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Professors' Perceptions on the Use of ChatGPT in Higher Education: a case study in Brazil

Percepções de Professores sobre o Uso do ChatGPT no Ensino Superior: um estudo de caso no Brasil

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Abstract: Since the emergence of Generative Artificial Intelligence (GAI), higher education professors worldwide have faced challenges related to academic integrity, ethics, cognitive bias, and the absence of clear regulation. Conversely, GAI holds significant potential to enhance educational experiences by increasing student engagement and enabling personalized learning. This study examines university professors' perspectives on the use of ChatGPT as a teaching tool before, during, and after participating in a professional development workshop at a public university in Brazil. In August 2023, professors from diverse academic disciplines engaged in both individual and collaborative online synchronous and asynchronous activities over five days, including forum discussions, lectures, and self-reflection tasks. Participants reported high levels of satisfaction with the workshop's organization, methodology, and instructional resources. Their primary motivations for attending were the desire to update their pedagogical practices and to exchange experiences with peers. Although participants demonstrated a general understanding of GAI, their familiarity with the technology varied: some had already used it, while others had not. Initially, their primary concern involved students' use of GAI, however, they gradually recognized its potential to support their own teaching practices. After the workshop, participants reported feeling more confident about incorporating GAI into education and identified multiple possibilities for applying it within their disciplines. Overall, the findings highlight the transformative potential of faculty development initiatives to reshape professors' attitudes toward GAI and ChatGPT, emphasizing the need for continuous professional learning and institutional support to promote the responsible and effective integration of these technologies in higher education.

Keywords: Generative Artificial Intelligence, ChatGPT, Inservice Teacher Education, Higher Education, Professors' Perceptions.

Resumo: Desde o surgimento da Inteligência Artificial Generativa (IAG), docentes do ensino superior em todo o mundo têm enfrentado desafios relacionados à integridade acadêmica, à ética, aos vieses cognitivos e à ausência de regulamentações claras. No entanto, a IAG apresenta grande potencial para enriquecer as experiências educacionais, aumentando o engajamento dos estudantes e possibilitando um aprendizado mais personalizado. Este estudo analisa as percepções de professores universitários sobre o uso do ChatGPT como ferramenta de ensino antes, durante e após sua participação em uma oficina de desenvolvimento profissional em uma universidade pública no Brasil. Em agosto de 2023, docentes de diversas áreas do conhecimento participaram, ao longo de cinco dias, de atividades online individuais e colaborativas, síncronas e assíncronas, que incluíram fóruns de discussão, palestras e exercícios de autorreflexão. Os participantes demonstraram altos níveis de satisfação com a organização da oficina, sua metodologia e os recursos didáticos utilizados. As principais motivações para participar foram a necessidade de atualizar suas práticas pedagógicas e de trocar experiências com outros colegas. Embora os participantes tenham apresentado uma compreensão geral sobre a IAG, seu nível de familiaridade com a tecnologia variou: alguns já a utilizavam, enquanto outros ainda não. Inicialmente, a principal preocupação estava relacionada ao uso da IAG pelos estudantes, entretanto, posteriormente, reconheceram também seu potencial para apoiar suas próprias práticas docentes. Ao final da oficina, os professores relataram sentir-se mais seguros para incorporar a IAG na educação e identificaram diversas possibilidades de aplicação em suas disciplinas. De modo geral, os resultados evidenciam o potencial transformador das iniciativas de desenvolvimento docente na mudança de atitudes em relação à IAG e ao ChatGPT, ressaltando a importância da formação continuada e do apoio institucional para promover a integração responsável e eficaz dessas tecnologias no ensino superior.

Palavras-chave: Inteligência Artificial Generativa, ChatGPT, Desenvolvimento profissional docente, Ensino Superior, Percepções dos Professores.

1. Introduction

Since the emergence of Generative Artificial Intelligence (GAI) systems, such as OpenAI's ChatGPT 3.5 in November 2022, educators worldwide have been facing challenges, especially in the university setting, as it arouses several issues related to academic integrity and plagiarism, besides concerns about ethics, cognitive bias, accessibility, lack of regulation, among others (Rodrigues & Rodrigues, 2023; Trust et al., 2023; Sabzalieva & Valentini, 2023). However, such systems also hold the potential to enhance the educational experience by increasing student engagement, providing personalized learning experiences and immediate feedback, benefiting both educators and learners (Kaplan-Rakowskiet al., 2023; Kasneci et al., 2023).

Although AI is not a new area of study or technology, it was popularized in 2022 with the rapid spread of ChatGPT 3.5, becoming such an emergent topic in education that UNESCO published a 'quick start guide' to using ChatGPT and AI in higher education (HE). In the guide, Sabzalieva & Valentini (2023) indicate some possible applications of ChatGPT for teaching and learning, research, administration, and community engagement. They also present recommendations for its ethical use and adoption. Some of them include discussing the impact of ChatGPT, providing clear guidance, reviewing and updating assessment, evaluation, and academic integrity policies, staff training, and incorporating AI literacy, ethics, competencies, and skills into the curriculum.

Trust et al. (2023) discuss the challenges, opportunities, and implications of ChatGPT for teacher education, presenting potential uses and possible risks and misuses. Among the opportunities, they highlight ChatGPT's potential to inspire a rethinking of teaching practices that support the development of critical media literacy skills, motivating new conversations and policies about academic integrity. Similarly, Kanesci et al. (2023) present several opportunities AI can bring for learning, such as assisting university students in developing research skills, developing critical thinking, and empowering learners with disabilities. According to the authors, ChatGPT can also benefit teachers by providing personalized learning, designing lesson plans, creating teaching and assessment materials, helping in correcting and assessing students' tasks, and assisting them with their professional development.

