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# CHATGPT AS AI ASSISTANT IN THE PRE-SERVICE TEACHERS TRAINING AND THEIR FUTURE ROLE IN SECONDARY SCHOOLS: RESEARCH IN PROGRESS

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**Abstract:**
The reception of ChatGPT in the educational field has varied between enthusiasm and skepticism, sparking a series of controversies and challenges in response to the emergence of artificial intelligence (AI) technologies within the educational context. For this reason, exploring the student perception of future educators in training regarding these tools, considering the challenges they will face both in their immersion processes in practice and in their future professional role, is believed to constitute a contribution to the field of initial teacher education knowledge. The purpose of this study was to interpret and describe the perceptions of a group of pedagogy students on the use of ChatGPT as an assistant in a learning experience implemented during their training and on the implications of this AI tool in their future work context as teachers. In this context, applied research in teaching was conducted with a course on "Assessment of and for learning" comprised of 26 students from various pedagogy programs in their fourth year. A sequential mixed methodology was employed, collecting quantitative data initially, to then delve deeper into the analysis based on qualitative data. For this, students were first asked to complete a questionnaire on prior knowledge and experiences with the use of ChatGPT. Subsequently, considering the results, work in class focused on two central themes: the drafting of prompts and academic integrity. Then, the workshop, its phases, and the students began working with the assistance of ChatGPT. Feedback sessions on the workshops were held, followed by the application of a semi-structured questionnaire with open-ended questions aimed at gathering information on student perceptions based on this experience and the implications of AI as future teachers. The data collected were analyzed based on codes and the development of categories. A focus group with 12 student representatives was later conducted to promote reflection and critical analysis among students on the implications of artificial intelligence in their future professional teaching performance. The extracted data revealed new codes and explanatory categories

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of the phenomenon under study. From the qualitative phase, 4 categories and emerging themes were identified, such as "Advantages of using ChatGPT as an assistant in the training of university pedagogy students", within which students expressed a positive valuation of the experience, highlighting the assistance of the chatbot during the workshop through various functions such as helping to justify or provide conceptual support to the evaluation criteria they were developing, proposing ideas for assessment situations, and receiving guidance or feedback quickly on their work. Additionally, a second category grouped the risks associated with using the chatbot, such as the possible lack of rigor or reliability of the information it provides, or the misuse of these tools through plagiarism. Other categories reported on student perceptions regarding their future professional teaching performance, with emerging themes such as the importance of teacher training and mediation when integrating these tools into learning processes with their students, ethical implications, and the need to transform assessment methods in schools to promote the development of critical thinking, information analysis, and creativity, so that AI tools can be a real support for students and not a threat. Finally, students highlighted the importance of working with these tools from the beginning of their training with the mediation of a teacher and a specialist in these new information technologies.

**Keywords:** pre-service teacher, ChatGPT, critical thinking, academic integrity, artificial intelligence (AI), students' perceptions, pedagogy

## 1. Introduction

In the realm of teacher education, the integration of innovative technologies has emerged as a central focus to enhance pedagogical practices and prepare future educators for their roles in secondary schools. ChatGPT, as a sophisticated language model, has garnered significant attention for its advanced natural language processing capabilities and its promising applications in higher education. This paper presents the findings of ongoing research conducted with a group of teacher education students in Chile, specifically focusing on the integration of ChatGPT as an assistant in a contextualized learning experience linked to the students' practicum processes, exploring ChatGPT's transformative potential as a teaching tool for pre-service teachers (Kerneza, 2023). In summary, the purpose of this research was to interpret and describe the perceptions of a group of students regarding the use of ChatGPT as an assistant in a learning experience implemented during their training and on the implications of this AI tool in their future work context as teachers.

By synthesizing existing literature and empirical evidence, this study aims to contribute to the effective and ethical integration of ChatGPT in higher education, with a particular emphasis on preparing pre-service teachers to leverage the opportunities presented by AI technologies and guide students in developing information analysis, discrimination, and critical thinking skills, through responsible use of ChatGPT during

their training and in their future professional performance (Kreinsen & Schulz, 2023). For teachers to integrate AI technologies into their teaching, they need to have the skills and experiences to do so, serving as a basis for developing professional competencies for the use of new artificial intelligence technologies. Given these new challenges, there is a limited and scarce number of studies that address the training of future teachers in this area and that have carried out experiences within which concrete student interactions with AI are promoted, as well as critical reflection on its responsible and ethical use (Tunjera & Chigona, 2023).

This article hopes to contribute to the currently available literature on the topic, from the South American context, providing valuable insights from the voice of students as active participants in the ongoing exploration of ChatGPT within university classrooms in Chile, with a specific focus on understanding its impact on teacher training before service and their future performance as educators in secondary schools. This study seeks to contribute to the effective and ethical integration of ChatGPT in higher education, with a particular emphasis on preparing pre-service teachers to seize the opportunities presented by AI technologies and guide students in developing critical thinking skills, through responsible use of ChatGPT in their studies (Kerneza, 2023).

In this context, it is of utmost importance to effectively train pre-service teachers in the university environment to seize the opportunities presented by ChatGPT, while also equipping them to navigate and mitigate the associated risks (Holmes *et al.*, 2021). By exploring the impact of ChatGPT on teacher education, this study intends to empower future educators to excel in their roles in secondary schools and guide students on how to leverage ChatGPT to enhance their studies and foster critical thinking skills.

The use of ChatGPT in higher education offers various opportunities, ranging from providing writing assistance and personalized guidance to enhancing student engagement and motivation (Rudoph *et al.*, 2023). The integration of ChatGPT presents a unique opportunity for pre-service teachers to refine their teaching practices, develop innovative teaching strategies, and prepare students for the digital age by incorporating AI technologies into the learning process (Floridi & Chiriatti, 2020).

However, the integration of ChatGPT in educational settings also raises critical ethical considerations and challenges, particularly in the context of pre-service teacher training (Sullivan *et al.*, 2023). Concerns about academic integrity, plagiarism, and the responsible use of AI technologies underscore the importance of establishing clear guidelines and ethical implementation strategies tailored to the needs of future educators (Gordijn & Have, 2023). Ensuring the reliability and credibility of AI-generated content is paramount to fostering a conducive learning environment for both educators and students (Xiao & Yi, 2020).

This study was conducted in the context of participation in an "AI Learning Community" convened by the Teaching Improvement Unit dependent on the academic vice-rectorate of the Pontifical Catholic University of Valparaíso, which involved teachers from different careers and during a semester we worked reflecting, analyzing, or conducting some practical experiences in our subjects that would serve as a basis to

address this topic at the university. The first progress of this work was presented within the community, allowing us to receive feedback from other academics that enabled us to adjust subsequent actions or add instruments to collect information after implementation. Subsequently, the preliminary results of this work were presented through an audiovisual format at the "Innovation Week for Training" organized by the university in the second semester of 2023.

The article is organized as follows: firstly, it contains a theoretical framework where the concepts and main theoretical discussions about the implications, risks, and ethical aspects that affect the use of AI in the university context and in the training of future teachers are reviewed; moreover, in the methodology section, the type of design, instruments, and participating subjects are presented, along with the different phases of the chatbot's integration into the learning experience with teacher education students. Then, the results are presented, organized from the techniques and instruments applied, first synthesizing the results of the prior knowledge questionnaire KPSI and then presenting the qualitative analysis of the questionnaire and Focus Group, through the establishment of emerging codes and their subsequent grouping into categories that explain the phenomenon under study, in this case, the students' perceptions. Finally, the study derives the theoretical and practical implications of the research, also recognizing its limitations and proposing directions for future investigations.

## 2. Theoretical Background

### 2.1 History of Chatbots

ChatGPT, an evolution of chatbots, has garnered significant attention due to its advanced capabilities in natural language processing (NLP) (Bains, 2023). It stands out for features such as accessibility, personalization, conversational format, and cost-effectiveness (Rahman & Watanobe, 2023). Developed based on models like GPT-3 with a vast number of parameters, ChatGPT has shown promise across various fields such as medical education, CAD design, radiology, and computational social systems (Gilson *et al.*, 2023; Nelson *et al.*, 2023; Lyu *et al.*, 2023; Wang *et al.*, 2023). Despite its strengths, ChatGPT has limitations, including occasional issues with narrative coherence as noted by Gilson *et al.* (2023), and the lack of patient-specific information that may impact the credibility of the health information it provides (Davis, 2023).

