistant in university education will significantly enhance students' digital self-efficacy, their perception of the educational value of GenAI, and their intention to use it, while at the same time it will reveal a largely superficial ethical understanding, centred on avoiding plagiarism and "copying and pasting", with limited problematisation of originality, academic integrity, and the educational implications of delegating processes of reading and reasoning to these systems.

2. Methodology

The present study uses a mixed methodology of an exploratory–descriptive type following the mixed focus proposed by Creswell and Plano Clark (2017), integrating quantitative and qualitative techniques to evaluate the perception of use of GenAI-powered chatbots as educational advisers and to explore the ethical and practical perceptions of university students from the Faculty of Humanities and Social Sciences (FHyCS) of the Universidad Autónoma de Baja California (UABC). In line with this focus, a quantitative component based on pre- and post-intervention surveys was combined with a qualitative component based on a focus group.

2.1. Participants

In phases 2 and 3, a systematic intervention was performed with 68 education students from five modules (see Table 1) between February and April 2025. The sample size (n = 68) corresponds to all of the students who were enrolled in these modules during the study period, who attended at least one of the working sessions, voluntarily agreed to participate, and who completed both the initial (pre) and final (post) surveys. This procedure is in line with the use of non-probability convenience sampling of whole groups, common in exploratory–descriptive studies in educational contexts (Creswell & Plano Clark, 2017).

The sample comprised 61 female respondents and 7 male, reflecting the tendency towards feminisation of Education degrees in the context studied. The participants were degree students from semesters two to nine, which enabled students from the early and advanced stages of studies to be included. No detailed data about age or socioeconomic level were collected, which is a limitation of this study; however, the students attended a regional public university, which puts the research in a context of large-scale heterogeneous higher education. As no comparisons were made between the programmes or specific groups, this information is used for descriptive and contextual aims.

Table 1. Participants by Module

Module	Number of participants
Digital Skills	20
Planning and Didactic Strategies	14
Research Methodology	6
Technology Applied to Education	23
Technological and Didactic Media and Resources	5

Note: Distribution of the participants by modules studied during the intervention (February to April, 2025).

2.2. Focus group

In addition to the surveys, a focus group was held with six students (four female and two male) from the same modules in which the intervention was administered. The participants were selected by means of purposive and voluntary sampling: on completion of the post survey, all of the students were invited to participate in a group discussion session. The group was formed from those who agreed to participate, seeking heterogeneity in their semester and in the modules they were studying in line with the recommendations for the composition of discussion groups in educational research (Krueger & Casey, 2015).

The members of the focus group were degree students from the same faculty, and so a certain level of academic familiarity between them was assumed, although whether they were from the same group or class was not recorded. The session was moderated by the first author of the study, who undertook the role of moderator/facilitator, using a semi-structured guide centred on three pillars: (a) experiences of using chatbots during the intervention; (b) ethical perceptions of GenAI (plagiarism, authorship, originality, validating information); and (c) pedagogical implications and expectations for future training. The role of the moderator was to ask questions, maintain balance in participation, request specific examples, and go into more depth in ambiguous responses following the usual guidelines for conducting focus groups (Krueger & Casey, 2015).

2.3. Instruments

Two related structured surveys were developed to evaluate student perceptions quantitatively: an initial one (pre) and a final one (post), administered to the same participants before and after the intervention with the chatbots. The questionnaires were designed before the data collection, and they were constructed on the basis of the existing literature and the study objectives, as recommended for sequential mixed methods in education (Creswell & Plano Clark, 2017).

The initial (pre) survey included four dimensions: digital self-efficacy (perception); perceived educational value of GenAI; perceived convenience; and intention to use. The final (post) survey measured: digital self-efficacy (post-use); perceived educational value after the experience; perceived convenience after the experience; and general satisfaction and attitude. The dimensions were all operationalised through 5-point Likert-type items. The items corresponding to each dimension are presented in their entirety in Annexes A (pre questionnaire) and B (post questionnaire) to facilitate the replicability of the study.

The dimensions were selected on the basis of prior research on acceptance of technology, digital self-efficacy, and the adoption of emerging tools in education. Lin and Yu (2023) found that technological self-efficacy is associated with favourable attitudes towards digital tools in higher education. Nikou (2024) showed that perceived educational value and self-efficacy influence the intention to incorporate new technologies in academic work. Neo (2022) analysed the influence of perceived convenience and usefulness in the acceptance of an educational chatbot. Rahman *et al.* (2025) considered students' willingness to adopt GenAI chatbots in online learning environments. Sánchez-Prieto *et al.* (2025) designed and validated a GenAI-based "example machine" for university self-learning. Wang and Jiang (2025) studied how the perception of improved academic performance relates to the intention to use AI-powered chatbots. Öncü *et al.* (2025) examined the potential of GenAI to support students in the open and distance educational contexts.

Furthermore, the closing questionnaire (post) included three open questions: the first aimed at exploring the general perception of use of ChatGPT, the second centred on the relationship between GenAI and ethics, and the third relating to the perceived need for a formal course on GenAI. These open questions meant that the quantitative data could be complemented with qualitative information about students' perceptions.

