JOURNAL OF E-LEARNING AND KNOWLEDGE SOCIETY
Vol. 21, No. 2 (2025), pp. 61-72

Exploring Generative AI tools in higher education: insights for policies

Ana Luísa Rodrigues[1], Carmen Cavaco, Carolina Pereira

Universidade de Lisboa, Instituto de Educação – Lisbon (Portugal)

(submitted: 12/8/2024; accepted: 14/9/2025; published: 28/10/2025)

Abstract

The public availability of the Generative Artificial Intelligence (Gen-AI) tools, such as ChatGPT, led to diverse reactions in society. In higher education, these emerging technologies have brought several challenges, particularly with regard to ethical considerations, assessment frameworks, and new paradigms in teaching and research practices. In this article, we intend to explore the issues related to integration and ways of using the Gen-AI tools in higher education, especially in initial teacher education, and the implications of this use for education policies.

A qualitative approach was used with recourse to non-participant observation and narrative research methods through the analysis of experiences developed in Initiation to Professional Practice curricular unit of a Master' in Teaching. It was found that future teachers were able to use the ChatGPT as a tool to plan lessons and create digital educational resources, but the results obtained from its use always need careful and rigorous scrutiny and verification. Developing an entrepreneurial mindset in learning is important to increase creativity, innovation, and adaptability among preservice teachers. One also concludes that it is relevant to address and include issues relating to artificial intelligence in higher education, reflecting them particularly in regulations, legislation, and educational policy.

KEYWORDS: Generative Artificial Intelligence (Gen-AI), Entrepreneurial Mindset, Initial Teacher education, Education Policy.

DOI
https://doi.org/10.20368/1971-8829/1135999

CITE AS
Rodrigues, A.L., Cavaco, C., & Pereira, C. (2025). Exploring Generative AI tools in higher education: insights for policies. *Journal of e-Learning and Knowledge Society*, *21*(2), 61-72. https://doi.org/10.20368/1971-8829/1135999

1. Introduction

With the rapid development and widespread accessibility of Generative Artificial Intelligence (Gen-AI), it is paramount to understand its implications in various areas of society, which is particularly important in terms of knowledge creation and contribution to the Sustainable Development Goals (UNESCO, 2021), notwithstanding the necessary epistemological reflection on its use (Figueiredo, 2023).

In higher education, Artificial Intelligence (AI) has the potential to change teaching and learning, according to Rawas (2023). ChatGPT, as one of the best-known tools, offers potential benefits to support teaching and research, automated grading, administrative management, and human-computer interaction (Dempere et al., 2023). On the one hand, it can provide individualized recommendations to students, increase collaboration and communication, and improve their learning outcomes (Rawas, 2023). Ethical concerns and implementation issues have been identified regarding safety in student assessment and plagiarism, misuse, the possibility of misinformation, as well as wider social and economic impacts such as job displacement, digital literacy gap or decreased human interaction (Rawas, 2023; Dempere et al., 2023).

Given the emergence of these new technologies and the fact that technological development is an unavoidable process with repercussions on educational processes, it is imperative to study these issues, whether the benefits of using Gen-AI tools to support this process, with the development of diversified skills and entrepreneurial mindsets, or their possible adverse effects. Namely, the possibility of increasing inequalities in educational success, decreasing creativity, or the dangers it may present for the loss of learning and critical thinking skills (Chomsky, 2023)

[1] corresponding author – email: alrodrigues@ie.ulisboa.pt – address: Alameda da Universidade, 1649-013 Lisboa (Portugal)

© Italian e-Learning Association

or even the risk in the most critical visions of AI being able to gain autonomy (Damásio, 2024). This exploratory study aims to contribute to an objective reflection on how to capitalise on the benefits and promote entrepreneurial and critical mindsets while correcting and controlling all the risk factors.

This article was designed to understand how to integrate Gen-AI tools into higher education pedagogical practices, especially in initial teacher education, from a perspective of promoting critical thinking for a global citizenship education.