The technology utilized in ChatGPT, particularly its ability to generate human-like responses and understand natural language cues, has positioned it as a valuable tool across diverse applications (Mei *et al.*, 2022). Its potential extends to fields such as education, research, critical care, and even architectural design (Wardi *et al.*, 2023; Koehler, 2023). ChatGPT's role in improving clinical workflows, providing readable health information, and assisting in decision-making processes underscores its significance in modern AI applications (Fatani, 2023; Chen *et al.*, 2021). Moreover, the evolution of chatbots like ChatGPT reflects the broader trend of AI redefining customer

experiences and interactions across various industries (Nirala *et al.*, 2022; Levene & Wooldridge, 2023).

As AI technologies continue to advance, the responsible deployment of extensive language models like ChatGPT is crucial (Li *et al.*, 2023). Ethical considerations, social implications, and the design of these technologies need to be proactively addressed to ensure their reliable and beneficial integration into society (Li *et al.*, 2023). Ongoing research and development around ChatGPT highlight its potential to revolutionize how information is processed, disseminated, and utilized across different domains (Wang *et al.*, 2023).

In conclusion, the evolution of ChatGPT represents a significant milestone in AI development, showcasing the power of extensive language models in transforming various sectors. While its capabilities are impressive, ongoing research is essential to address limitations and ensure ethical and responsible use in the ever-evolving landscape of artificial intelligence.

### 2.2 AI Challenges in Higher Education and Future Teacher Training

The challenges posed by Artificial Intelligence (AI) in higher education and in the training of pre-service teachers are multifaceted. AI applications in education, such as personalized learning, automated grading, virtual tutoring, and learning analytics, offer significant benefits but also raise ethical concerns (Akgün & Greenhow, 2021). Pre-service teachers need to be aware of the implications of AI in education, especially in subjects like science and mathematics (AlKanaan, 2022). The shift to online learning during the COVID-19 pandemic has highlighted the importance of preparing pre-service teachers for online teaching and learning (Ogbonnaya *et al.*, 2020). Additionally, the need for more training in special education for pre-service teachers is well-documented, emphasizing the importance of inclusive education (Diamantouros, 2021; Schwab *et al.*, 2021).

Furthermore, integrating service-learning into teacher training programs can expose pre-service teachers to real-world challenges and complexities, enhancing their understanding of community needs (Pazilah *et al.*, 2021). The shift to online teaching during the pandemic has underscored the importance of multiple platforms to enhance accessibility and support for online learning for pre-service teachers (Tunjera & Chigona, 2022). Moreover, preparing future teachers, particularly in terms of technological integration skills and competencies, plays a crucial role in addressing the challenges faced by novice teachers (Kozikoğlu & Senemoğlu, 2021; Haseski, 2020).

In conclusion, addressing the challenges posed by AI in higher education and in pre-service teacher training requires a comprehensive approach that includes ethical considerations, awareness of AI implications, preparation for online learning, training in special education and inclusive practices, exposure to real-world challenges through service-learning, and the development of technological integration skills and competencies among pre-service teachers. By equipping pre-service teachers with the necessary knowledge and skills, teacher training programs can better prepare them to navigate the evolving landscape of education in the digital age.

### 2.3 Digital Literacy and Teacher Mediation

Digital literacy is a crucial aspect of education, especially in the context of using artificial intelligence (AI) in secondary schools. Teachers play a key role in mediating digital literacy skills among students. Research has shown that teachers' digital literacy positively impacts student learning outcomes (Setyawan *et al.*, 2022). Teachers with high digital literacy skills can effectively create and provide learning experiences using digital media, enhancing student engagement and collaborative learning (Sogalrey *et al.*, 2022). Additionally, teachers' digital literacy has been linked to improved teaching performance (Setyawan *et al.*, 2022).

In the era of Industry 4.0, English teachers are expected to possess high digital literacy skills to meet the needs of digital native students (Liza & Andriyanti, 2020). Studies have emphasized the importance of integrating digital literacy into the school curriculum to prepare students for the digital age (Afrilyasanti *et al.*, 2022). Moreover, implementing digital literacy in vocational education aims to cultivate intelligent and characterful individuals through school literacy movements (Wahjusaputri & Nastiti, 2022).

Teachers' attitudes towards digital literacy are crucial in the educational context. Teachers' beliefs and practices regarding digital literacy in the English as a Foreign Language (EFL) classroom need further exploration (Cahyono *et al.*, 2020). Additionally, EFL teachers' preparedness for online instruction is influenced by their levels of digital literacy (Kailani *et al.*, 2021). It is essential for teachers to continuously improve their digital literacy skills to support innovative teaching practices (Baharuddin *et al.*, 2021).

In conclusion, teacher mediation in digital literacy is vital for the effective integration of AI in secondary schools. Teachers need to possess high digital literacy skills to create engaging learning experiences and improve student outcomes. Ongoing professional development and training programs are essential for enhancing teacher digital literacy and ensuring the successful implementation of digital technologies in education.

### 2.4 Academic Integrity

ChatGPT has attracted attention in academic circles due to its potential impact on academic integrity. While some scholars have expressed concerns about issues such as misinformation generation, bias, and privacy implications associated with ChatGPT (Firat, 2023), others have highlighted its potential in revolutionizing knowledge assessment, particularly in fields like medicine (Gilson *et al.*, 2023). ChatGPT's ability to mimic human responses using deep learning algorithms has been noted, making it a powerful tool for generating content similar to text written by humans (Fatani, 2023).

In the context of education, ChatGPT has been explored for its role in assisting with CAD design, providing disease prevention recommendations, and even potentially replacing traditional assessments in higher education (Tlili *et al.*, 2023; Nelson *et al.*, 2023). However, the use of ChatGPT in education raises important considerations for academic integrity and student learning (Sullivan *et al.*, 2023). It is crucial for universities to educate

students on the ethical use of tools like ChatGPT to promote critical thinking and responsible academic practices. As artificial intelligence applications like ChatGPT continue to advance, there is a growing need to address ethical challenges, transparency, and accountability in their implementation in educational settings (Holmes *et al.*, 2021; Akgün & Greenhow, 2021). The potential of AI, including chatbots like ChatGPT, to transform learning experiences and personalize education is evident (Xiao & Yi, 2020). However, ensuring that pre-service teachers are equipped with the necessary skills to navigate these technologies responsibly is essential (Haseski, 2020).

In conclusion, the emergence of ChatGPT has sparked discussions about its implications for academic integrity, knowledge assessment, and the future of education. While it presents exciting opportunities for innovation and personalized learning experiences, it also underscores the importance of ethical considerations, transparency, and proper training for educators and students in the responsible use of AI technologies.

**2.5 Implications for Assessment in Higher Education**

In the realm of redefining assessment and feedback in higher education, the integration of ChatGPT and similar AI technologies offers both opportunities and challenges. ChatGPT has been recognized for its potential to enhance personalized learning experiences, provide quicker and more regular feedback, and support knowledge assessment (Sullivan *et al.*, 2023). However, the emphasis on AI tools like ChatGPT, primarily as aids for improving task feedback and administrative tasks, rather than addressing concerns related to academic integrity, is notable (Sullivan *et al.*, 2023). This underscores the importance of carefully considering the broader implications of AI integration into educational assessment processes.

Moreover, the utilization of ChatGPT in medical education has shown promise in facilitating discourse in small groups and problem-solving activities (Gilson *et al.*, 2023). This application highlights the potential of AI technologies to revolutionize traditional educational approaches and enhance collaborative learning experiences. Additionally, ethical considerations surrounding the use of chatbots in education, including issues related to deception and honesty, underline the importance of ensuring responsible implementation and ethical use of AI tools like ChatGPT (Tlili *et al.*, 2023).

As the educational landscape progresses, the role of AI in assessment and feedback processes becomes increasingly crucial. While AI technologies like ChatGPT offer innovative solutions for improving learning outcomes and assessment practices, there is an urgent need to address ethical, pedagogical, and practical challenges associated with their implementation (AlKanaan, 2022). Ensuring transparency, accountability, and fairness when integrating AI tools into higher education assessment is essential for maintaining the integrity of educational practices and promoting effective learning outcomes.