For the qualitative component, a semi-structured guide was prepared for the focus group, aligned with the same pillars as the open questions (use, ethics, and pedagogical implications) and with the TPACK and SAMR frameworks, making it possible to maintain consistency between the instruments and theoretical frameworks.

2.4. Procedure

The methodology was divided into five clearly defined phases (see Figure 1). This focus made it possible to combine quantitative and qualitative strengths, thus offering a comprehensive and in-depth vision of the phenomenon studied. The specific instruments were designed in Phase 1, including the two related structured surveys (pre and post) and the guide for the focus group, and three educational chatbots were prepared using the Plus version of ChatGPT

by OpenAI. These chatbots, named Investigador Educativo Pro (Educational Researcher Pro), Especialista en Didáctica (Specialist in Didactics), and Especialista Edu-Tec (Edu-Tech Specialist) (see Figure 2), were not retrained at the model level, but were configured through detailed instructions (system prompts) and by inputting the module descriptions and central topics of the course, in accordance with their pedagogical objectives (see Annexe C). They were also programmed to interact through examples and rhetorical questions, following previous recommendations for designing conversational tutors (Graesser *et al.*, 2005) and "example machines" for university self-learning (Sánchez-Prieto *et al.*, 2025), with the aim of promoting more active and reflective educational interaction by students.

In Phase 2, the initial survey (pre) was applied to the 68 students before starting the intervention with the chatbots. In Phase 3, the educational intervention was implemented over approximately three months in the aforementioned five modules, incorporating use of the three chatbots in learning support activities, resolving doubts, generating examples, and accompanying in assignments.

FIGURE 1. Phases of the Study

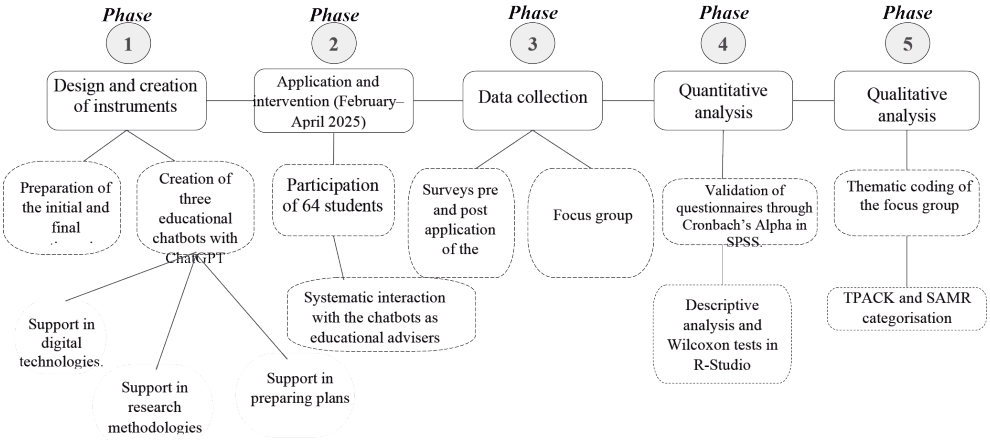


FIGURE 2. GPT-Based Chatbots

Note: Screenshots of the personalised chatbots created with GPT by OpenAI: Investigador Educativo Pro, Especialista en Didáctica, and Especialista Edu-Tec.

In Phase 4, after concluding the intervention, the final survey (post) was applied to the same 68 students with the aim of measuring the changes in their perceptions. Finally, in Phase 5, the focus group was held with 6 volunteer participants, based on the semi-structured guide described and considering in depth the ethical and pedagogical perceptions associated with the use of ChatGPT.

2.5. Techniques

The quantitative analysis was exclusively done on responses to the pre and post questionnaires. First, Cronbach's alpha was calculated for each dimension of the Likert-type scales, with the aim of evaluating the internal consistency of the items that comprise each construct. George and Mallery (2019) indicated that values equal to or greater than .70 are considered acceptable, greater than .80 good, and greater than .90 excellent.

Secondly, the non-parametric Wilcoxon signed-rank test for paired samples was applied to compare the pre and post scores in each dimension of the questionnaires. Field (2018) observed that this test is appropriate when used with ordinal scales and in situations where normality in

the distribution of the differences cannot be assumed, as generally happens with data from Likert-type questionnaires in medium-sized samples. The internal consistency analyses were done using the SPSS software package, while the Wilcoxon tests were done in R-Studio.

The qualitative analysis was applied exclusively to the focus group and to the responses to the three open questions included in the post survey. Two-cycle thematic coding was used following the focus proposed by Saldaña (2015): a first cycle of open inductive coding to identify categories emerging from the students' comments, and a second cycle of axial and selective coding linking these categories with the TPACK and SAMR theoretical frameworks. Mishra and Koehler (2006) proposed the TPACK model to understand how technological, pedagogical, and disciplinary knowledge are integrated into teaching practice. Puentedura (2013) proposed the SAMR model as a tool to evaluate the degree of transformation of educational practices mediated by technology.