Regarding the implications of ChatGPT in the academic sphere, they highlight the importance of teacher education programs that support the effective integration of AI into the curriculum, enabling learners to use it effectively and ethically. They also recommend some AI integration practices for teacher education that include: (1) offering pre-service and in-service teachers the chance to explore and understand GAI technologies in depth, enabling them to make informed choices about incorporating these technologies into their teaching practices; (2) creating opportunities for teachers to reflect and rethink their teaching approaches in light of the advancements in AI technologies; (3) demonstrating to teachers how to critically assess teaching materials and information generated by AI writing tools; (4) motivating teachers to integrate AI education into their teaching methods; and (5) promoting a greater level of transparency in educational processes. They conclude that 'educators, administrators, and policymakers must proactively seek to educate themselves and their students on how to use these tools both morally and ethically' (Trust et al., 2023, p. 14).

Moreover, Rodrigues & Rodrigues (2023) emphasize the importance of bringing the discussion on GAI into the academic field and fostering critical spaces for its use, ensuring that these technologies contribute meaningfully to human development in education and society. They also advocate for a critical and reflective framework for the use of GAI in HE, highlighting the importance of integrating this discussion into teacher education programs and professional development initiatives.

A preliminary review of the literature revealed a limited number of studies about faculty training in the use of GAI, which indicates the need to design teacher development initiatives and evaluate their efficacy. The study conducted by Lan et al. (2023) presents results from a six-hour training session on chatbot editing for preservice language teachers, in which participants created their own chatbots to assist students in practicing Chinese as a Foreign Language. The study aimed to investigate participants' perceptions of the potential benefits of chatbots for language education. It concluded that most participants appreciated the chatbot-based editing task and supported integrating chatbots into language instruction, as they could enhance student learning.

Acknowledging the potential of GAI to enhance teaching and learning, as well as the importance of addressing this topic in in-service teacher education, the X Program developed and implemented an online professional development workshop for professors from diverse disciplines at a public university in the state of Rio de Janeiro, Brazil. The workshop sought to inform participants about the challenges and opportunities associated with AI technologies, such as ChatGPT, and to foster their critical and pedagogically grounded use in HE. Additionally, it provided participants with opportunities to experiment with these tools, reflect on their implications, and reconsider their teaching practices in light of emerging technological transformations.

Thus, this paper investigates professors' perspectives on the use of ChatGPT as a teaching and learning tool before, during, and after they participate in the workshop, identifying possible changes in their perceptions concerning GAI. Understanding professors' perspectives is crucial for the successful integration of ChatGPT into HE as they play a significant role in shaping the learning environment by incorporating or not AI technologies into teaching practices and developing students' AI literacy.

The subsidiary aims comprise: (1) to identify participants' motivations to join the professional development workshop; (2) to investigate their understanding and previous experiences with AI; (3) to explore their views on AI's possibilities and challenges; (4) to identify the changes in their perceptions after exploring AI's possibilities; and (5) to assess the effectiveness of the workshop through participants' evaluation.

The study adopts a mixed-method approach (Mann & Stewart, 2002) to explore professors' attitudes, beliefs, and experiences regarding the use of ChatGPT for teaching. The workshop was grounded on the theoretical frameworks of Ausubel's (2003) meaningful learning and Vygotsky's (2008) concept of the zone of proximal development. The activities were designed according to the principles of autonomy, the strategic use of technology, and the plurality of techniques characteristic of active learning methodologies (Andrade et al., 2023). It also incorporated some of the recommendations for AI integration practices for teacher education (Kanesci et al., 2023). The workshop was adapted to the theme and remote format, and it was based

on the structure established in workshops offered for faculty development at PROIAC - UFF (Programa de Inovação e Assessoria Curricular), Universidade Federal Fluminense (UFF) (Valente et al, 2021; Ferreira et al, 2021)

Understanding professors' perspectives on the use of AI in HE can inform future initiatives in teacher professional development, supporting the effective integration of these technologies into university teaching and learning practices. Furthermore, the findings of this study may contribute to the development of best practices and pedagogical strategies for professional development programs that seek to incorporate ChatGPT and similar generative AI tools into higher education contexts.

2. Methods

2.1. Context and participants

The present work is an exploratory case study (Meirinhos & Osório, 2010) that investigated professors' attitudes, beliefs, and experiences regarding the use of AI for teaching. It follows the eight pillars for quality in qualitative research (Tracy, 2021). In August 2023, university professors at UFF University enrolled in an online workshop offered by PROIAC, which aimed to promote professors' teaching development. The theme was 'AI in higher education: possibilities, challenges, and implications'.