In conclusion, the adoption of ChatGPT and similar AI technologies in higher education assessment has the potential to transform traditional approaches to feedback and assessment. By leveraging the capabilities of AI tools like ChatGPT, educators can

enhance personalized learning experiences, streamline assessment processes, and gain valuable insights into student performance. However, it is crucial to carefully consider the ethical implications, academic integrity concerns, and responsible implementation strategies to maximize the benefits of AI integration in higher education assessment.

### 2.6 Training Future Teachers in New Technologies

Training pre-service teachers in AI technologies is essential for preparing educators for the changing educational landscape. Research has highlighted the need for improved training in specialized areas such as special education (Diamantouros, 2021). Studies have also focused on assessing pre-service teachers' attitudes toward inclusive schooling, emphasizing the importance of adapting assessment scales to be inclusive of all students (Schwab *et al.*, 2021). Although service-learning is recognized as valuable for exposing pre-service teachers to future challenges, there is limited research in certain contexts, such as ESL teacher training programs (Pazilah *et al.*, 2021).

The rapid progress in AI technologies, demonstrated by tools like ChatGPT, necessitates a re-evaluation of teaching philosophies to effectively integrate these innovations (Tlili *et al.*, 2023). AI in education offers various algorithmic applications, including personalized learning systems, automated assessment tools, and facial recognition systems, to enhance student learning experiences (Akgün & Greenhow, 2021). Educators must adjust their teaching and assessment methods to successfully incorporate AI into the educational environment (Sullivan *et al.*, 2023).

Ethical considerations related to AI in education, such as transparency, accountability, and student privacy, require further exploration and consensus among educators and students (Holmes *et al.*, 2021). Integrating digital literacy into teaching practices has been shown to positively influence educators' beliefs and practices, underscoring the importance of technological training for teachers (Cahyono *et al.*, 2020). Additionally, digital literacy is crucial for educators in the digital age, emphasizing the need to be competent in using digital technologies for effective teaching (Liza & Andriyanti, 2020).

In conclusion, preparing pre-service teachers in AI technologies involves addressing specialized areas such as special education, fostering inclusive attitudes, and integrating service-learning experiences. Educators must adapt to the evolving technological landscape by responsibly incorporating AI tools, considering ethical implications, and enhancing digital literacy competencies to meet the demands of modern education.

## 3. Methodology

The present study employed a sequential mixed-methods methodology with a predominance of the qualitative-interpretative approach (Bamberger, 2012), which is most pertinent to the scope of the objectives. This approach allows for the analysis of participants' perceptions and experiences within a particular context or situation (Flick,

2004). In this case, it aligns with the purpose of the study, which seeks to interpret and describe students' perceptions regarding the integration of ChatGPT into higher education as an assistant and the implications of AI use in their future teaching roles within a workplace context.

The method corresponded to a case study, as it aimed to investigate a phenomenon within a specific context or group of students. In this instance, students from various teacher education programs who were enrolled in the "Assessment for and of Learning" course during the second semester of 2023 were examined. These students were in their fourth year and concurrently engaged in an intermediate practicum at schools or high schools, part of their training as future teachers. Thus, this group was considered of particular interest, as their diverse roles and experiences allow access to their perceptions on the use and impact of AI in the educational context from their perspectives as students in training and as future teachers.

This methodological approach enables analysis and proposals based on empirical data, such as participants' discourse captured in texts or expressed in a group discussion. To this end, a questionnaire with open-ended questions was applied, and a group discussion was conducted at the end of the experience to gather students' perceptions of their experience using ChatGPT as an assistant for developing the workshop proposed in the course.

An open-ended questionnaire was designed based on central themes suggested in previous studies to address students' perceptions during a practical experience with the use of chatbots as an assistant. To ensure the content validity of the questionnaire, an analysis of literature reviews and similar previous research was conducted, from which the following central themes were identified: students' knowledge about chatbots, previous experiences with these tools, and the types of uses students make of ChatGPT during their university training (Deng and Yu, 2023; Kelly *et al.*, 2023; Limna *et al.*, 2023; Shoufan, 2023). These themes were used to guide the construction of the prior knowledge questionnaire (KPSI), which was then validated by expert judgment, one research specialist and another academic in the field of assessment. This review allowed for changes or adjustments to the clarity of some statements and their formulation.

Moreover, this study was designed based on the principles and suggestions of the "Guidelines on the use of artificial intelligence and ChatGPT" published by UNESCO in 2023, which posits that ChatGPT can perform different functions when integrated into the teaching and learning process, enhancing students' learning experience (UNESCO, 2023). Therefore, it was used for planning and implementing this experience in a workshop considered central, as it covers the course's learning outcomes regarding students' competencies in the assessment area to design criteria, assessment situations, and instruments that will later be applied in practical interventions they are conducting during that semester.

### 3.1 Planning and Implementation Stages

#### 3.1.1 First Stage

The experience was designed, and in the first week, it was presented to students, inviting them to participate actively. The objectives were presented, and each of the phases was explained, as well as the workshop in which ChatGPT was integrated as an assistant. This workshop responded to a central learning outcome in the development of the course's competencies and consisted of formulating evaluation criteria with their quality levels or standards, which served as the basis for proposing assessment situations and designing evaluation rubrics. These would later be implemented in their practice centers in a real context after the final review by the teacher.

It is important to note that before this workshop, an activity was conducted in class where students were explained the formulation of evaluation criteria from objectives and cognitive skills for an initial formative experience. After this activity, they received feedback from the teacher and assistant both in writing for each of their works through the course's virtual classroom and orally as a summary with the entire course group, highlighting the achieved aspects and how they could improve the proposed evaluation criteria. Therefore, students had prior knowledge about how to formulate criteria, which was very important so that in the workshop with ChatGPT, students could propose quality evaluation criteria and discriminate the information received from the chatbot.

Before starting the workshop, the Knowledge and Prior Study Inventory (KPSI) questionnaire published in 1977 (Young & Tamir, 1977) was applied. Since then, it has been updated and widely used in different areas of knowledge and student training. In 2014, Tamir published a new article referencing the use of this instrument in various projects and research for over 15 years. In some of these studies, its reliability and validity as a self-assessment instrument have been determined. However, it also allows teachers to collect information about students' prior knowledge of a topic or skill that will be addressed during a course (Tamir, 2014).

This instrument enables teachers to collect valuable data regarding students' perceptions of their own understanding before starting a specific topic in the course. On the one hand, it facilitates students' autonomous reflection on their prior knowledge, and on the other, it provides faculty with a basis to adjust teaching strategies to optimize the pedagogical process or intervention. For the purposes of this study, it was used at the beginning to collect information about students' prior knowledge and experiences they may have had based on ChatGPT, thus adjusting the design of the innovation.

Students were asked to indicate their level of prior knowledge on certain academic contents using a scale that varies in complexity, offering options of five or four levels of self-evaluation. The questionnaire designed for this study was developed with a set of 10 statements and a scale from 1 to 4, where level 1 indicates the least prior knowledge about the topic to be discussed, and 4 the highest, according to the level of knowledge and experience with the Chatbot. These statements were organized into three categories that responded to the prior analysis of literature and other research on the use of chatbots in the context of higher education. The categories were: knowledge about AI, uses and

experiences with AI tools, and perceptions regarding the use of AI tools. The data about the students were limited to determining the teaching career or specialty they were studying, as the purpose in this phase was to inquire into the prior knowledge of all students, regardless of their background.

In this first phase, a couple of class sessions were also spent analyzing and discussing the implications of using ChatGPT, such as the risk of using personal data in interaction, potential biases in the information, and the relevance of academic integrity when working with AI tools, reinforcing the work that has been carried out at the university transversally in all subjects regarding training students in this very important ethical aspect. To address these topics, a section of the UNESCO guide text on "Challenges and Ethical Implications" was shared with students to analyze the following proposed topics: academic integrity, data protection, cognitive biases, and equity in accessibility (UNESCO, 2023, pp 11-12).

### 3.1.2 Second Phase

In the second phase, a detailed explanation of the workshop was given during a class session, followed by its corresponding publication in the course's virtual classroom. In this workshop, students were asked through a guide with directions and a predefined format to formulate evaluation criteria based on the curriculum of their specialty, the objectives and skills declared for the level or course in which they will develop their practice. Based on these criteria, they had to propose an evaluation situation and instruments. They were also informed about the formative submissions of their work, in which they submit an initial state of progress through the virtual classroom to receive feedback. Subsequently, they make a final improved submission, and from that moment, they can apply the evaluation situation in their practice center with the high school students where they are conducting their practicum. It is noteworthy that during the work sessions, the criteria by which their work would be evaluated were also communicated to the students.