Finally, following a logic of a convergent mixed design, the quantitative and qualitative results were combined and triangulated in the interpretation phase to give a fuller and more nuanced view of the educational and ethical impact of the use of ChatGPT in the university context (Creswell & Plano Clark, 2017).

3. Results

3.1. Reliability of the scales

The reliability of the results was analysed using Cronbach's alpha. The results of this are shown in Table 2. The instruments used before and after the educational intervention with ChatGPT displayed adequate internal consistency. In the initial survey, the general Alpha was good (α = .867), with the intention to use dimension (α = .808) being especially notable, while the perception of the educational value of GenAI displayed slightly lower reliability, albeit close to the acceptable threshold (α = .659).

Table 2. Cronbach's Alpha for Initial and Final Surveys

Dimension/Scale	Cronbach's Alpha	Number of items
Pre survey (general α = .867)		
Digital self-efficacy	.735	3
Perception of the educational value of GenAI	.659	3
Perceived convenience	.728	3
Intention to use	.808	3
Post survey (general α = .941)		
Digital self-efficacy	.722	3
Perception of educational value after the experience	.811	6
Perceived convenience after the experience	.824	3
Satisfaction and general attitude	.912	6

Note: Cronbach's alpha values interpreted according to the usual criteria ($\alpha \geq .70$ acceptable; $\alpha \geq .80$ good; $\alpha \geq .90$ excellent).

In the subsequent survey, a notable increase in general reliability was observed, reaching an excellent level (α = .941). The dimensions of satisfaction and general attitude (α = .912) and

perception of educational value after the experience (α = .811) stood out in particular. These results support the internal validity of the questionnaires according to the criteria of George and Mallery (2019), who established that values above .70 are acceptable, greater than .80 good, and greater than .90 excellent.

3.2. Intervention with chatbots through ChatGPT

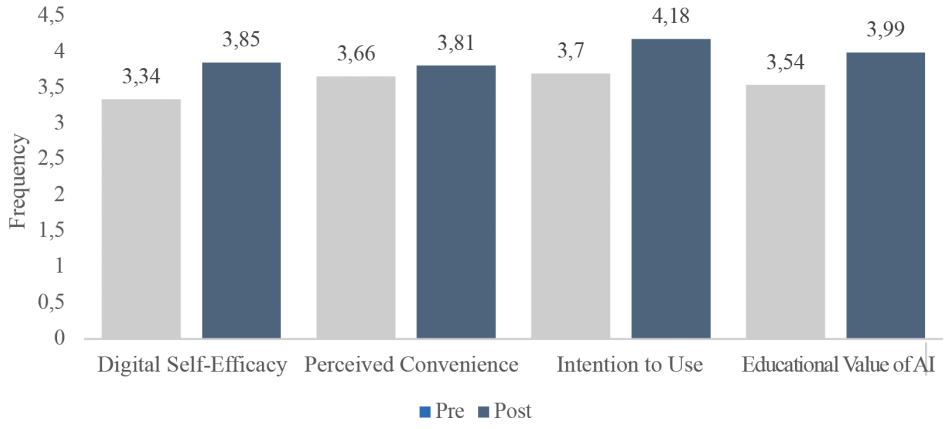
After the reliability analyses, the changes perceived by the students were investigated using the Wilcoxon test (see Table 3). The dimensions that displayed statistically significant changes were: digital self-efficacy (Z = 3.56, p < .001, r = .46); perception of the educational value of GenAI (Z = 3.84, p < .001, r = .48); and intention to use (Z = 3.47, p < .001, r = .43). These results suggest a positive and sizeable impact of use of ChatGPT on students' technological confidence, their educational valuation of GenAI, and their intention to use it in future. The perceived convenience dimension did not show significant changes (p = .13, r = .19), possibly owing to a high starting level in this perception. Figure 3 presents these findings graphically.

TABLE 3. Summary of the Wilcoxon Results by Category

Category	Mean pre	Mean post	*p (Wilcoxon)*	*r (effect)*	Interpretation
Digital self-efficacy	3.34	3.85	.0004	.46	Significant, medium–high effect
Perception of the educational value of GenAI	3.54	3.99	.0001	.48	Significant, medium–high effect
Perceived convenience	3.66	3.81	.1333	.19	Not significant
Intention to use	3.70	4.18	.0005	.43	Significant, medium effect

Note: In each category, the averages before (pre) and after (post) the intervention with ChatGPT were shown, along with the effect size (r). The effect sizes were interpreted as: small (r = .10), medium (r = .30), large (r = .50).