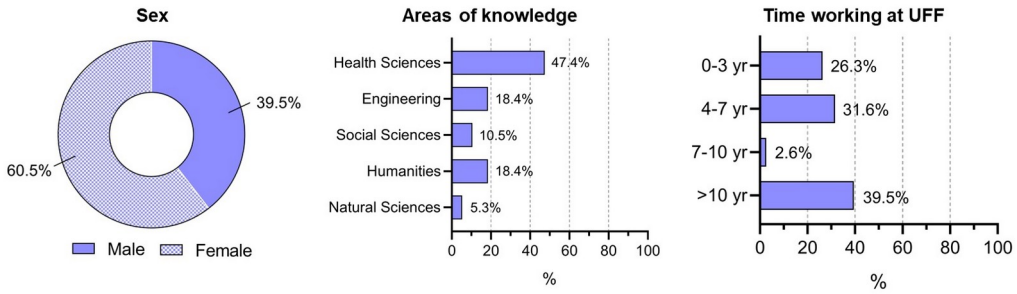

Figure 1. Participant's sex, areas of knowledge, and time working at UFF

Eighty professors applied via Google Forms, 40 were selected, and 38 attended the workshop. Most participants were female (60.5%) and had obtained an undergraduate degree in Health Sciences, Engineering, and Humanities, although all knowledge areas were represented (Fig. 1). Twenty-six percent worked at the institution for less than three years, and 39.5% for more than ten years (Fig. 1). Eighty-four percent of them heard about the workshop from e-mail and worked in the city of Niterói (65.7%). Forty-four percent held administrative positions such as course coordinator, head of department, and vice principal, whereas 39.5% were part of the Núcleo Docente Estruturante (NDE), a group of professors responsible for curriculum planning, evaluation, and revision (Fig. 2).

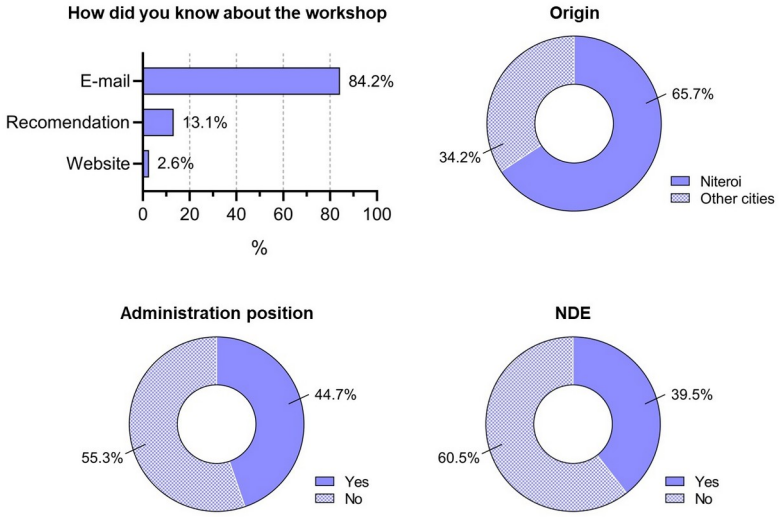

Figure 2. Participants' origin and roles in the university UFF.

Workshop organization and planning

The learning goals were to understand the concept of AI, to know the main AI tools currently in use, and to apply AI for teaching in HE. The content comprised: (1) AI's definition and characteristics; (2) AI technologies and applications in HE; (3) AI possibilities, challenges, and limitations; and (4) planning a lesson that requires the use of AI technologies by students. The online workshop was structured into synchronous (4 h) and asynchronous (4 h) activities, carried out over five consecutive days, as shown in Table 1.

Activities and digital educational resources were made available on Google Classroom. Firstly, participants spent two days engaged in asynchronous activities, during which they introduced themselves (name, course, motivations, and expectations) and shared their thoughts on the AI definition and their previous experience using AI. They were guided to reflect on and share their vision of the possibilities, challenges, and implications of using AI in HE, and then watched a video discussing the issue.

On the third day, a synchronous web conference discussed AI possibilities, challenges, and implications in HE. The concept and characteristics of AI were reinforced, the main AI technologies currently in use were presented, and some experiences of AI use for teaching in HE were shared. After the web conference, participants were encouraged to explore ChatGPT 3.5 and create a lesson plan, an activity, or an assessment instrument for their classes and to share their thoughts on their experience by recording a 3-minute video on Flip (https://flipgrid.com/).

The fourth day was dedicated to reading and forum discussion. Firstly, participants read two articles about ChatGPT in education (Pimentel & Carvalho, 2023a; Pimentel & Carvalho, 2023b) and then engaged in a forum discussion. They exposed their positive or negative impressions, how the concepts previously presented in the

video related to the texts, and how they perceived the applicability of these ideas, concepts, and practices to their teaching.

Table 1. Activities developed in the workshop 'AI in HE: possibilities, challenges, and implications.' (2023).

Day	Activities	Description
1-2	A1	Online board: Participants' introduction.
	A2	MCQ Yes/No: «Do you know what AI is? Explain what you think or imagine it is.»
	A3	MCQ Yes/No: «Have you ever used AI for teaching? If yes, share your experience. If not, how might it be useful, or what would you like to learn about it?
	A4	Discussion forum: «In your opinion, what are the possibilities, challenges, and implications of AI in higher education?»
	A5	Video: «While watching, make notes of any doubts or questions, considerations, and reflections to bring to our synchronous web conference.» [https://www.youtube.com/live/AJN4ODSkWzo?si=px0y--QIXwA04Eb4]
3	S1	Lecture: «Artificial intelligence in higher education: possibilities, challenges and implications».
	A6	Self-reflection activity: «Use ChatGPT to create a lesson plan, an activity, or an assessment instrument for one of your classes and record a 3-minute video on Flip sharing your thoughts about your experience.»
4	A7	Discussion forum: «First read the text, and then share your thoughts, perceptions, and questions about it.»
5	S2	Small group task: «Plan a discipline or course that uses AI (ChatGPT) in the classroom.»
	A8	Online form: Workshop assessment by participants.