In the process of working on this workshop, which lasts approximately 1 month with 2 weekly class sessions, the use of the chatbot as an assistant to support different activities was intended, such as refining the formulation of the evaluative criteria proposed by the students, requesting theoretical information about the criteria, but contextualized in the discipline, and requesting feedback on their proposals for evaluation situations. Likewise, students were encouraged to research and experiment autonomously with other potential applications of the chatbot, always framed within the activities of the workshop. This pedagogical strategy not only seeks to enrich the students' learning experience using advanced educational technologies but also to foster a proactive and exploratory attitude towards learning, essential characteristics in the field of higher education. Students were also asked to take notes on the experience of interacting with the chatbot for future evaluation of the experience.

### 3.1.3 Third Phase

To conclude, once the students finished their workshops and uploaded them to the virtual classroom to receive feedback, a brief questionnaire with open-ended questions was applied to collect information about the students' perceptions and experiences using the chatbot as an assistant in a real learning experience. The questionnaire was applied in person to ensure students' responses during a class session.

The questionnaire was also developed based on the review of literature, focusing on the criteria considered when inquiring into students' perceptions of AI, but this time focused on the experience of using chatbots as an assistant during the workshop conducted in the subject. To ensure the content validity of the questionnaire, a matrix was constructed based on the objective and the criteria selected from the literature review. Subsequently, a validation by expert judgment was conducted based on the clarity, relevance, and pertinence of the questions, and minor modifications were suggested regarding their formulation or wording.

**Table 1:** Questions & Categories

| Nr. | Question | Statement Categories |
|---|---|---|
| **Q01** | The characteristics and functions of ChatGPT as a virtual assistant for students in the university context. | Knowledge |
| **Q02** | Distinguish different AI tools, with respect to their characteristics and functions. | Knowledge |
| **Q03** | The use of ChatGPT, understanding its operation, and how I can use it as an assistant in my student training. | Experience & Use |
| **Q04** | The relevance of formulating questions or prompts so that the chatbot works efficiently and meets the requirements. | Experience & Use |
| **Q05** | The core characteristics of prompt formulation, such as: determining a clear purpose, a particular context or case, defining an audience, delimiting the topic, personalizing or asking it to play a role, among others. | Experience & Use |
| **Q06** | The search and information analysis strategies that ensure the reliability of the information provided by the chatbot or other AI tools. | Experience & Use |
| **Q07** | The challenges of using information from ChatGPT in assignments because it can deliver imprecise or unrealistic data (hallucinations). | Student perception |
| **Q08** | The risks regarding the use of data and information from people interacting with chatbots. | Student perception |
| **Q09** | The importance of ethical principles and academic integrity declared by the university for handling information and using any AI tool. | Student perception |
| **Q10** | The challenges that AI tools pose in teacher mediation and in our future teaching role. | Student perception |

Once the questionnaire implementation was concluded, a script for a Focus Group was developed, incorporating two of the key themes addressed in the previously used instrument. This Focus Group also aimed to promote participation and critical reflection among students on the various topics discussed during the experience and on their future professional performance as teachers with the advent of AI in the educational context.

For this purpose, a segment was introduced in the focus group where a text with quotes was presented, and a discussion about the impact of artificial intelligence on student learning processes in secondary schools was initiated. Various questions were raised about the role of the teacher as a facilitator or mediator in these educational processes.

For the application of the Focus Group, students were invited to participate in the last class session of the semester, ensuring the reliable and anonymous treatment of data, both from the recording and in the transcription. Participants could be representatives of the pairs that participated in the experience and who had carried out their practical immersion in an educational center during the semester. Finally, the Focus Group was conducted with 12 students and was recorded with the students' consent. The objectives or purposes were reminded, and the forms of interaction in participation were explained. To safeguard the process and ensure greater confidence from the students, the accompaniment and mediation of a teaching assistant from a higher course, who belonged to one of the careers taking the subject that semester and who, being in the process of completion, had already taken other courses related to educational research, was requested. Therefore, she could contribute to this process.

## 4. Results

The analysis of the results was conducted rigorously to respond to the research objective and in coherence with the central themes addressed in the theoretical framework regarding university students' perceptions of AI use. The validation of the findings was achieved through the data triangulation process from the different techniques used.

The organization of the analysis and presentation of the main findings were structured based on the research phases. Therefore, the descriptive statistical analysis of the KPSI will be presented first, along with the didactic changes and adjustments made to the design and subsequent intervention. Subsequently, the qualitative data analysis and the results of the questionnaire applied in the second phase will be presented, showcasing the students' perceptions of using the chatbot as an assistant in their learning process based on the conducted experience. Finally, the qualitative results of the Focus Group will be disclosed.

### 4.1 Prior Knowledge and Student Experience in Using ChatGPT (KPSI)

An analysis of the data combined the values obtained from the KPSI and the categories defined for each of the questions. A descriptive statistical analysis was then conducted with the following results:

#### 4.1.1 Knowledge Category

Questions:

**Q01:** Characteristics and functions of ChatGPT as a virtual assistant for students in the university context.

**Q02:** Distinguishing different AI tools, regarding their characteristics and functions.

#### 4.1.1.2 Insights

Focusing on the fundamental knowledge of AI tools, the moderate level of agreement (average response approximately 3.02) suggests that respondents have a relatively solid understanding of the characteristics and functions of AI tools. This area appears to be a strength among respondents, though there is still room to deepen this knowledge, particularly in understanding various AI tools and their specific applications in educational contexts.

### 4.1.2 Experience and Use Category

Questions:

**Q03:** Using ChatGPT, understanding its operation, and how I can use it as an assistant in my student training.

**Q04:** The relevance of clearly formulating questions or instructions when interacting with AI tools like ChatGPT.

**Q05:** Fundamental characteristics of formulating instructions for effective interaction with AI tools.

**Q06:** Search and information analysis strategies that ensure the reliability of the information provided by the chatbot or other AI tools.

#### 4.1.2.3 Insights

This category, which had the lowest average response (approximately 2.66), underscores a significant gap between theoretical knowledge and practical application. It highlights a critical area for improvement, showing that, although respondents may understand AI concepts theoretically, they feel less confident in their practical application. This suggests the importance of integrating more practical experiences and real-world scenarios into learning pathways to enhance practical skills and confidence in the effective use of AI tools.

### 4.1.3 Student Perception Category

Questions:

**Q07:** The importance of ethical principles and academic integrity stated by the university for information handling and the use of any AI tool.

**Q08:** Challenges that AI tools pose in faculty mediation and our future role as teachers.

**Q09:** Perceptions of the impact of AI on the future of education and the teaching profession.

**Q10:** Student views on the integration of AI tools within educational environments and their potential to enhance learning.

#### 4.1.3.1 Insights

Maintaining the highest average response (approximately 3.37), this category reflects a strong agreement or positive perception regarding ethical considerations, challenges, and the potential of AI in education. This suggests that respondents are particularly aware

and optimistic about the broader implications of AI, its ethical integration, and its transformative potential in educational settings.

The analysis highlights the disparity between theoretical knowledge and practical application among respondents. It emphasizes the need for educational strategies that not only enhance understanding of AI tools but also focus on developing practical skills and confidence in applying these tools in real-world contexts. This approach will better prepare students to effectively leverage AI technology in their future academic and professional lives, ensuring they can navigate the evolving landscape of AI in education. During the same week, based on the results, two types of activities were conducted in a session: writing prompts, as several students were unfamiliar with this topic. Therefore, suggestions for drafting them were presented, and examples were illustrated in a presentation. Subsequently, students practiced different assignments by asking the chatbot to propose evaluation criteria for a specific assessment situation or to contribute feedback to the criteria they had previously developed formatively or as a proposal.

### 4.2 Qualitative Data Analysis

#### 4.2.1 Survey Analysis

We present the results according to the study's objective, which sought to interpret and describe students' perceptions of using ChatGPT as an assistant in a contextualized learning experience during their training and the implications of this AI tool in their future work context as teachers.

To work with the data, students' responses from the open-ended questions of the questionnaire and the Focus Group were transcribed to process the units of analysis and establish codes with the support of Atlas.ti software.