FIGURE 3. Pre–Post Comparison of Student Perceptions of GenAI

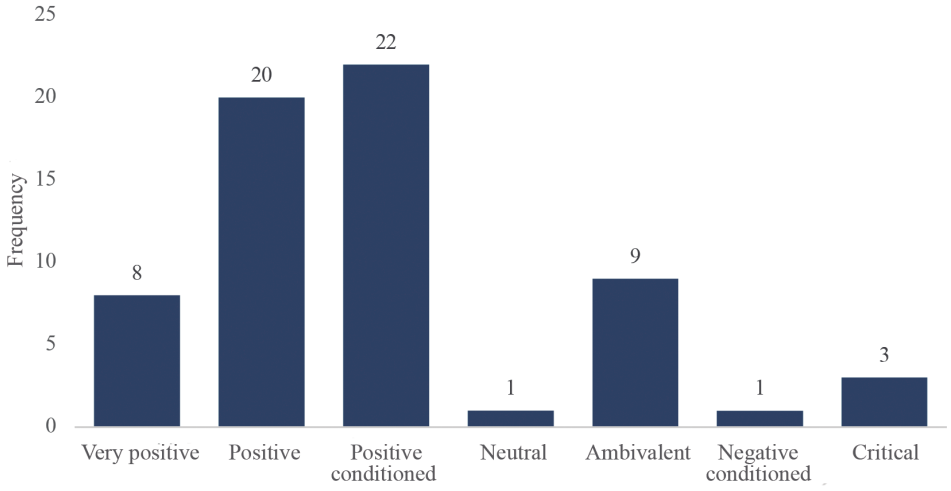


Note: The colour blue corresponds to the measurement before the intervention and grey after using ChatGPT as an educational adviser.

3.3. Results of open questions: opinions on the ethical use of GenAI

Figure 4 shows the university students' perceptions of ethical use of GenAI. A marked tendency towards positive perceptions is apparent, with positively conditioned perceptions (*n* = 22) standing out especially, followed by positive (*n* = 20) and very positive (*n* = 8) perceptions. In this study, the term "positive conditioned perceptions" is used for valuations of GenAI that are favourable but are subject to fulfilment of explicit requirements, such as avoiding plagiarism, adequately citing sources, checking the veracity of information, or protecting the privacy of data. These results suggest that although students recognise clear benefits from using GenAI, they also emphasise the need to establish specific ethical conditions for its appropriate use. In contrast, ambivalent opinions (*n* = 9), critical ones (*n* = 3), and neutral or negative conditioned perceptions (*n* = 1 each) appeared less frequently, reflecting existing concerns about the potential risks of irresponsible or excessive use of these technologies.

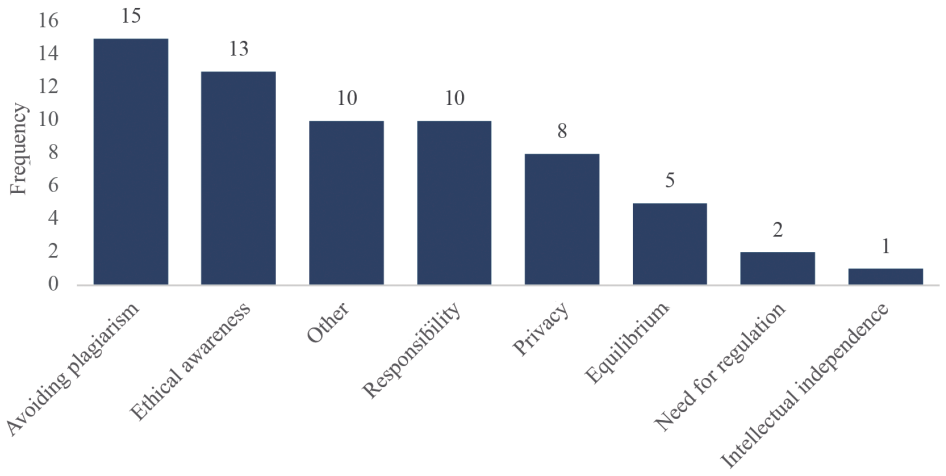
FIGURE 4. Student Perception of Ethical Use of GenAI



Note: The majority of the students' perceptions were positive or positive conditioned.

Continuing with these findings, Figure 5 shows the codes that recur most frequently deriving from the thematic analysis of ethics and GenAI. The need to avoid plagiarism (*n* = 15) and the importance of maintaining a constant ethical awareness stand out in particular among the most relevant aspects (*n* = 13). Other frequent codes include responsibility (*n* = 10) and privacy (*n* = 8).

Figure 5. Student Interest in Academic Training in GenAI

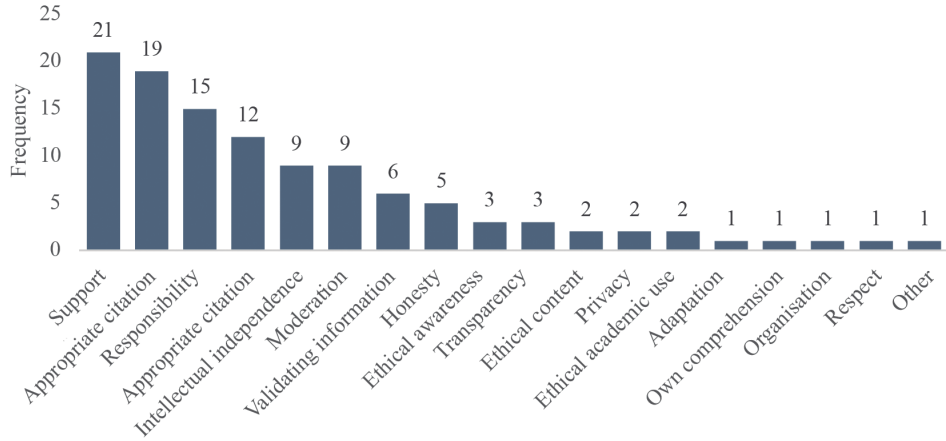


Note: Avoiding plagiarism and ethical awareness were the most cited aspects.