Finally, on the fifth day, they worked in small groups during a *Google Meet* web conference with breakout rooms. They had 30 minutes to plan a lesson or discipline in which students had to use AI (ChatGPT) to develop their AI literacy. Then, each group presented its proposal, which was discussed by the workshop organizers and participants, and feedback was provided. The lesson plan should inform the theme, course hours, learning goals, methodological strategies, educational and technological resources, and learning assessment.

Workshop assessment

After the web conference, participants were invited to evaluate the workshop by filling out an anonymous online Google Forms survey with both closed- and open-ended questions (Supplement 1). Completing this form was voluntary, and answers were not mandatory. They were asked about their previous experience attending professional development activities about AI for education and their motivations for attending the current workshop. They were also enquired about workshop quality as «excellent», «good», «fair» or «poor», and its overall organization (e.g., application, educational resources, methods, and activities) using a Likert scale of five points («very good», «good», «fair», «poor», and «very poor»). Participants' perceptions of AI use in education before and after attending the workshop were also assessed using a Likert-type scale as «strongly agree», «agree», «disagree», or «strongly agree».

Data collection and analysis

Qualitative and quantitative data were extracted from three sources: (1) workshop registration form, (2) written and audio content produced by participants during their engagement in the activities posted in the virtual learning environment (A2 to A7), and (3) workshop assessment form (A8). Participants provided consent on the workshop assessment form (Supplement 1).

Qualitative data were analyzed using ChatGPT 3.5, as proposed by Morgan (2025). He describes a three-step set of procedures, called query-based analysis (QBA), for generating themes from qualitative data. In the first step, the researcher asks ChatGPT broad, undirected queries. The goal of this step is to locate a set of basic themes for further searching. This step requires that the researcher have a reasonable degree of familiarity with the data. Following up, the researcher runs more specific queries, asking about each theme, equivalent to seeking subcategories under the major themes generated earlier, and reducing the number of subthemes when they overlap. The third and final step is to examine the supporting data and seek quotations for inclusion in the Results section that support the themes and subthemes (Morgan, 2025).

In the present study, we evaluated each activity in which participants interacted separately (A2 to A7). Participants' text and audio interactions were gathered in digital documents segregated by activity. Audios were listened to and hand-typed. Then, the material was read to gain a general understanding of its content. To perform the QBA, the following prompt was used: «Higher education professors participated in an online teacher development workshop. They were asked about [activity instruction]. Perform the content analysis of the comments made by professors. The answers follow below; each number represents an answer: [participant's text or audio transcription].» Then, the researchers evaluated whether ChatGPT output captured the original research goals and, once QBA matched it, defined a set of core themes and selected quotations that represented themes and subthemes.

Quantitative data obtained from the assessment form are presented as n and a percentage. Likert scale statements were condensed as «very good/good», «fair», «poor/very poor», or as «strongly agree/agree», «disagree/strongly disagree», depending on the question being asked. «Not applicable» was condensed with unanswered questions (blank).

Ethical considerations

The conduction of the workshop and the use of data for the preparation of this manuscript were based on the ethical recommendations of the Brazilian National Health Council Resolution No. 466/2012 — autonomy, non-maleficence, beneficence, justice, and equity — as well as Resolution No. 510/2016 and its Article 1, sole paragraph, which states that «activities carried out exclusively for education, teaching, or training purposes, without scientific research objectives,» involving professionals in training, are not subject to review by a research ethics committee. During the planning and implementation of the workshop, ethical considerations were guided by Sabzalieva & Valentini (2023).

3. Results

3.1. Participants' motivations

Most participants (90.9%) had never attended a workshop focused on discussing the use of AI for teaching in education (Fig. 3). Main reasons for attending the current workshop were personal interest in the subject (79.2%), followed by the realization that education practices need to be changed in the face of the diffusion of AI technologies (70.8%). About half of the participants wanted to hear about other professors' experiences (54.2%), and 20.8% already used AI and wanted to improve their skills with these tools in education. Regarding application, 54.2% wished to use AI in undergraduate courses and 12.5% in graduate courses. The other reasons mentioned by two participants were the considerable importance that AI has gained in the last few years and the suspicion that students were using ChatGPT to write their final undergraduate work. Thus, it is essential to understand how it works (Fig. 3).

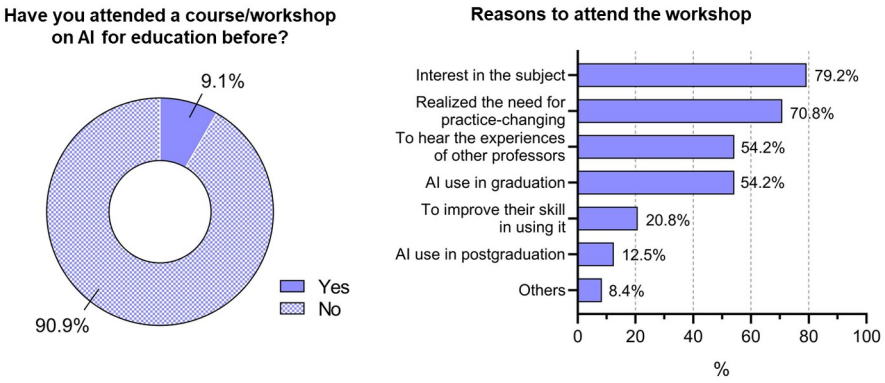

Figure 3. Participant's motivation to attend the workshop. Source: Authors.