The analysis was carried out using qualitative content analysis. Following the phases of this procedure, emergent codes were first raised from the students' discourse, both written and oral, considering first the questionnaire data and then the Focus Group data. To give greater rigor and validity to the analysis process, the initial coding was done in parallel by the researcher in charge of the study and the research collaborator independently. Subsequently, a meeting was held in which both codifications were reviewed and discussed, and the coding process was reviewed together to achieve the reduction of codes.

Based on the set of established codes, the interpretation process was carried out seeking to establish patterns, themes, and connections among the codes to later group them into central categories. Thus, categories were first raised for the questionnaire and then for the Focus Group. Considering the scope of the study, codes of a descriptive and explanatory nature of the phenomenon under study were worked with, seeking to establish the students' perceptions representing the richness of their dual perspective, their perceptions as students in training, and, as future teachers, an experience they were living in their practicum processes.

First, we will present the main findings and categories raised in the questionnaire, focusing on the students' perceptions as university students in the context of the experience they have had in the subject using the chatbot.

Below are the analysis categories with their respective codes.

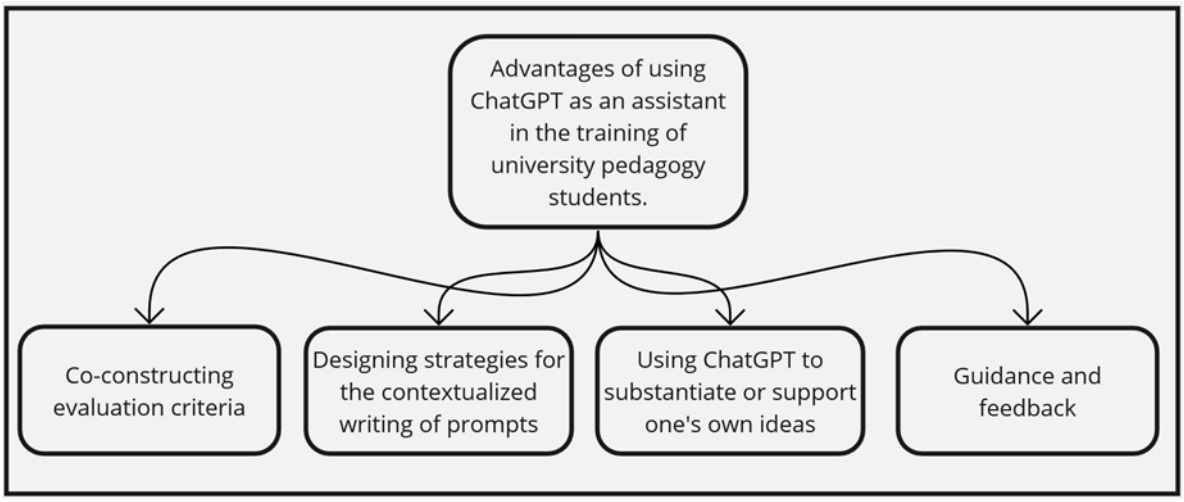


**Figure 1:** Questionnaire: Category 1 and their related codes

Students perceived positive aspects of interacting with the chatbot as its assistance and guidance to co-construct evaluation criteria with their respective quality levels and/or propose situations or forms of assessment. Most students stated that it had been useful to refine, delimit, or establish quality standards for the criteria they had previously set or had as a preliminary proposal. In this context, they also used it to support their own ideas or proposals for assessment situations for the courses they were working with in practice centers, giving the chat a personalized role and clear and specific information about the context, objectives, and evaluation criteria they were working on. In this sense, they expressed the relevance of using strategies to draft prompts with as much contextual information as possible and clearly directing the type of response or information being requested.

Some participants stated the following:

> *"We first focused on how ChatGPT operates, the more detailed and more information we provide, the better its response will be. With this in mind, we gave it parameters and guided it by giving it an identity, for example: You are a teacher of children aged 12 to 13 years old, working in a private school in Chile and teaching music, aiming for students to be able to perform some musical pieces... You have extensive experience working with neurodivergent students, based on this, what would you consider when developing an assessment situation?"* (questionnaire/pair 3).

> *"We used it to provide conceptual support to our criteria, definitions, or delimitations from different authors or music specialists, to help us set the quality of the criteria and the levels or standards, because evaluating 'musical performance' in primary is not the same as in a*

*higher course" and it gave us a definition from different authors that served our work, after that we defined three to four criteria that we used to develop a rubric."* (questionnaire/pair 1).

*"We asked for references to better formulate the criteria we had already created based on a taxonomy of skills centered on mathematics, to assess the use of the drafting of notable products and then their development in algebraic expressions. It provided us with a list of verbs associated with skills or aspects to evaluate, with that we reinforced the evaluation criteria and then asked it to propose situations in which the notable products must be applied concretely or in everyday life, for an assessment of students."* (questionnaire/pair 2).

*"Another function highlighted by the students was the guidance and feedback the chatbot provided on their work, having a constant assistant during the workshop to whom they could ask questions, request to review the progress of their work, and ask for quick feedback contributed to the development of their work in its first phase, as after the formative submission, they always have a feedback space with the assistant and teacher. For example: "Sometimes you need an external viewpoint when you're doing work that's neutral, ChatGPT can be that and support or criticize or suggest improvements to the work"."* (questionnaire/pair 6).

However, at this point, it is worth noting that while the AI's support or feedback to improve student work was valued, they also stated that it could not replace the guidance and feedback of the teacher, as being a specialist in the subject and due to their expertise, they can make more focused comments on some aspects of the student's work, which for the chatbot might go unnoticed:

*"It served us to have an external look at the criteria and the assessment situation we had proposed, and we asked it to provide feedback on our work, even to improve more formal things like the clarity of the evaluation instructions, and with that, we saved time, we focused on adjusting the quality levels of our rubric which is the most difficult, but when the teacher and assistant gave feedback on the rubric, they were more demanding and focused on the differences between the various performance levels, that's why we believe, it cannot replace the feedback of the teacher as a specialist in their area."* (questionnaire/pair 4)

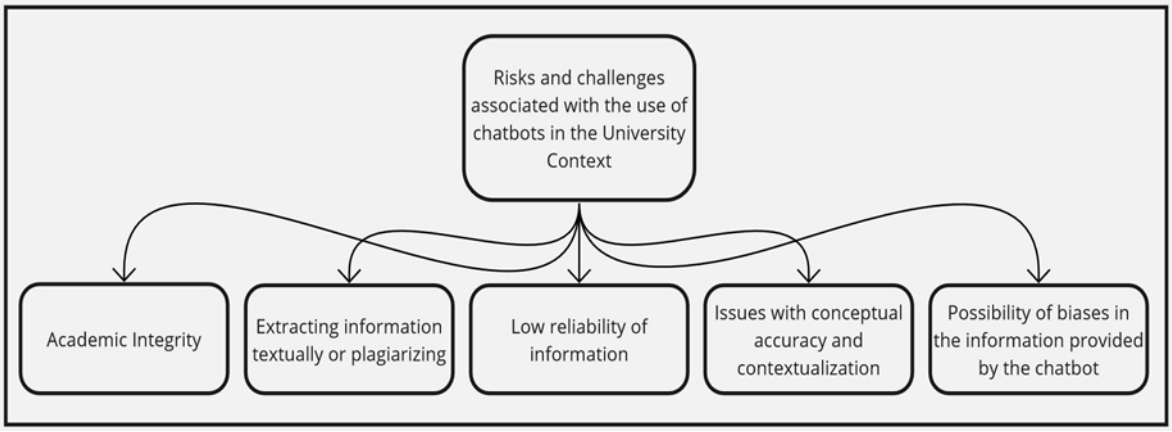


**Figure 2:** Questionnaire: Category 2 and their related codes

The main challenge for students when using AI tools as assistance for their work is to always keep academic integrity in mind, and the rules regarding plagiarism or other aspects of authorship that govern university activities. For this reason, they stated that these tools should always be used as support and accompaniment, but not to replace the students' work during their university training.

Students also expressed the risk of potential inaccuracy and unreliability of the information provided by the chatbot, as the data could be imprecise or result from hallucinations, which is widely documented for this type of tools. However, this issue was analyzed before the experience, so the students knew it was necessary to review and contrast the information delivered by ChatGPT. Regarding the context, they considered that the chatbot might issue responses that are not relevant to the conditions and characteristics of the student group at the practice center where they must apply the assessment situation:

> *"Not knowing how to classify, critique, or confirm the information provided by the chatbots, students can end up with imprecise information or with non-existent sources or poorly made references."* (questionnaire/pair 5).