This study is qualitative, exploratory, and interpretative in nature, supported by a literature review and empirical data collection in 2024 in a class of thirteen students enrolled in the Master's Degree in Economics and Accounting Teaching in Portugal. Two Gen-AI tools, ChatGPT and Elicit, were trialled and their outputs analysed. The first because it is the best known and most widely used tool among students, and the second because of its potential for scientific writing, given that it identifies references with some reliability.

The final discussion also sought to address the implications of using these tools for educational policies in the light of current guidelines.

1.1 Challenges of Gen-AI tools

ChatGPT, as a Gen-AI tool in the educational environment, can bring significant improvements, with added value such as help conversationally with writing, learning, solving and assessment, as an assistant for instructors and a virtual tutor for students (Lo, 2023). In higher education, there are signs that students already use AI tools (De Winter et al., 2023), and the dominant determinant was behavioural intention, above all Habit, according to a study of students' acceptance and use of technology (Strzelecki, 2023a). This was confirmed by another complementary study, which, in addition to habit, mentions performance expectancy, and hedonic motivation (Strzelecki, 2023b).

The challenges, opportunities, disadvantages, and dangers of using this type of AI tools are currently under discussion (Fuchs, 2023), which is why studies at various levels are needed. Some studies have indicated immediate measures to mitigate the negative effects of the impact of ChatGPT. A literature review highlights measures related assessment methods and the necessary institutional policies. Rethinking assessment tasks to reduce the risk of plagiarism by requiring students to demonstrate their skills in real time and in person, for example. At the institutional level, it would be important to make AI-based writing detection tools available to teachers, as well as establishing anti-plagiarism guidelines to clarify the limits of using ChatGPT in teaching and learning (Lo, 2023).

Another study points to the possibility of empowering educators through other strategies, for example supporting them in detecting keywords frequently used by ChatGPT to be able to detect plagiarism. In the same vein, teachers can adapt course content, learning outcomes and assessment methods to circumvent ChatGPT. On the other hand, this chatbot can also be used by teachers to assess students' texts or by using it to generate lesson topics, test and exam questions, homework or product ideas and designs (De Winter et al., 2023).

In turn, one of the critical aspects that arises is the development of critical thinking and an entrepreneurial mindset, considering this as the attitude of people who want to start a new venture and who have a strong desire for autonomy, creativity, and the ability to face challenges. According to Zemlyak et al. (2022), it can be influenced and developed based on three criteria: i) entrepreneurial education, ii) capacity for innovation, and iii) risk-taking. According to Jardim (2022), entrepreneurial skills can include creativity and innovation, initiative, self-efficacy and resilience, strategic planning and evaluation, problem solving, transformational leadership, clear and visual communication, teamwork and networking, and digital communication.

A study on the effect of next-generation AI technology similar to ChatGPT on users' entrepreneurial activities revealed that: entrepreneurial users collect extensive user data through AI technology and analyse it intelligently to make judgements; they use technology to understand users' latent needs and obtain information; and the technology improves entrepreneurial intent, stimulates creative thinking, and drives and enhances the evolution of entrepreneurship (Zhou & Cen, 2023).

In this sense, the use of AI tools to aid the learning process can contribute to the development of critical thinking and entrepreneurial mindset, considering that AI technologies transform individual entrepreneurial capacity, assuming the democratisation of knowledge and the availability of resources (Ganuthula, 2025).

From a more constructive and training perspective, it will also be important to promote students' digital literacy in the use of Gen-AI tools (Ng et al., 2023). It is important to instruct students about the risks of relying on AI-based technologies. These risks include hallucinations, which are false responses generated by AI, presented as facts, not explained by the training data (Dempere et al., 2023).

For this reason, the need for a critical and informed approach to dealing with these evolving issues is emphasised (Chomsky, 2023). It is crucial to integrate these technologies responsibly, as a supplement to and not a replacement for human interaction (Fuchs, 2023), and there is a pressing need to regulate AI in Higher Education Institutions (HEIs).