Concept and previous experience using AI

Activity A2 asked participants if they knew what AI was, and they were encouraged to explain what they thought or imagined it was. The QBA analysis evidenced that participants had a reasonable understanding of AI as a technology that simulates human intelligence, as illustrated below[1]:

> «I imagine it to be what is commonly referred to as artificial thinking, in the sense of trying to construct and mimic human thought, human intelligence, reasoning». (Participant #18)

> «I believe that AI is a set of computational technologies that store a huge amount of data, work with patterns and algorithms, and through intelligent commands, make decisions and respond by simulating human intelligence». (Participant #22)

[1] All participants' answers were written in Portuguese and translated to English by the authors. The authors highlighted the units of meaning in bold.

In activity 2, participants also expressed that they were mainly interested in learning about AI use in their areas of knowledge, professional practices, and personal life, as observed in the extracts below:

> "[...] I only use ChatGPT and would like to explore this tool further and learn about new tools that can help me in both work and daily life." (Participant #1)

> «[...] Recognizing the importance of this topic and tools for higher education and better social interaction, I am willing to learn and incorporate it into my academic and personal life." (Participant #32)

In the next activity (A3), participants had to share their experiences using AI for teaching or wonder how AI would be useful for this purpose, and what they would like to learn in the workshop. In QBA analysis, a multitude of experiences and interests were identified. Some participants had already used it, while others were anxious to learn and explore its applications for teaching and learning, as well as its ethical aspects.

For teaching and learning, a participant mentioned using ChatGPT with undergraduate students to generate texts that would later be revised to search for content errors and discuss AI limitations. Another participant mentioned using ChatGPT with students to assist in writing research protocols and to test its performance in answering questions about a specific topic in medicine. Some examples are given below:

> «[...] I asked them to do a group assignment, in which they should ask ChatGPT to create a text (summary, poetry, song, etc.) on a specific topic, and the students should correct the errors made by the AI. It is important that they know how to use it properly and, most importantly, understand its limitations." (Participant #9)

> "As I teach subjects in the field of computer science, I have already used AI in classes, mainly with the support of programming languages like Python. [...]" (Participant #25)

Possibilities and challenges

Activity A4 asked the following: "In your opinion, what are the possibilities, challenges, and implications of AI in higher education?" In this topic, the participants' focus and foremost concern was the use of AI by students; some were optimists, and others were pessimists.

QBA analysis identified that some participants recognized AI's potential to improve teaching and learning, but they also highlighted challenges such as ethical dilemmas, student dependency, and the need to adapt teaching practices to this new reality. Some participants' opinions are displayed below:

> "I believe that AI enhances the speed of task completion, assists in organization, and makes learning more dynamic. The challenge is knowing how to use it for the benefit of learning and not as a form of replacement. As educators, we need to be familiar with these tools and help students make good use of them". (Participant #21)

> "I don't have a formed opinion on the topic due to my lack of knowledge about what AI is [...] for the challenges and implications, they are associated with my prejudgment in dealing with a "machine that thinks,"

> while also raising ethical questions about not having "as much control" over what may be produced by such machine". (Participant #16)

In summary, the forum discussion in activity A4 highlighted the complexity of AI's impact on HE and the need to approach the topic with caution given its varied implications.

Game-changing

In activity A5, participants watched a web conference in which the lecturer presented the history of ChatGPT, its applications, benefits, and risks, and discussed AI in education, the future of GAI, and the possible implications of AI for professors.

After watching the video, participants shared their views in the comments area in Google Classroom (activity A5). The QBA analysis identified positive thoughts about the web conference and an increasing interest in learning about its possibilities and challenges in education and other areas. Additionally, they expressed that it is essential to comprehend the effective use of technology in the learning process. Some testimonies are highlighted below:

> «The possibilities are much greater than I imagined. And the proposal to rethink the evaluation process seems highly relevant to me. This also implies reviewing the objectives of the Lesson Plan». (Participant #31)

> «Indeed, there are many possibilities for the use of AI in different areas, not just in education. […] There is an emphasis on the need to think about training practices that encourage problematization, the production of questions about a certain subject, and not its reproduction […]». (Participant #37)

On the third day, the lecture about "Artificial intelligence in higher education: possibilities, challenges and implications" continued the discussions of asynchronous activities. Then, activity A6 stimulated the use of ChatGPT to create a lesson plan and reflect upon the experience. Then, participants had to record a 3-minute video sharing their thoughts about the experience and share it with the group in the Flip app.

Once again, a positive attitude was noticed among participants. So far, participants have mainly been concerned about students' misuse of ChatGPT, and few have mentioned the implications of ChatGPT for their daily tasks in previous activities. After the activity, they acknowledged that ChatGPT is a valuable support tool for planning lessons and creating educational resources. ChatGPT's flexibility and speed in content generation were identified as meaningful advantages, as illustrated below.