> *"Using inaccurate or biased content thrown by ChatGPT or outdated information since the free version does not have internet access to update information."* (questionnaire/pair 7).

> *"We believe it is a very useful tool, but it depends on how it is used because it is still easy for students to copy things verbatim and fall into plagiarism. At least in our discipline, the fear of these tools is not something new; there was a time against calculators, now against apps that solve exercises connected with AI."* (questionnaire/pair 5).

### 4.2.2 Focus Group Analysis

In this second part, we present the categories extracted from the analysis of the Focus Group transcript. This technique aimed to promote critical reflection among students and

gather information on some relevant topics presented in the questionnaire that require more critical analysis. Group discussion mediated can promote dialogue and problematization on new topics or emerging scenarios, such as the advent of AI in the educational field. In line with the purpose of this study, the discussion focused on the students' perceptions from their future teaching role, considering that they have had practical interventions during the semester that could influence their perspectives.
From the analysis, 2 central categories were raised with their respective codes:

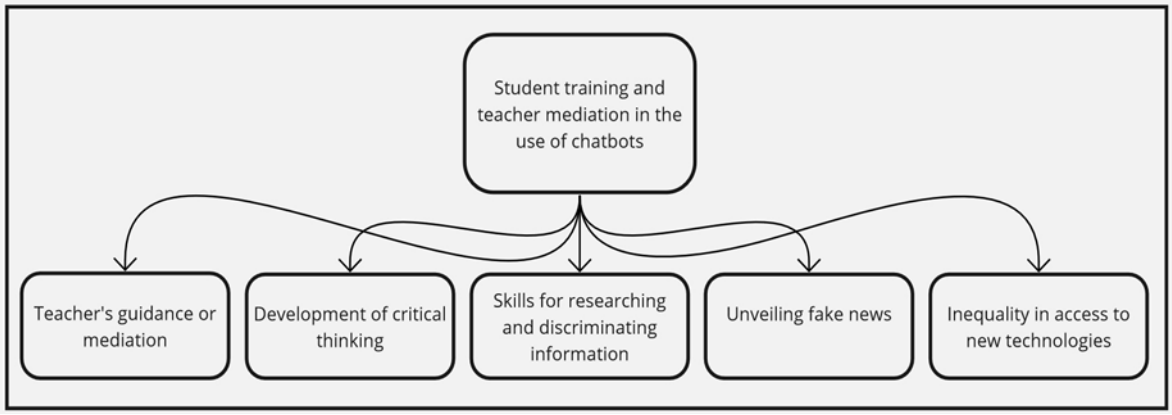


**Figure 3:** Focus Group - Category 3 and their related codes

Students or future teachers proposed that the teacher's role as a mediator in training and guiding students is essential for the development of research skills and analysis of the information provided by tools like ChatGPT, teaching them to discriminate between reliable sources or data that can be used responsibly. This educational process must foster skills involved in critical thinking, such as analysis, synthesis, and problematization of different topics addressed in school and generate spaces for critical reflection on the implications of AI and how to use the available knowledge to prioritize skills that help students to innovate or create based on the critical use of this foundational knowledge. Furthermore, future teachers expressed the importance of analyzing and debating with students the use of fake news to influence public opinion on various social and political issues so that young people are aware of the ways of circulation, production, and use of information in new technologies.

Among the aspects that could influence the mediation that a teacher can carry out to educate students from a critical perspective on the use of these tools is the inequality or lack of equity in access, which creates a digital divide, manifested in the lack of internet access in some schools or the absence of connectivity in many students' homes. This situation can limit their opportunities to explore and use AI technologies. This condition jeopardizes the principle of equity in education, as it prevents all students from having the same opportunities to learn about technologies that are impacting the future of society and the labor context:

*"If AI is used without guidance or mediation, it could cause students to lose important skills such as research, selecting information, discriminating, and critical thinking."* (E1/Focus Group).

*"That's why I think teachers first must educate students to be aware of the benefits and risks of AI. Also, prepare them to be critical of the information they find online, check their sources, for example, we all know that fake news exists and influences public opinion, and perhaps a debate on that with students could motivate them to critically reflect."* (E2/Focus Group).

*"I think it's important that high schools or schools, teachers, and administrative teams work together to create some ethical framework or guidelines for the use of AI and share them with students and teachers explain their importance so that they can have responsible use."* (E3/Focus Group).

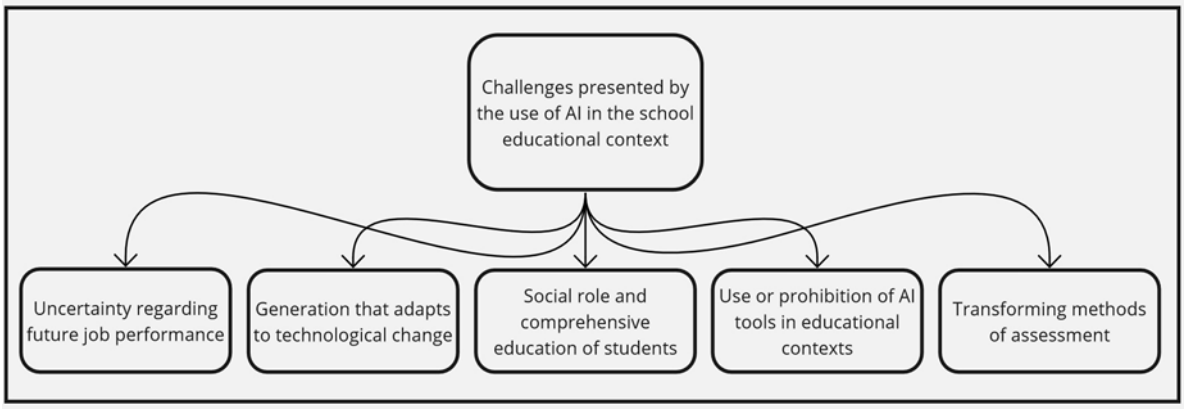


**Figure 4:** Focus Group - Category 4 and their related codes

Students expressed their concerns regarding future educational scenarios in which they will have to function as teachers and interact with the rapid advancement of artificial intelligence. Furthermore, students were already facing this reality in their practicum processes and in the schools where they were carrying out practical interventions that semester. In some schools, teachers prohibited its use, while in others, this issue was just beginning to be discussed, especially regarding how to proceed with assessments like research papers or others that were assigned to students to complete at home without school supervision. Most of the students who participated in the group discussion agreed that prohibition was not the best way to address this issue; strategies were, firstly, to educate and train students, and secondly, to modify assessment methods. In this regard, one student explicitly stated:

*"We must transform the way of assessing; we cannot continue assessing in a reproductive manner or in mathematics with a set of routine exercises or problems. We need to design assessments that promote mathematical thinking and reasoning in different situations, which are close to the students' everyday problems."* (E8/Focus Group).

Another student on the same topic stated:

> *"The teacher must give meaning to the assignments or tasks, in which students have to analyze, solve problems, contrast different viewpoints, be more critical, and there the use of chat or other tools can be enhanced, so students benefit from ChatGPT as a support in the foundation of ideas or responses."* (E9/Focus Group).

Regarding the future job performance of students, there is a growing uncertainty that pedagogy students face regarding their future professional performance because, while AI technologies can support new teaching and learning methods, they also raise fundamental questions about the teacher's role and their adaptability to a constantly changing professional field. During the group discussion, students discussed and analyzed the role of the school as a community regarding strategies and dispositions to work with AI, as well as the importance of teacher training in the use of these new tools for educational purposes. In this regard, one student proposed:

> *"We grew up in a constantly changing society where technology is increasingly present, and we have been adapting to it, so, in this case, with artificial intelligence, we would have to do the same, look for ways to work with it in the educational context with our students."* (E9/Focus group).

> *"I think it's important that high schools or schools, teachers, and administrative teams work together to create some ethical framework or guidelines for the use of AI and share them with students and explain their importance for the responsible use of these tools."* (E10/Focus Group).