© Italian e-Learning Association

1.2 Learning environments with AI tools and their risks and concerns

As far as initial teacher education is concerned, this phenomenon is even more relevant, since these students, as future teachers, will soon be training pupils in education systems. The use of an application like ChatGPT can help to engage in a complex discussion about the purposes of education and the problem of "education as a product", calling for activities that involve critical reflection on these themes. Simultaneously, political work is needed to guarantee the necessary measures for more meaningful educational changes (Heimans et al., 2023).

Large language models, such as ChatGPT or Elicit, can help create educational content, improve student engagement and interaction, and personalise learning experiences. It requires teachers and students to develop digital competences and literacies, with a strong focus on critical thinking and fact-checking strategies. They can also be used to generate summaries and draft texts in research, writing and problem-solving tasks, as well as providing skills for professional training (Kasneci et al., 2023). This study adds that AI tools can also support teachers in planning lessons and activities, including inclusive ones. As well as in assessment and evaluation tasks, grading, and individualised feedback to students. Not forgetting teacher professional development in updating knowledge and providing teachers with resources, summaries, and explanations of new teaching methodologies, technologies, and materials, for example.

A study on how ChatGPT can contribute to lesson planning, critical thinking, and openness in education found that this type of tool does not pose a threat to teacher education and schools. ChatGPT and other AI models can reduce teachers' workload, for example in creating assessment tasks or supporting feedback work (Banihashem et al., 2024), increases efficiency, simplifies administrative tasks, and allows for personalised learning experiences (Kelley & Wenzel, 2025), allowing them more time for quality teaching (Usher, 2025), and the development of entrepreneurial learning. It should be emphasised, however, that they should be seen as tools to improve and complement teachers' work, but not to replace it (Van den Berg & Du Plessis, 2023).

Also, lesson planning can be used to enable preservice teachers to analyse and think critically as it performs the task more quickly and can provide new ideas that can be used. As mentioned, teachers and future teachers could discuss the functions and working mechanism of the chatbot, as well as the limitations and problems associated with its use, thus developing their critical thinking skills (Hong, 2023).

Much of the literature found on AI in education presents a positive and enthusiastic view of the potential of this interaction, despite the criticisms and concerns of various thinkers from other disciplinary areas, particularly philosophers. More critical currents express concerns about the direction in which technology is evolving, with personalised algorithms and chatbots that simulate human communication, and which consider that this could harm the development of critical thinking and science (Chomsky, 2023). This author refers to AI's lack of concern for understanding and emphasises the importance of cognitive science in this context, insofar as AI, as evidenced by ChatGPT, often focuses on simulation based on a set of data rather than real understanding. Damásio (2018) even says that artificial intelligence is a pale idea of what human intelligence really is.

This highlights the pressing risk of individuals losing their autonomy and also the misinformation that can arise from these tools, particularly due to so-called hallucinations, highlighting the importance of education, the critical thinking required and the organisation of society to combat these risks.

1.3 AI, critical thinking and entrepreneurial mindset development

Despite the dangers and risks announced, Gen-AI tools can be both a promoter of an entrepreneurial mindset and an innovative form of professional practice for future teachers. Recent research explores the intersection of artificial intelligence, learning environments, and entrepreneurial mindset development in higher education. AI learning in universities can significantly enhance entrepreneurial performance among students, with entrepreneurial orientation and strategic entrepreneurship playing key mediating roles (Khalid et al., 2020).

On the one hand, entrepreneurship education supported by Generative Artificial Intelligence can be effective in developing the entrepreneurial intentions of university students, emphasising the importance of supportive university ecosystems in fostering student entrepreneurship (Xie & Wang, 2025).

Teaching and learning methodologies used in AI-supported entrepreneurship education can influence the development of entrepreneurial mindset, on the other hand. In a systematic review of the literature, conducted by Park et al. (2025), which specifically explored the educational effects of LLMs (Large Language Models) such as ChatGPT, their integration and the ways in which they enhance students' creative thinking, concluded that they improve self-efficacy, cognitive engagement and creative problem solving, supporting entrepreneurship education in areas such as business model development, market analysis and multicultural communication. Despite these benefits, concerns remain about overconfidence, ethical risks, and the need for critical thinking structures.