> «I had never used it before, now I can't imagine finishing any academic activity without asking for some "advice" from ChatGPT... lol… I love it» (Participant #17)

> «I also really liked the lesson plan suggested by it. In fact, it wasn't even necessary to ask it to create an activity because, being a lab class, it proposed several interesting activities that I'm really looking forward to using». (Participant #2)

Divergent thoughts were mainly due to previous experience using ChatGPT, the nature of the tasks, and personal views on the technology and its limitations. On the other hand, in the following activity (A7), participants were open-minded to using

ChatGPT in HE, sharing thoughts about their commitment to improving the quality of education despite knowing AI's complexity and implications. The main concern was how to educate students on AI's responsible and critical use, and professors were willing to explore the multiple possibilities of efficiently incorporating ChatGPT into their pedagogical practices. Some participants' opinions are displayed below to illustrate their thoughts:

> «[...] Several students' opinions about the use of AI (in the paper) are presented, highlighting that many choose to resort to ChatGPT instead of using conventional search engines on the internet. This behavior has raised concerns among educators due to the potential for improper use of this tool.[...]» (Participant #17)

> «[...] I believe we should use this tool as a new partner, embrace the technology, and use it more and more in projects and in the classroom itself. Show and make an effort to teach our students how to use it so that they can enhance the concepts built in class. [...] we need to review our assessment methods and teaching practices in light of this new reality. AI is here, and there's no point in denying it or trying to hide it.[...]" (Participant #30)

Workshop assessment

Twenty-four participants answered the workshop assessment form. All participants expressed satisfaction with the workshop, where 78.3% rated it as excellent, 21.7% as good, and none as fair or poor (Fig. 4). Concerning workshop organization and planning (Fig. 4), more than 87.5% of participants classified the workshop registration, organization, educational resources available, active methodologies applied, and the availability of organizers to help participants during the workshop as «very good/good». Individual activities were slightly better evaluated than small group activities (87.5% vs. 79.2%). The synchronous web conference and the adequacy of the planned activities to the target audience were rated as «very good/good» by 83.3%. The adequacy of the activities to the planned time deserves attention, as 29.2% rated it «fair» or «poor/ very poor.»

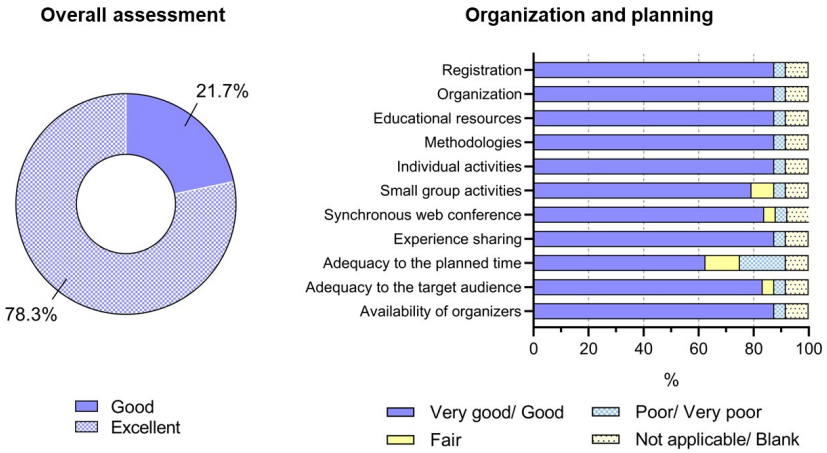

Figure 4. Workshop assessment. Source: Authors.

Tables 2 and 3 display participants' perceptions before and after the workshop. Before the workshop, only 20.8% strongly agreed or agreed that they felt safe using AI in their classes; after the workshop, this increased to 95.8%. Before the workshop, a few participants strongly agreed or agreed that they knew the AI's principles discussed (29.2%) and applied them in their classes (20.8%). Even so, more than half of them (62.5%) strongly agreed or agreed that they perceived the possibilities for applying this knowledge in their teaching activities. An important finding was that after the workshop, this percentage increased to 95.8%, and professors strongly agreed or agreed that they were motivated to learn about new digital technologies for teaching (95.8%) and were willing to engage in workshops discussing more advanced topics about AI in education (91.6%).

Table 2. Participants' perceptions before the workshop.

Questions	Strongly agree/ Agree	Disagree/ Strongly disagree	Not applicable/ Blank
I felt safe using AI in my classes.	5 (20.8%)	18 (75.0%)	1 (4.2%)
I already knew the principles discussed in this workshop.	7 (29.2%)	17 (70.8%)	0 (0.0%)
I have already applied the principles discussed in my classes.	5 (20.8%)	19 (79.2%)	0 (0.0%)
I saw the possibilities for applying this knowledge in my teaching.	15 (62.5%)	8 (33.3%)	1 (4.2%)

Data as n (%).

Table 3. Participants' perceptions after the workshop.

Questions	Strongly agree/ Agree	Disagree/ Strongly disagree	Not applicable/ Blank
I feel safer using AI in my classes.	23 (95.8%)	0 (0.0%)	1 (4.2%)
I think the possibilities of use are limited for my classes.	7 (29.1%)	16 (66.7%)	1 (4.2%)
I see possibilities to apply this knowledge in my disciplines.	23 (95.8%)	0 (0.0%)	1 (4.2%)
I want to learn new digital tools for teaching.	23 (95.8%)	0 (0.0%)	1 (4.2%)
I want to participate in more advanced workshops on the topics covered.	22 (91.6%)	1 (4.2%)	1 (4.2%)

Data as n (%).

4. Discussion

The faculty development workshops at University UFF have been well established since 2012 with the institutionalization of the PROIAC (Valente et al, 2021). Since then, the challenge of integrating Information and Communication Technologies (ICTs) into educational practices has been observed. The advent of the COVID-19 pandemic made the use of virtual learning environments necessary, and apprehension about these changes emerged again. With the introduction of GAI, faculty members recognize the need for updates and discussions on the challenges and opportunities of integrating these technologies into teaching and learning routines.