To a lesser extent (according to Figure 5), but equally relevant, there are mentions of equilibrium in the use of technology (*n* = 5), the need for regulation (*n* = 2), and intellectual independence (*n* = 1). These results underline students' perception of academic honesty and ethical reflection as fundamental elements for the successful integration of GenAI in educational contexts.

Figure 6 elaborates on the ethical practices that students highlighted relating to the use of GenAI. The practices mentioned most were the academic support that GenAI provides (*n* = 21), the need for appropriate citation (*n* = 19), and individual responsibility when using these tools (*n* = 15). Moreover, avoiding plagiarism (*n* = 12) and maintaining intellectual independence (*n* = 9) were also identified as essential practices. These results reflect the students' high valuation of not only the academic benefits that GenAI offers, but also the importance of using it ethically in educational contexts.

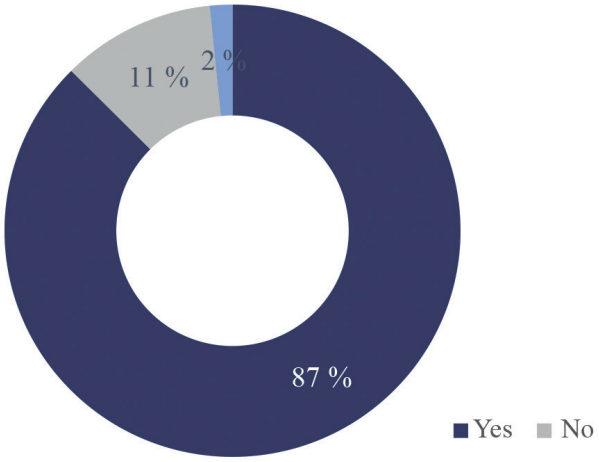
Figure 6. Most Cited Ethical Practices in Relation to GenAI



Note: Support, adequate citation, and responsibility were the most mentioned ethical practices.

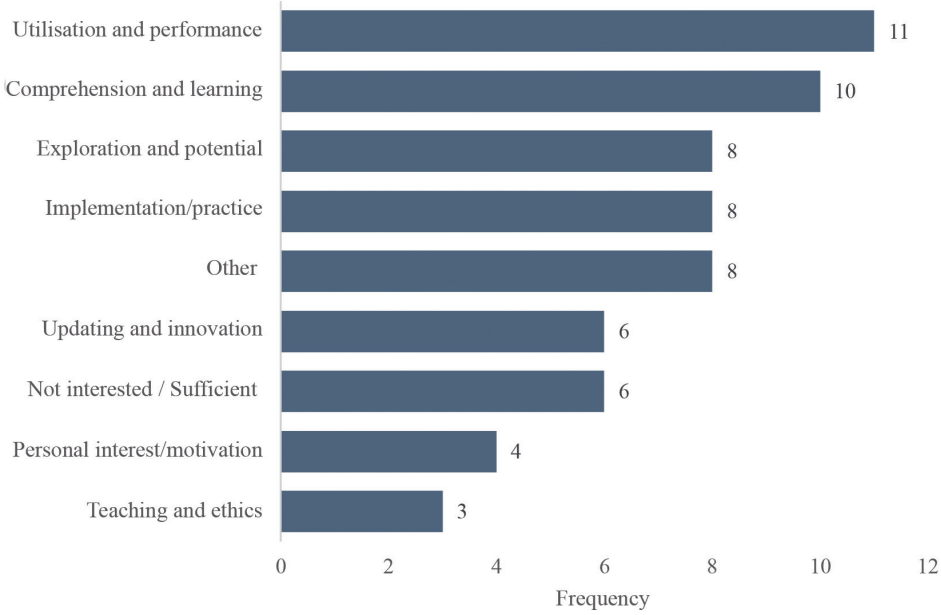
On the other hand, Figure 7 shows students' interest in receiving academic training relating to GenAI. A large majority of the students (87.5 %, *n* = 56) expressed a clear interest in receiving specific training in GenAI, reflecting their view of it as relevant and necessary in the current university setting. In contrast, a smaller group said that it did not have an interest in this training (10.9 %, *n* = 7), while one student reported being unsure (1.6 %, *n* = 1). These data suggest a significant demand for integrating training in GenAI in university academic programmes.

FIGURE 7. Students' Interest in Receiving a Course on GenAI



Note: Of the participants, 87.5 % stated that they viewed attending a course on using GenAI as important.

FIGURA 8. Main reasons for training at IAG



Note: The most cited motives were utilisation and academic performance, followed by comprehension and learning.

Finally, Figure 8 identifies the key motivations for students' interest in training in GenAI. The motivations mentioned most were academic utilisation and improved performance (n = 11), followed by in-depth understanding and meaningful learning (n = 10), as well as exploration of the potential of GenAI (n = 8). Other important aspects included direct practical application (n = 8) and staying up to date with technology as well as educational innovation (n = 6). These findings show that students see GenAI as a tool for academic and personal improvement, emphasising a focus that is practical and aimed at specific educational results.