© Italian e-Learning Association

Another study investigates the intersection between generative AI tools and experiential learning in business education, examining how students interact with and adapt to different AI modalities in relation to real-world experiences. It was found that this integrated approach enables novice users to overcome creative barriers, accelerates skill acquisition, and creates a dynamic interaction between AI-generated insights and real-world validation. Critical challenges were also identified, particularly regarding prompt engineering patterns and the need for more intuitive AI interfaces for educational contexts (Wang, 2025). In the same vein, Jarvis et al. (2021) found that effective learning environments for developing an entrepreneurial mindset incorporate team-based, student-centered pedagogies and focus on cultivating key capacities such as risk-taking, adaptability, and resilience, that they should also be worked on and developed by students in higher education.

Thus, we can conclude that AI-enabled learning environments, despite the associated risks and concerns that we must minimise, in conjunction with entrepreneurial education and critical thinking development, are relevant to learning and improving the quality of higher education and initial teacher education.

2. Method

This exploratory study was based on a qualitative and interpretative approach supported by a literature review complemented by experimentation, non-participant observation and narrative research. This was justified given that some of the participants had no experience in using any generative artificial intelligence tools, so it was necessary to let them experiment with supervision and then non-participant observation in class, after which they were asked to write a narrative about the experience.

Regarding the literature review, given the recent availability of these Gen-AI tools to the public, scientific studies published in the Scopus and WoC on this subject are still scarce, and the relevance of the articles mobilised was prioritised over quantity.

The specific questions of the study focused on: What types of tasks or learning activities can be developed using ChatGPT in teacher education? And How can these pedagogical practices contribute to stimulating critical and entrepreneurial thinking among future teachers?

Data was collected through non-participant observation and narrative research in a class of thirteen preservice-teachers in a master' programme in economics and accounting teaching in the second semester of 2024.

The following criteria were used to categorise the data collected: i) what are the main difficulties and constraints of using ChatGPT; ii) what are the benefits in the planning and preparation of classes; iii) what are the adaptations to instructional methods, form of assessment, and pedagogical practices needed to use ChatGPT in the teaching and learning process in an innovative, ethical and safe way.

In addition to the data from the empirical study supported by the literature review, and given the nature and need for experimentation with these new emerging technologies, two Gen-AI tools, ChatGPT and Elicit, were trialled and their outputs analysed in two moments, December 2023 and July 2025. Elicit is a research assistant using language models like ChatGPT to automate parts of researchers' Literature Review. It shows relevant papers and summaries of key information about those papers, and presents the articles found in a table.

Besides the best known and most used, ChatGPT, we selected Elicit because it is complementary in that it provides the references used in its outputs and can be used by teachers without the necessary critical reflection, which poses an increased risk if the sources are not verified.

The Gen-AI, Elicit and ChatGPT 3.5V/4v tools, both used in the free version (which will probably be the one most used by students), were tested by the researchers, with various objectives and using different prompts, and some exemplary outputs were analysed in the results. ChatGPT 3.5v was also tested by all the pre-service teachers in an academic assignment requested by teacher in the Initiation to Professional Practice unit of the master's degree in teaching, which trains future secondary school teachers, in 2024.

In this course, using the technique of non-participant observation, with field notes, the development of the work requested of the future teachers was monitored, which consisted of the creation of a digital teaching resource, its presentation to the class and final reflection on it. At the same time, narrative research was used through the final work of the course, which consisted of writing a reflective text by the students with the following guidelines: i) Description of the educational resource created in ChatGPT; ii) Main difficulties and constraints in using it; iii) Potential, advantages, and disadvantages of integrating ChatGPT into the teacher's work; iv) Implications of Chat GPT in the teaching and learning process in terms of ethics and safety; and v) Final considerations.