This study presents the results of an online workshop structured with synchronous and asynchronous activities, addressing definitions of AI, its applications in HE, and lesson planning using AI. After the workshop, several positive perceptions regarding the use of AI emerged, such as timesaving, facilitated assessment, and personalized learning. However, professors raised concerns about data and conceptual accuracy, as well as the need to train students to think critically about the use of AI.

Iqbal, Ahmed & Azhar (2022) identified a negative attitude toward ChatGPT in university professors (n=20). Most either did not use the tool or only used it occasionally. They were concerned about student cheating, plagiarism, and data privacy. These negative impressions are likely since most participants had no training, had difficulty understanding how to use ChatGPT, and had no support for using the technology in their classrooms. A second study by Kiryakova & Angelova (2023) at Trakia University in Zagora, Bulgaria (n=87), found that although some professors used AI applications such as ChatGPT, a large percentage did not use it or used it occasionally. This was a possible reason for divergent opinions among professors throughout the study, as they needed to learn about the possibilities and use GAI tools sufficiently to comprehend them.

Al-Mughairi & Bhaskar (2023) investigated the factors that motivate and inhibit professors from adopting ChatGPT for educational purposes at the University of Technology and Applied Sciences in Oman. Only professors who were aware of ChatGPT or used it for educational purposes were interviewed (n=34). Like our data, professors were motivated by the need to adapt their teaching approach to the new digital age, the possibility of creating teaching instruction materials, timesaving by automating administrative tasks, and further developing their technical skills by using new technologies in education. Among the inhibiting factors, they reported the need to verify the information generated for reliability and accuracy, and an overreliance on ChatGPT, which reduced their critical thinking and led to a dependence on the tool. Lack of institutional support and concerns about privacy and data security were also mentioned. The authors highlight that teachers may require assistance and training to integrate ChatGPT into their educational practices.

Kiryakova & Angelova (2023) found that professors were familiar with AI applications and used them at Trakia University for teaching and academic activities such as learning, grammar correction, translation, transcription, and image creation. Regarding ChatGPT, most of them had not used it (42.5%) or used it for curiosity (43.7%), meaning they were still exploring and investigating its possibilities. The prevalence of use was for searching for information, generating ideas, and writing text; few reported creating learning materials (9.2%) and exams (4.6%).

Finally, the work of Ogurlu & Mossholder (2023) ratifies some of the topics that this study and others have covered. Eighty-five professors from HE to elementary school mentioned plagiarism and cheating, lack of authenticity by students, overreliance on technology, and loss of higher-order thinking skills, such as critical and creative thinking and problem-solving skills. Potential benefits include reducing professor workload by developing teaching materials, providing instant access to information, and elevating teaching by implementing methods and strategies that challenge students and prompt them to think deeply and critically.

University students share similar perceptions about using ChatGPT, such as ease of use and concerns about ethics and academic integrity. Bonsu & Koduash (2023), Ngo (2023), and Valova, Mladenova & Kanev (2024), carrying out studies in Ghana, Vietnam, and Bulgaria, respectively, observed that the use of ChatGPT is widespread and defended by students. They have positive perceptions, including ease, simplicity, agility of use, possibilities for searching for information in different languages, providing feedback for learning, and improving text writing. Students also highlighted concerns about the reliability and accuracy of the answers and references provided. Ibrahim et al. (2023) also identified these points, conducting research with students from Brazil, the United States, India, Japan, and the United Kingdom who enrolled in computer science, social and political science, economics, engineering, and mathematics undergraduate courses.

Another critical issue was regarding the evaluation aspect, identified in the works of Bonsu & Koduash (2023), Ibrahim et al. (2023), and Ngo (2023). Students report difficulty identifying ChatGPT use in academic work. Thus, their learning and performance assessment would be compromised. This concern joins this tool's ethical and critical use, as the grade is often a criterion for obtaining scholarships and entering the job market. The students participating in Ngo's (2023) work consider that critical training and developing guidelines for using ChatGPT can alleviate perceived problems. Thus, professional development workshops aimed at helping faculty members understand and learn how to integrate GAI tools into their teaching practices may diminish students' concerns and enhance their ethical and responsible use in academic work.

5. Conclusion

This paper investigated professors' perspectives on the use of ChatGPT as a teaching and learning tool before, during, and after they participated in a professional development workshop on AI in HE. It may be concluded that the workshop has met its objectives as its organization, content, and methodology were positively assessed by participants. The practical activities allowed participants to explore the potential and challenges of using AI. In summary, the workshop helped broaden teachers' understanding of AI and its applications in HE, prepared them to integrate this technology into their pedagogical practices and created a space for discussing the topic.

The participants' teaching experience and the need to revisit educational practices were also noted by Azevedo et al. (2019). Veiga (as cited in Azevedo, 2019) states, 'It seems to be an effort by the teachers to innovate in their practice by utilizing methods that go beyond the traditional lecture and promote the improvement of their work quality.' In other words, the shift from the traditional, uncritical, lecture-based teaching methods to active, critical, and reflective methodologies emphasizing student protagonism is driving teachers to seek professional development activities to meet this demand.

By making students the protagonists in knowledge construction, teachers assume the role of tutor and supporter, requiring them to rethink their teaching and learning processes in light of instantaneous information and the use of digital

technologies (Guimarães et al., 2024) to develop students' ability to understand, analyze, and apply solutions in context.