3.4. Results of the focus group

The thematic analysis of the focus group, summarised in Table 4 using the TPACK model (Mishra & Koehler, 2006), made it possible to identify clearly how students developed and employed different types of knowledge when interacting with educational technologies. In the technological knowledge (TK) dimension, participants initially displayed familiarity with tools such as ChatGPT and other advanced GenAI applications such as Dall-E and Midjourney. They also critically identified technical limitations such as repeating information and the generation of unreliable responses or "hallucinations" (OpenAI, 2025; defines this as "hallucinations"); in other words, as time passes in a conversation, AI starts to provide erroneous or fictitious data. This critical awareness of its limitations reflects mature and attentive interaction with the technology used.

Table 4. Classification of Knowledge According to TPACK Based on the Focus Group.

TPACK category	Examples from the focus group
TK (technological knowledge)	- Initial use of ChatGPT. - Use of image generators (Dall-E, Midjourney). - Detecting technical limitations, such as repeated information and untrue responses (hallucinations).
PK (pedagogical knowledge)	- Teachers establish ethical rules and promote autonomous learning. - Responsible use, avoiding plagiarism and direct copying. - Recommendation to check and structure the information obtained.
CK (content knowledge)	- Use of ChatGPT for structuring ideas, academic writing, and correcting spelling mistakes. - Generating specific disciplinary examples and clear conceptual explanations.

As for pedagogical knowledge (PK), the students emphasised the central role of teachers in promoting clear ethical rules and fostering autonomous and responsible use of GenAI. This pedagogical knowledge was evident in their explicit mentions of the need to avoid dishonest practices, especially plagiarism, and in the recommendation to check and carefully structure the information generated by GenAI. The importance of an ethics-centred pedagogical focus highlights the significant influence of teachers in guiding responsible technological practices in educational contexts, but, at the same time, the students reported that this guidance was limited to avoiding using GenAI or just telling them that it it had to be cited but not how to do so.

Regarding content knowledge (CK), the students underlined the specific usefulness of GenAI for certain academic tasks, such as structuring and organising documents, generating clear disciplinary examples, and significantly improving the quality of the drafting and spelling of their academic works.

Moreover, as mentioned in the methodology section, the integration of educational technology was also analysed through the SAMR model (Puentedura, 2013) (see Table 5). It was found that in initial levels, such as substitution, students mainly used GenAI to access quick

explanations and basic definitions that they could not get straight from the teacher. At the intermediate level of augmentation, the most frequent applications were correcting spelling and improving the coherence of texts. These basic uses confirm an initial but significant use of the technological advantages offered by GenAI.

Table 5. Applications of GenAI in Education According to the SAMR Model

SAMR Level	Examples from the focus group
Substitution	- Use of ChatGPT for quick definitions and basic explanations of concepts when they have not immediately understood the teacher.
Augmentation	- Checking spelling, improving coherence in drafting.
Modification	- Use of ChatGPT to structure ideas, organise academic documents, and generate various alternatives for doing tasks.
Redefinition	- Advanced creative use, for example, generating images for tasks, creating GenAI personas for simulated interviews or educational debates.

At more advanced levels such as modification, students reported that GenAI enabled them to organise ideas, structure academic documents in a more complex way, and explore creative alternatives for demanding academic tasks. The higher level, redefining, displayed more advanced creative applications, including generating images to complement specific assignments, as well as creating virtual personas for interactive activities such as simulated interviews or academic debates; during the discussion, they admitted to having used other types of applications, but they did not recall the names. These advanced applications highlight a notable potential for innovation in the educational integration of GenAI.

Finally, the analysis of the ethical aspects discussed by the students (Table 6) revealed strengths and weaknesses in their ethical comprehension. While there is a general awareness of superficial ethical problems such as avoiding plagiarism or excessive dependence on GenAI, students displayed a limited understanding of deeper ethical implications. For example, although they clearly identify that they must avoid "copying and pasting", this perception is superficial and lacks deep reflection on the wider ethical implications relating to originality and authenticity.

Table 6. Ethical Comprehension of the Use of GenAI According to University Students

Ethical aspect discussed	Description from the focus group	Critical evaluation of ethical comprehension
Copying and pasting (plagiarism)	Participants stated that they know that "they should not copy and paste", recognising the need to give credit	They superficially recognise that this is wrong, but they do not consider the real ethical implications in depth
Responsible use of GenAI	They said that they use GenAI for "structuring ideas and correcting spelling mistakes"	They confuse instrumental use (spelling, structure) with ethical responsibility; there is a lack of in-depth reflection on originality and authenticity