To conclude the analysis, students highlighted the social role of the school as a space where students not only develop their cognitive but also social skills. The school is a privileged space to learn to live together in a democratic society and interact with others who think differently and come from different spaces, traditions, or cultures. For students, one of the central purposes of the school is to form well-rounded individuals, considering all their dimensions, who can collaborate and contribute to the society they are part of.

The fear of AI arises from various factors, as it can replace many tasks currently performed by humans, creating uncertainty:

> *"At first, I was worried, but then I thought that the school has many more functions that are very important, such as comprehensive training and the social interaction of a person, which cannot be replaced by AI."* (student 10/Focus Group).

## 5. Discussion

In this section, we discuss the main findings that emerged from the analysis of results concerning the central question of this research, which explored what are the perceptions of fourth-year pedagogy students who are enrolled in the assessment for and of learning course on the integration and use of ChatGPT as an assistant in a learning experience during their training and how they perceive the implications of this AI tool in their future professional teaching performance. Based on the main findings and the coding process carried out, we highlight the following broad dimensions: students' perceptions of the integration of AI as an assistant in an experience during their training and students' perceptions of the implications of AI in their future professional teaching in the educational context. Within each of these, the themes of the central categories will be presented in discussion contrasted with findings from other research presented in the literature.

The integration of Artificial Intelligence (AI) as an assistant in students' training experiences has elicited various perceptions and considerations among university students. The study revealed that students generally possess a solid understanding of the characteristics and functions of AI tools, indicating a strength in their knowledge base. However, there is a notable gap between theoretical knowledge and practical application, emphasizing the need for more practical experiences to enhance students' confidence in effectively using AI tools (Gilson *et al.*, 2023).

Furthermore, students expressed positive perceptions regarding the ethical considerations, challenges, and transformative potential of AI in education. This optimistic outlook suggests that students are aware of the broader implications of AI and its potential to enhance learning experiences. However, concerns were raised regarding the importance of maintaining academic integrity and the potential risks associated with the use of AI tools, such as the risk of inaccurate or unreliable information provided by AI tools like ChatGPT (Wollny *et al.*, 2021).

The Focus Group discussions highlighted the essential role of teachers as mediators in guiding students to develop critical thinking skills and responsibly use AI tools. Students emphasized the importance of analyzing and debating with students on issues like fake news to promote critical reflection and responsible use of information. Additionally, concerns were raised about the potential impact of AI on future educational scenarios and the need for teacher training to adapt to the rapidly changing professional field influenced by AI technologies (Tlili *et al.*, 2023).

In conclusion, the study's findings underscore the importance of balancing the advantages of AI tools with the risks associated with their use, particularly concerning academic integrity and information reliability. Teacher mediation, development of critical thinking skills, and ethical considerations are crucial in mitigating these risks and preparing students for future professional teaching roles in an AI-integrated educational context. The study highlights the need for ongoing teacher training and the development

of strategies to effectively integrate AI tools in educational settings while ensuring responsible and ethical use (Floridi & Chiriatti, 2020).

The results of the study on university students' perceptions of using ChatGPT as an assistant in their learning process revealed several key insights. The analysis showed that while students had a moderate understanding of the characteristics and functions of AI tools, there was a gap between theoretical knowledge and practical application. Students expressed the need for more practical experiences to enhance their skills and confidence in using AI tools effectively (Wollny *et al.*, 2021).

Furthermore, students perceived positive aspects of interacting with ChatGPT, such as its assistance in co-constructing evaluation criteria and providing guidance and feedback on their work. However, they also acknowledged that the tool could not replace the guidance and feedback of a teacher, especially in providing focused comments on specific aspects of their work (Wollny *et al.*, 2021).

Moreover, students highlighted challenges related to maintaining academic integrity when using AI tools and the potential inaccuracies in the information provided by ChatGPT. They emphasized the importance of using such tools as support and accompaniment rather than replacements for their work, and the necessity of reviewing and contrasting the information delivered by ChatGPT (Wollny *et al.*, 2021).

In the Focus Group analysis, students discussed the essential role of teachers in guiding students to discriminate between reliable sources of information and fostering critical thinking skills. They also raised concerns about the potential impact of AI technologies on future educational scenarios and the need to modify assessment methods to promote higher-order thinking skills among students (Wollny *et al.*, 2021).

Overall, the study underscores the importance of integrating practical experiences into educational strategies to bridge the gap between theoretical knowledge and practical application of AI tools. It also highlights the critical role of teachers in guiding students to use AI tools responsibly and develop essential skills for navigating the evolving landscape of AI in education (Wollny *et al.*, 2021).

The study on university students' perceptions of AI use found a discrepancy between theoretical knowledge and practical application among respondents. While students had a good grasp of AI tools' characteristics and functions, they lacked confidence in applying them practically. This emphasizes the necessity of incorporating real-world scenarios into learning to boost students' practical skills and confidence (Wollny *et al.*, 2021).

Additionally, students appreciated ChatGPT for aiding in developing evaluation criteria and offering guidance and feedback. Nevertheless, they raised concerns about maintaining academic integrity and the risks of inaccurate information from ChatGPT. Students stressed the importance of using AI tools as aids rather than substitutes, especially in upholding academic integrity and critically assessing information (Wollny *et al.*, 2021).

During the Focus Group analysis, students highlighted teachers' crucial role in helping them differentiate reliable sources and use AI tools like ChatGPT responsibly.

They also deliberated on the impact of AI in education, underscoring the significance of teacher training in leveraging these tools for educational purposes and establishing ethical guidelines for their responsible use. Students expressed worries about teachers' future roles in the AI field and the necessity to adjust teaching and assessment strategies to effectively utilize AI tools (Wollny *et al.*, 2021).

In summary, the study emphasizes the need to bridge the gap between theoretical knowledge and practical application of AI tools among students. It accentuates educators' critical role in steering students towards responsible AI tool use, upholding academic integrity, and adapting to the evolving AI landscape in education (Wollny *et al.*, 2021).

The results of the study on university students' perceptions of AI use in education revealed several key insights. The analysis showed that while students had a moderate understanding of the characteristics and functions of AI tools, there was a gap between theoretical knowledge and practical application (Wollny *et al.*, 2021). This highlighted the need for educational strategies to enhance practical skills and confidence in using AI tools effectively in real-world contexts. The study also found that students had a positive perception of the ethical considerations, challenges, and potential of AI in education, indicating optimism about the transformative potential of AI in educational settings (Wollny *et al.*, 2021).

The qualitative data analysis further delved into students' experiences with using ChatGPT as an assistant in their learning process. Students perceived positive aspects of interacting with the chatbot, such as its assistance in co-constructing evaluation criteria and providing guidance and feedback on their work (Gilson *et al.*, 2023). However, they also expressed concerns about maintaining academic integrity, the reliability of information provided by the chatbot, and the need for human guidance alongside AI support (Gilson *et al.*, 2023).

In the Focus Group analysis, students emphasized the essential role of teachers in guiding students to discriminate between reliable sources and fostering critical thinking skills in the use of AI tools (Tlili *et al.*, 2023). They also discussed the challenges and uncertainties surrounding the integration of AI in future educational scenarios, highlighting the need for teacher training and modifications in assessment methods to adapt to the evolving landscape of AI in education (Tlili *et al.*, 2023).

Overall, the study underscores the importance of bridging the gap between theoretical knowledge and practical application of AI tools in education. It emphasizes the role of educators in preparing students to navigate the complexities of AI technology while upholding ethical standards and promoting critical thinking skills for responsible AI use in educational settings. The findings suggest that a balanced approach that combines theoretical understanding with practical experience is crucial in preparing students for the future professional landscape where AI is increasingly prevalent in educational contexts.

The study on university students' perceptions of using AI tools, particularly ChatGPT, highlights the importance of bridging the gap between theoretical knowledge and practical application in educational settings. While students demonstrate a solid

understanding of AI tools' characteristics and functions, there is a significant need to enhance practical skills and confidence in utilizing these tools effectively (Gilson *et al.*, 2023). This emphasizes the necessity of integrating more practical experiences and real-world scenarios into educational strategies to better prepare students for leveraging AI technology in their academic and professional lives. Additionally, the research indicates that students view AI tools positively in tasks such as co-constructing evaluation criteria and providing guidance and feedback on their work (Gilson *et al.*, 2023). However, students also recognize the importance of upholding academic integrity and being cautious of potential inaccuracies and unreliability of information provided by AI tools like ChatGPT (Gilson *et al.*, 2023). This underscores the need for educators to instruct students on responsible use and critical evaluation of information obtained through AI tools. Moreover, insights from the Focus Group discussion underscore the essential role of teachers as mediators in guiding students to develop critical thinking skills and discern reliable sources of information when using AI tools (Gilson *et al.*, 2023). Students acknowledge the necessity of addressing issues like the digital divide and ensuring equitable access to AI technologies in education to prevent disparities in learning opportunities (Gilson *et al.*, 2023). Furthermore, there is a growing concern among students about the changing landscape of education with the integration of AI, highlighting the need for teacher training and adaptation to effectively incorporate these tools into teaching practices (Gilson *et al.*, 2023).