In this context, teachers and students increasingly frequent use of AI is evident. However, to maximize its potential, it is necessary to understand, experiment with, and critically evaluate its possibilities and applications in education (Miranda & Andrade, 2023), aligning with the statements of the workshop participants and the workshop objectives. Another critical point is students' ethical use of ChatGPT, a topic that was intensely debated during the synchronous activities. This concern is also evident in other studies, such as those highlighted by Seabra (2023), which discuss the misuse by 'crafty students and unprepared teachers', and by Farias (2023), who emphasizes issues related to originality, scientific integrity, transparency in identifying the use of ChatGPT in writing, responsibility in its use, and the accuracy of the information provided.

One limitation of the study is the small sample size, which hinders generalization and standardization. The case study methodology may be considered a strategy with limited systematization; however, this limitation was mitigated by explicitly presenting the workshop's script and detailing the data collection and research instruments. On the other hand, even as a single case, this approach enables an in-depth understanding of a specific situation (Meirinhos & Osório, 2010), seeking, even from a few cases or a small sample, to explore, reflect upon, and theorize lived contexts. Thus, although the workshop had a small number of participants, the case study enabled reflection on issues related to the use of AI in teaching and learning, which is the main objective of this manuscript and the workshop evaluation.

It is worth noting that this was the first workshop conducted on the use of GAI in HE, held approximately one year after the launch of ChatGPT. Subsequent workshops at UFF University have followed a similar methodology while incorporating advancements in GAI technologies and addressing additional educational topics such as assessment and ethical considerations. Further research is needed to examine how professors' perspectives have evolved now that GAI technologies have become more widespread and familiar among both faculty and students.

In summary, the present study demonstrates the transformative potential of professional development initiatives in shaping professors' perceptions about AI and the use of ChatGPT in education. Such initiatives provide a conducive environment for reflection, learning, and sharing experiences, enabling professors to understand AI concepts, their applications, and how to use ChatGPT effectively in education. This highlights the importance of ongoing professional development and support in fostering a positive attitude towards AI tools in education, underlining the crucial role of institutional support in this process.

6. Authors' note

During the preparation of this article in 2023, the authors used OpenAI's ChatGPT, version 3.5, to help analyze qualitative data, translate extracts, and review parts of the written text. Grammarly was also used to review the final version of the manuscript. After using these tools, the authors reviewed and edited the content in accordance with the scientific method. The authors assume full responsibility for the content of the publication.

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8. Supplement 1 - Workshop assessment (online form)

Evaluation of the Workshop 'AI in higher education: possibilities, challenges, and implications'

We ask that you complete this questionnaire and help us further improve our faculty development activities and studies at UFF University. You should take between 5 and 10 minutes to answer this questionnaire.

Important! This questionnaire is anonymous, but we need to know some basic information about your affiliation. Do not worry, this data will not be cross-referenced with any previously provided data.

Department to which you are affiliated: _____

Course(s) you teach: _____

ABOUT YOUR EXPERIENCE AND MOTIVATION

Have you ever taken a course or workshop on the use of artificial intelligence in education?

[ ] Yes
[ ] No

What are your motivations to attend the workshop? (Check as many as you deem necessary.)

[ ] I am interested in the subject.
[ ] I had free time.
[ ] I realized I would need to change my practices due to the demands imposed by the advancement of AI in today's society.
[ ] Need to use the tool with postgraduate studies.
[ ] Need to use the tool with undergraduate studies.
[ ] I already used some tools and wanted to improve them.
[ ] I wanted to hear about the experiences of other teachers who applied these technologies.
[ ] Other: _____

WORKSHOP EVALUATION

Please answer with the workshop's learning objectives in mind.

How would you rate the workshop in terms of:
Alternatives: [1] Very poor; [2] Poor; [3] Fair; [4] Good; [5] Very good; [5] Not applicable/Blank

[ ] Registration procedures
[ ] Organization
[ ] Educational resources provided
[ ] Methodology used
[ ] Individual activities proposed
[ ] Small group activities proposed
[ ] Synchronous web conference
[ ] Opportunity for sharing experiences
[ ] Adequacy of activities to the planned time
[ ] Adequacy of activities to the target audience
[ ] Availability of organizers

Rate this workshop according to the alternatives below:

1 - Bad
2 - Average
3 - Good
4 - Excellent

Indicate your agreement with each of these statements BEFORE attending the workshop:
Alternatives: [1] Strongly agree; [2] Agree; [3] Disagree; [4] Strongly disagree; [5] Not applicable/Blank.

[ ] I felt safe using AI in my classes
[ ] I already knew the principles discussed in this workshop.
[ ] I have already applied the principles discussed in my classes.
[ ] I saw the possibilities for applying this knowledge in my teaching.

Indicate your agreement with each of these statements AFTER attending the workshop:
Alternatives: [1] Strongly agree; [2] Agree; [3] Disagree; [4] Strongly disagree; [5] Not applicable/Blank.

[ ] I feel safer using AI in my classes.
[ ] I think the possibilities of use are limited for my classes.
[ ] I see possibilities for applying this knowledge in my disciplines.
[ ] I want to learn new digital tools for teaching.
[ ] I want to participate in more advanced workshops on the topics covered.

UFF uses the results of its activities from an action-research perspective. Do you authorize us to use the data from this questionnaire for our research?

[ ] I do not authorize the use of my answers for UFF research.
[ ] I authorize the use of my answers for UFF research.

Author's note: We omitted further questions not related to this article's content.