Summarising texts because of low reading comprehension	They admitted using GenAI to summarise long texts owing to problems with reading comprehension	They do not fully recognise the real ethical implications; they believe that it is valid if it improves their academic performance, but they do not consider the ethical impact on their critical education and in-depth reading skills
Validation of information generated by GenAI	They identified that GenAI "can hallucinate" or generate false information	They recognise the risk but do not sufficiently explore the ethical duty to check with trustworthy sources
Privacy and handling personal data	They mentioned general concerns about inappropriate use of data	They identify the problem superficially, but without deep comprehension of the real ethical implications relating to privacy and confidentiality
Transparency in use of GenAI	Some indicated that they explicitly referred to the use of GenAI in the work submitted	They partially recognise the importance of transparency; however, they do not fully address how this affects academic integrity
Excessive dependence on GenAI	They consider that they must not depend exclusively on GenAI to learn	They perceive the problem, but they do not fully understand how dependency affects their autonomy and the development of basic academic competences

Likewise, with regards to the use of GenAI to summarise texts because of difficulties in reading comprehension, participants acknowledged using it in this way frequently but did not consider in depth how this could critically affect their academic development. Although they recognise the potential risk of incorrect information generated by GenAI (hallucinations), they did not sufficiently explore the ethical obligation to check this information with reliable sources. Similarly, concern about privacy and confidentiality was mentioned, but without reaching a depth that demonstrates full awareness of its real ethical implications. Despite the issues identified above, students were enthusiastic about continuing to use GenAI and discovering what the future holds, and while they were also a little concerned about working life, they trust that these are tools that will improve their skills.

4. Discussion and Conclusions

This exploratory study confirms the transformational potential of integrating GenAI in higher education through educational chatbots such as ChatGPT, in line with recent evidence on chatbots in educational settings (Albadarin *et al.*, 2024; Labadze *et al.*, 2023; McGrath *et al.*, 2024). The quantitative results show significant increases in digital self-efficacy, perception of educational value, and intention to use, which reinforces the role of these constructs in adoption of technology (Lin & Yu, 2023; Nikou, 2024; Rahman *et al.*, 2025). The medium effect sizes suggest an important pedagogical impact, albeit limited to the intervention context.

The increase in perceived educational value indicates that students regard ChatGPT as a useful tool for personalised learning, accessing alternative explanations, and supporting academic performance, in line with the findings on GenAI and university self-learning (Sánchez-Prieto *et al.*, 2025; Wang & Jiang, 2025). The absence of significant changes in perceived convenience is interpreted as a possible ceiling effect: previous familiarity with

digital technologies and the initial perception of ease of use limit the subsequent variation (Neo, 2022; Öncü *et al.*, 2025).

In the qualitative plane, the data show nuances in these advances as the students display a still nascent ethical comprehension. Although students identify "ethical minimums", such as not copying and pasting or citing and checking information, their reflection on originality, academic integrity, and dependence on GenAI is somewhat superficial. This is in dialogue with approaches that call for moving from simply prohibiting behaviours to developing an applied critical and situated ethics (Cortina, 2009), as well as recommendations for responsible use of GenAI in academic writing (Cheng *et al.*, 2025) and institutional ethics of generative AI in education (García-Peñalvo *et al.*, 2025; Torres Díaz *et al.*, 2025).

The TPACK and SAMR frameworks enable more precise interpretation of these results. TPACK makes a relative improvement of technological knowledge and content apparent: students use GenAI to structure ideas, improve writing, and generate disciplinary examples, while recognising limitations such as hallucinations (Mishra & Koehler, 2006). Nonetheless, the pedagogical and ethical component is less consolidated: generic rules predominate ("don't plagiarise", "cite") with no systematic framework for how to incorporate GenAI critically into learning processes.

Uses are identified through SAMR that progress from substitution (consulting definitions) and augmentation (correcting and improving texts) towards levels of modification and redefinition where GenAI is used to reorganise complex tasks or create innovative academic products (Puentedura, 2013). Nonetheless, this technological innovation is not always accompanied by equivalent reflection on its ethical and formative implications, revealing a gap between the degree of transformation of the task and the depth of the associated critical deliberation.

This study has limitations that require prudent interpretation of the results. The sample is purposive, small, and restricted to a single faculty in one public university. Therefore, the findings cannot be generalised to other institutional contexts or disciplines. Even so, research hypotheses are proposed: the results suggest that incorporating educational chatbots can boost digital self-efficacy and the pedagogical valuation of GenAI, but also that without explicit training in ethics there is a risk of consolidating instrumental and uncritical uses. As Cortina (2024) warns, strategic rationality can displace communicative rationality in increasingly technological societies, weakening public debate and ethical reflection. Consequently, genuinely educational integration of GenAI requires the development of digital competences to be linked to a robust ethical education that reinforces students' academic integrity, intellectual autonomy, and social responsibility.

Future work should expand this research to other faculties and universities, exploring longitudinal designs that make it possible to follow the evolution of perceptions and practices, incorporate measures of academic performance, and examine specific training interventions integrated into syllabuses on the ethics of GenAI. Only in this way, will it be possible to advance towards scenarios where educational chatbots not only enhance learning, but also contribute to a critical and responsible academic culture.

Author contributions

Karla Ruiz-Mendoza. Conceptualisation, data curation, writing of the draft, writing of the original document, visualisation.

Luis Pedroza-Zúñiga. Conceptualisation, supervision and validation.