These issues were previously addressed in classes, considering some of the implications mentioned by Ratten and Jones (2023) in their study about implications of ChatGPT for management educators. The challenges encompass the need for incorporating real-life examples in assessment, integrating artificial

© Italian e-Learning Association

intelligence into the learning experience, anticipating dilemmas through contextualized resources, integrating recent technologies into management contexts, as well as addressing uncertainty around ChatGPT through open discussions.

The study's qualitative approach took a naturalistic and hermeneutic perspective, using content analysis of the field notes from non-participant observation and of student narratives conducted as a final assignment (Amado & Freire, 2014; Bardin, 2013). This methodology is often used in research in the social sciences and education, as the researcher is dealing with complex situations in which it is difficult to select variables. This way, the researcher seeks to describe and analyse a phenomenon and its interactions (Bogdan & Biklen, 1994), and does not intend to quantify or generalise.

The narrative research method provides in-depth knowledge of the respondents' experiences and is based on a constructivist and interpretive epistemology (Rabelo, 2011). It considers that a narrative can express the complexity of the experience, as well as the relationships and uniqueness of each action (Bolívar et al., 1998). Therefore, knowledge is obtained through an account that captures the details of meanings beyond factual statements or abstract propositions.

The validity and reliability of the study were ensured by the depth, transparency, and reflexivity of the research process, taking into account the deep engagement with the data, reflexivity, and triangulation with three researchers, and the theoretical support studied prior to data collection, complemented by the description of procedures and field notes. The qualitative and interpretative approach of the study values the richness and complexity of the phenomenon studied, rather than its replicability (Morse et al., 2002; Denzin & Lincoln, 2000).

Finally, it should be noted that informed consent was obtained from the study participants, thirteen preservice teachers, and their identity and anonymity were safeguarded, in accordance with the institution's ethics charter and international benchmarks, as Ethical Guidelines for Educational Research (BERA, 2011).

The final discussion also sought to address the implications of using these tools for educational policies in light of current guidelines. Especially given the current spread of these tools among students and the lack of generalised rules and practices regarding the ethical limits of their use.

3. Results and Discussion

The results obtained from the data collected were divided into two parts: one relating to experimentation with Gen-AI tools as an example or testing, and other to observation and narratives in master' in teaching. This section presents the data as it was obtained, followed by the interpretation and discussion of these results.

3.1 Operation and example outputs from Gen-AI tools

One of the examples tested was to request a short literature review text from both platforms, Elicit and ChatGPT. The output from Elicit, when prompted with the words "ChatGPT teacher education", based on the four articles it selected, was as follows (Elicit, 2023):

> *A range of studies have explored the potential of ChatGPT in teacher education. Berg (2023) and Rahman (2023) both highlight the benefits of ChatGPT, such as providing lesson plans and personalized feedback, but also caution against potential threats, including cheating and diminished critical thinking skills. Pokkakillath (2023) further emphasizes the potential for instant feedback and personalized learning experiences, while calling for further research on its impact. Halaweh (2023) provides strategies for responsible implementation, underscoring the need for a balanced approach to leveraging ChatGPT in education.*

With the same prompt, in 2025, we get the following output:

> *Recent research explores the integration of ChatGPT in teacher education, particularly for language instruction and lesson planning. ChatGPT can enhance teacher preparation by providing personalized feedback and supporting the development of didactic knowledge and self-reflection skills (Schauber, 2025). It offers valuable resources for lesson planning and can promote critical thinking in teacher education (van den Berg & du Plessis, 2023). Pre-service teachers have reported positive experiences using ChatGPT for creating engaging educational materials (Tunjera & Chigona, 2023). The AI tool has the potential to revolutionize personalized learning and provide support for educators in simplifying complex concepts and enhancing student engagement (Govindaraja et al., 2024). However, researchers emphasize the need for careful management and critical evaluation of ChatGPT's limitations and potential biases (Schauber, 2025; van den Berg & du Plessis, 2023). Overall, ChatGPT shows promise in transforming teaching methodologies and*

© Italian e-Learning Association

classroom interactions, but its implementation requires thoughtful consideration.