In conclusion, the study emphasizes the significance of balancing theoretical knowledge with practical application, promoting academic integrity, and preparing students and educators for the ethical and pedagogical implications of AI integration in education. By addressing these aspects, educational institutions can better equip students to navigate the complexities of AI technology and leverage its potential benefits while mitigating associated risks.

The integration of Artificial Intelligence (AI) in education presents both opportunities and challenges. While AI can enhance educational experiences and address instructional concerns (Akgün & Greenhow, 2021), it also raises critical questions about potential obstacles that may arise (Firat, 2023). One significant concern is the impact of AI, such as ChatGPT, on the development of critical thinking skills and the transformation of assessment methods in educational settings (Sullivan *et al.*, 2023). The use of AI, particularly in the form of chatbots, has the potential to revolutionize traditional assessment methods in higher education (Rudolph *et al.*, 2023). However, there are ethical considerations surrounding the use of AI in education, emphasizing the importance of responsible AI practices to ensure fairness, transparency, and accountability (Tlili *et al.*, 2023).

Moreover, the implementation of AI in education requires a framework that addresses ethical considerations (Holmes *et al.*, 2021). Establishing such a framework is essential but poses challenges that may require long-term efforts (Holmes *et al.*, 2021). Additionally, there is a need to raise awareness among educators, such as pre-service science teachers, about the implications of AI in education (AlKanaan, 2022). Ensuring

that AI technologies used in education are trustworthy and transparent is crucial to maintain integrity in educational practices (Levene & Wooldridge, 2023).

Furthermore, the use of AI, like ChatGPT, in educational assessments may introduce biases present in the training data, highlighting the importance of addressing bias in AI applications (Fatani, 2023). Additionally, the development of new technologies, such as AI-based plagiarism detectors, is essential to uphold the integrity of education and research (Rahman & Watanobe, 2023). As AI continues to advance, there is a growing need to address challenges related to data privacy, security, and model bias in various social systems, including education (Wang *et al.*, 2023).

In conclusion, while AI offers promising opportunities to enhance education, it is crucial to address challenges such as bias, ethics, and accountability to ensure its effective and responsible integration in educational contexts.

The results section of the study provides valuable insights into university students' perceptions of AI use, particularly focusing on their prior knowledge, experiences, and perceptions of using ChatGPT as an assistant in their learning process. The analysis revealed a disparity between theoretical knowledge and practical application among respondents, emphasizing the need for educational strategies that enhance both understanding of AI tools and practical skills in applying them in real-world contexts (AlKanaan, 2022).

The study highlighted that the students demonstrated a relatively solid understanding of the characteristics and functions of AI tools, indicating a strength in their fundamental knowledge. However, there was room for improvement, especially in understanding various AI tools and their specific applications in educational contexts. This underscores the importance of deepening practical experiences to bridge the gap between theoretical knowledge and practical application (AlKanaan, 2022).

Furthermore, the analysis brought to light that while students valued the support and feedback provided by ChatGPT in refining their work, they also acknowledged the limitations of AI tools, particularly in terms of academic integrity and the potential inaccuracies in the information provided. Students recognized the need to critically evaluate and cross-verify the information delivered by ChatGPT to ensure accuracy and relevance to their academic requirements (Tlili *et al.*, 2023).

In discussing the future implications of AI in education, students expressed concerns about the evolving role of teachers in the face of rapid advancements in artificial intelligence. They emphasized the importance of teacher training to adapt to the changing landscape of AI and the necessity of modifying assessment methods to promote critical thinking and problem-solving skills among students. The students recognized the need for a balance between leveraging AI technologies for innovative teaching methods and preserving the essential role of teachers in guiding and mentoring students (Tlili *et al.*, 2023).

In conclusion, the study's findings underscore the critical need for educational institutions to focus not only on enhancing students' theoretical knowledge of AI tools but also on developing their practical skills and ethical considerations in using these

tools. Moreover, the study emphasizes the pivotal role of teacher training in preparing educators to navigate the integration of AI technologies in educational settings effectively, ensuring a balance between leveraging AI for innovative teaching practices and maintaining the core values of education and mentorship (Tlili *et al.*, 2023).

## 6. Conclusion

In the context of pre-service teacher education for future teachers in secondary schools utilizing ChatGPT, it is crucial to consider the implications of integrating artificial intelligence (AI) models into educational practices. Pre-service teachers play a vital role in shaping the future of education, and their awareness of employing AI tools like ChatGPT can significantly impact their teaching approaches (AlKanaan, 2022). By exploring pre-service teachers' attitudes towards technology and digital literacy, educators can better understand how to prepare them for utilizing AI in educational settings (Liza & Andriyanti, 2020).

Moreover, the challenges faced by beginning teachers highlight the importance of providing pre-service teacher education that equips prospective teachers with the necessary professional knowledge and skills for their future roles (Kozikoğlu & Senemoğlu, 2021). As AI technologies like ChatGPT become more prevalent in education, it is essential to address ethical considerations, such as academic integrity and student learning outcomes (Chen *et al.*, 2021). Additionally, studies focusing on teachers' beliefs and practices regarding digital literacy in the classroom underscore the need for further exploration in this area (Cahyono *et al.*, 2020).

Furthermore, research on the effectiveness of AI-powered language models like ChatGPT in disseminating health information and assisting in critical care demonstrates the diverse applications of AI across different fields (Davis, 2023; Wardi *et al.*, 2023). By examining the implications of AI in education and addressing ethical challenges, educators can harness the potential of AI models like ChatGPT to enhance teaching practices and student learning experiences (Akgün & Greenhow, 2021; Holmes *et al.*, 2021).

In conclusion, the integration of ChatGPT in pre-service teacher education holds promise for transforming teaching methodologies and improving learning outcomes in secondary schools. Further research is needed to explore the full potential of AI models in education, address ethical considerations, and enhance digital literacy among pre-service teachers to prepare them for the evolving landscape of education.

**Author Contributions**

Maura Amaranti Pesce: Conceived and designed the analysis, Collected the data; Performed the analysis; Wrote the paper.

Daniel Fernandez Blanco: Contributed data analysis tools and code; Performed the analysis; Wrote the paper; designed tables and figures.

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Compliance with ethical standards: The participants were young college students of legal age. Their involvement in both the KPSI questionnaire and the open-ended questionnaire was anonymous. The outcomes of the Focus Group encapsulated the viewpoints and salient themes discussed, with the participation of its members being anonymous.
Data availability: The datasets generated during the current study are available from the corresponding author on reasonable request.

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**Maura Amaranti Pesce** holds a PhD in Education Sciences from the Universidad de la Frontera and was a ANID scholarship recipient, with a distinguished career in educational evaluation and teacher training. She is a Spanish language teacher and holds a Master's degree in Education with a specialization in Curriculum. She has worked as a language teacher at the school level and in the continuous training of teachers, notably contributing to the development of materials such as the textbook "Evaluación para el aprendizaje" for the Ministry of Education. In higher education, she has led projects on curriculum redesign and faculty evaluation and has taught courses such as "Evaluation for Learning" at PUCV. Her doctoral research, conducted during an academic residency at UNAM, focused on feedback in teaching evaluation under the mentorship of Dr. Mario Rueda Beltrán. Additionally, she is an active member of the Ibero-American Network of Researchers on Teaching Evaluation (RIIED) and the Latin American Network of Educational Research (RELIEVA), where she contributes to the advancement of educational evaluation and teaching performance.
**Daniel Fernández Blanco** holds a BSEE from the Universidad de Buenos Aires and is also a Data Scientist, as well as a Machine Learning and AI Engineer. As a research methodologist, he collaborates on numerous projects in the educational field.

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