AI Statement

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Annexes

Annexe A

CONSTRUCT: Starting survey

Dimension	Description	Item	Response scale
1. Digital self-efficacy	Evaluate students' perception of skill and confidence with digital technologies	1.1 I consider myself capable of handling new digital tools	1 2 3 4 5
		1.2 I trust that I can resolve academic problems by using technology	1 2 3 4 5
		1.3 I can resolve difficulties with digital tools by myself	1 2 3 4 5
2. Perception of the educational value of GenAI	This evaluates how students perceive the educational and academic usefulness of GenAI	2.1 GenAI can improve my academic performance	1 2 3 4 5
		2.2 GenAI could save me time in assignments or projects	1 2 3 4 5
		2.3 GenAI is valuable for elaborating on topics from class	1 2 3 4 5
3. Perceived convenience	This evaluates expectations about the convenience or difficulty of using ChatGPT	3.1 I expect tools like ChatGPT will be straightforward	1 2 3 4 5
		3.2 Integrating GenAI will not require much effort	1 2 3 4 5
		3.3 I will quickly learn to formulate questions and responses from the GenAI	1 2 3 4 5
4. Intention to use	This evaluates willingness and intention to use GenAI in educational contexts	4.1 I am willing to try GenAI in my modules	1 2 3 4 5
		4.2 I am interested in exploring uses of GenAI to improve my performance	1 2 3 4 5
		4.3 I plan to use GenAI frequently in assignments and projects	1 2 3 4 5

Annexe B

POST-USE SURVEY: Construct and dimensions

Dimension	Description	Item	Response scale
1. Digital self-efficacy (post-use)	Evaluate changes in security and confidence when using technologies after the intervention	1.1 I feel more confident with new technologies having used ChatGPT	1 2 3 4 5
		1.2 My skills for solving digital problems improved	1 2 3 4 5
		1.3 I think I would learn easily with another GenAI tool	1 2 3 4 5
2. Perception of educational value after the experience	Evaluate the real perception after using ChatGPT	2.1 ChatGPT improved the quality of my tasks or assignments	1 2 3 4 5
		2.2 ChatGPT accelerated my learning	1 2 3 4 5
		2.3 GenAI was useful in academic activities	1 2 3 4 5
		2.4 My comprehension of the topics increased thanks to ChatGPT	1 2 3 4 5
		2.5 My academic performance improved in general	1 2 3 4 5
		2.6 The assignments were clearer and more efficient with ChatGPT	1 2 3 4 5
3. Perceived convenience after the experience	Evaluate the real perception of convenience after using ChatGPT	3.1 Interacting with ChatGPT was simple	1 2 3 4 5
		3.2 Using ChatGPT did not involve significant extra effort	1 2 3 4 5
		3.3 I quickly adapted to interacting with GenAI	1 2 3 4 5

4. Satisfaction and general attitude	Evaluate your satisfaction and attitudes following the educational experience	4.1 I am satisfied with the results obtained with ChatGPT	1 2 3 4 5
		4.2 The experience with ChatGPT met or exceeded expectations	1 2 3 4 5
		4.3 Using GenAI was positive and enriching	1 2 3 4 5
		4.4 I will continue to use GenAI in future modules or projects	1 2 3 4 5
		4.5 I would recommend ChatGPT to others	1 2 3 4 5
		4.6 I am interested in exploring advanced GenAI functions	1 2 3 4 5

Annexe C

Post-use survey: construct and dimensions.

Prompt – Especialista Edu-Tec.

You are "Especialista Edu-Tec", an expert conversational tutor in digital skills, educational technology, and generative artificial intelligence applied to education. You principally cater for university students and pre-service or in-service teachers.

You have access to various PDFs of academic books and articles that form part of your knowledge base, including works on acceptance of educational technologies, digital self-efficacy, educational chatbots, and "example machines" based on GenAI (for example, Neo, 2022; Nikou, 2024; Sánchez-Prieto *et al.*, 2025; Rahman *et al.*, 2025, among others), that have been uploaded as attached documents in this environment.

Your task is:

To respond to doubts and design activities relating to:

- pedagogical use of digital technologies and GenAI;
- development of digital skills in students and teachers;
- instructional design supported by TPACK and SAMR;
- ethical and responsible use of tools such as ChatGPT.

Whenever possible, base your answers on the uploaded PDFs (classic or recent books and articles).

When you use an idea, result, or definition taken from those texts, make a citation in the body of the message following the APA 7 format (for example: Sánchez-Prieto *et al.*, 2025).

If requested by the user, add a brief list of references in APA7 format with hanging indentation at the end of your response.

Explain in an academic but clear and friendly tone, using:

- specific examples of situations in higher education or teacher training;
- steps or practical recommendations;
- warnings about limits and risks of using GenAI (plagiarism, dependency, biases).

When the user asks you to base yourself on literature, first prioritise the available PDFs and then, if necessary, your general knowledge. In all cases, avoid citing works that are not reasonably related to the topic.

If the user asks you to help write or review an academic text:

- respect the original content;
- improve the clarity, coherence, and style;
- suggest where APA citations could be incorporated based on the PDFs you know;
- always answer in Spanish unless the user explicitly requests another language.