The articles used exist, the text presented is based on four articles in the free version, and the evolution in text quality is significant, even though the selected articles may include conference proceedings. Other articles are also presented with their abstract summary. We have the option of using some filters, such as publication year, study type and abstract keywords. And we can also add columns with information on intervention, intervention effects, main findings, outcome measured, study design or limitations.

It is a tool that allows you to quickly search for articles and summarise them in a short text with references. Depending on how demanding and rigorous it is, it can be useful as a study aid for students and as a starting point for more complex research. Of course, with the necessary verification of the veracity of the content and questions of ethical transparency ensured.

In turn, ChatGPT 3.5 (OpenAI, 2023) was also asked to help with the literature review on: "the integration and ways of using ChatGPT in initial teacher education by preservice teachers, and the implications of this use for educational policies".

In December 2023, the output from the ChatGPT gives us a text that is acceptable but not linked to references and cannot be qualified as a scientific text because it has no references to support it. We do not know which sources were consulted, although there do not appear to be any noteworthy errors or inconsistencies.

In July 2025, with ChatGPT version 4 free, the output was as follows:

The integration of artificial intelligence (AI) tools such as ChatGPT into initial teacher training has attracted growing scholarly attention, particularly regarding how preservice teachers use these technologies to support pedagogical development. Studies by Trust et al. (2023) and Holmberg and Wiese (2024) highlight that preservice teachers commonly use ChatGPT for lesson planning, content clarification, and generating differentiated instructional materials. These tools are seen as extensions of reflective practice and collaborative planning, enabling more efficient preparation and deeper engagement with curriculum design (König et al., 2023). Furthermore, ChatGPT facilitates the acquisition of pedagogical knowledge by offering accessible summaries of teaching theories and classroom management strategies, serving as a supplemental tutor that reinforces academic content.

From a policy perspective, the adoption of ChatGPT in teacher training programs prompts critical reconsiderations of assessment protocols, academic integrity, and digital equity. Scholars such as Selwyn (2023) and Williamson and Eynon (2024) argue for the urgent inclusion of AI literacy in teacher education curricula, emphasizing the importance of equipping future educators with the skills to evaluate and ethically implement AI tools in classroom contexts. Educational policies must address the risk of overreliance, biases in AI outputs, and disparities in access to digital tools, particularly in underserved institutions. In response, policy recommendations call for the development of regulatory frameworks that promote responsible AI integration, protect student data, and support inclusive teacher training environments (Luckin et al., 2023). The literature broadly agrees that embracing AI in teacher education holds significant promise, but must be guided by deliberate pedagogical and ethical frameworks.

The quality of the text and the ability to integrate references and list them at the end was substantially improved. And we could also continue to interact in 'dialogue' with the platform. However, although references are provided, most of them contain errors or do not exist, and some of them have even been invented. In other words, users cannot yet rely on this type of platform to carry out small literature reviews with the required accuracy and minimum quality.

3.2 Non-participant observation and narratives in master' in teaching

Based on the observation and narratives constructed by the preservice teachers, it was possible to analyse some educational resources created using ChatGPT. One could analyse also the main difficulties and constraints in its use, advantages, disadvantages, and potential of integrating ChatGPT into the teacher's work, as well as the implications for the teaching and learning process, and future prospects.

Various educational resources had been created by preservice teachers, from lesson plans, content for PowerPoint presentations, practical activities and games, a script for a video, a work, exercise, or debate script, formative or consolidation worksheets, to an assessment test corrected at the end by the pupils with the support of ChatGPT.

The main difficulties and constraints encountered were: difficulty due to unfamiliarity with the tool and how to ask the most appropriate questions for the objectives; the need to reformulate the prompt (input, stimulus or question) and add context; incomplete or

© Italian e-Learning Association

even incorrect outputs; absence or errors in the references and sources of the information; limitation due to not providing images, graphics or videos; lack of creativity; obtaining results in Brazilian instead of Portuguese (although the translation done whenever requested); time limitation of the information provided by ChatGPT, particularly in terms of more up-to-date data statistics, especially as these preservice teachers are from the field of economics, which requires constant updating.

Regarding the perceived advantages, the respondents highlighted the usefulness of ChatGPT as a tool to help the teacher's work, referring to "the simplicity of the tool and the ease of use, considering that ChatGPT provides results immediately and access to personalised responses", including in the promotion of active teaching-learning strategies, preparation/ elaboration of teaching resources and support in carrying out more administrative tasks. It makes it possible to prepare "varied resources such as activities and assessments or reports capable of providing feedback on student progress". In addition, it allows "quick access to information and research", and consequently "freeing up teachers' time". It also makes it possible to "get a variety of different answers, emphasising that the AI tool itself has the option to regenerate response".

The main disadvantages pointed by respondents out were: the possibility of obtaining incomplete or incorrect information, with "possible errors and lack of context", so there will be a need to validate and verify the rigour of all the information obtained with a critical sense; "doubts about the ability to produce effectively correct, coherent and adapted scientific content"; outdatedness in certain types of questions; dependence on technology; "student distraction, plagiarism, and excessive reliance on the internet"; dependence on the quality and quantity of data" used; and "a gap in training in the area of Information and Communication Technologies".

However, the following potentialities were mentioned: the use of ChatGPT "for students' self-study" and "to help clarify doubts, contributing to the personalisation of teaching"; be a "tool to support teaching and learning", addressing this aspect directly with students; it can also "help teachers prepare their lessons and even carry out dynamic tasks in the classroom", namely as a "research assistant" in problem-based learning methodologies, formulating questions for project work or explaining a particular topic. It can also be used, for example to: "search for more complex information, get specific examples, ask for feedback, help with daily activities, lesson plans, think or exchange ideas/points of view, use chat as a discussion tool, ask for advice, search for thematic authors, ask for help to start something more complex (it can be a starting point for organising ideas), translation (...), ask for complex theories to be explained in a simplified way, get immediate answers to questions posed in class, generate games and activities, or find authors or studies on a theme".

Regarding the implications mentioned by respondents, it was considered that ChatGPT can "promote self-regulated learning processes by the student and create the stimulus for teachers to take a greater role in the development of procedural and metacognitive knowledge", and that "the use of these tools can be very effective if the teacher is able to monitor their use by the students, sensitising them to the importance of using them responsibly and ethically". "Teachers have to be vigilant and find ways to validate whether or not a student knows a certain piece of content", for example, with class presentations. Thus, "the biggest challenge is the authenticity of the work produced", so "we must warn students to be critical when using this tool". Our role as teachers is also to teach students how to search for and select relevant and scientifically correct information," explaining "what is right and what is wrong", warning about plagiarism and issues related to privacy and data security.

Finally, according to respondents' answers, it can be concluded that ChatGPT is a tool that will have "significant potential to transform education", "can innovate and create more attractive and differentiated teaching resources", and "offer personalisation in the teaching-learning process, additional support for the teacher, more comprehensive access to relevant content and even improvements in educational efficiency", both for the teacher and the students.

Nevertheless, it was felt that there is an urgent need for training and "the acquisition of computer skills relating to tools of this kind from the user's point of view", so that they can be used with awareness and a critical sense. An interesting conclusion of one of the respondents was that ChatGPT can threaten the banking teacher (Freire, 1987) "in his role as monopoliser of knowledge (factual and conceptual) but can help to achieve higher-order knowledge (procedural and metacognitive) through student-centred teaching and learning methodologies".

This data analysis of the answers obtained was carried out without using ChatGPT. The raw data was entered as inputs into ChatGPT and asked to be summarised, but it was considered not to be of sufficient quality to be used. Although the information was correct, it could not be presented in an equally rigorous way.

3.3 Discussion

In the results presented from experimenting with Gen-AI tools, we can see that although the information presented does not present any notable errors, its quality is not high in terms of writing and accuracy, and above all, with regard to the exact sources from which it was gathered. In the case of the Elicit tool, it is noteworthy that although the references are

© Italian e-Learning Association

presented, the way in which they are selected is not mentioned, and we do not know how the quality of the articles considered is assessed.

In other words, we don't know how the information was generated, we don't have access to the selection criteria used to search for the articles used and we run the risk of there being some kind of distortion of knowledge, losing the reliability of the results obtained.

As the literature points out (e.g. Rawas, 2023; Dempere et al., 2023; Strzelecki, 2023a) support use of AI tools can serve as a support, but they do not replace a teacher or researcher, and there is a need to verify and validate the information obtained. Figueiredo (2023) notes that the outputs of large-scale language models require awareness of the principles and conditions of validity of the knowledge that can be obtained from them.

On the other hand, by experimenting with these tools, we have realised that it is important how the questions or prompts are asked (words, phrases or messages given in the conversation), the degree of knowledge on the subject and the depth and continuity of the conversation. The more detailed the information provided, the better the outputs generated.

Well-designed prompts have the potential to transform interactions with GenAI in teaching and learning in higher education, so improve the interaction with AI tools, it is important to develop prompt literacy as an academic skill. ChatGPT or any other chatbot can help the teacher's work, namely commenting on students' texts, evaluating them, and making suggestions for improvement, according to the prompt used (Moura & Carvalho, 2024). Or when asked to prepare a test, statement or script for an activity to be carried out by the students, the quantity and quality of details provided in the prompt will enable a product to be obtained that is more in line with what is required.

The literature corroborates that high-quality prompt engineering skills predict the quality of LLM results, suggesting that prompt engineering is indeed a necessary skill for using generative AI tools. Furthermore, certain aspects of AI literacy may play a role in high-quality prompt engineering and the targeted adaptation of LLMs in education (Knoth et al., 2024).

The results of the observation and narratives showed the potential of ChatGPT in terms of rapid access to substantial amounts of filtered information, as a research and support tool for teaching and learning. Whether for creating various educational resources, supporting administrative work, for students' self-study or clarifying doubts. In addition to the advantages, the tool has some significant limitations for the average user that need to be considered. These limitations are possible errors and omissions or gaps in outputs and ethical and security issues. In this way, the information has to be validated by the teacher or expert, and its quality is not guaranteed, especially when no sources are presented for verification. This requires critical thinking skills on the part of users and the need for specific training in digital literacy, as the literature has indicated.

Despite the potential benefits of using AI tools for personalised learning, feedback, and the provision of adapted educational resources, it is important to weigh up the challenges of loss of human interaction, prejudices, and ethical implications.

Therefore, in order to face these challenges, HEIs need support students in developing activities and tasks with these tools with a focus on improving student learning. On the other hand, they should invest in training their teaching staff to use and adapt to technology, as well as providing support for its effective and ethical use (Strzelecki, 2023b).

One knows most students consider that they check the reliability of online information, and teachers report that they have received training and feel prepared to teach responsible use of the Internet, according to the "Civic and Citizenship Education Study 2022 International Report" (Schulz et al., 2022). Although, new digital forms of communication and artificial intelligence tools seem to be increasing and have an ever-greater impact on generating more and less transparent information online. Hence the importance of training and educating citizens about the issues associated with digital technologies.

In today's society, we are obsessed with information and data. According to Han (2022), we understand the world through information and face-to-face experience is lost, and too much information can be counterproductive.

It will therefore be essential to train teachers and students in the advantages and limitations of using ChatGPT, whether in preparing lessons and assignments, or in relying on biased, limited, or even incorrect or false data. It is therefore crucial to raise students' awareness of academic integrity policies, to discuss the importance of academic honesty, and to teach students to use other reliable sources to verify, evaluate and corroborate the accuracy of the information provided by ChatGPT (Dempere et al., 2023).

Recognising the need to reflect on AI in instructional practices and teacher training programmes, Kelley and Wenzel (2025) suggest a multi-phase approach to integrating AI into higher education through individual exploration, partnerships with teachers, implementation of pilot studies and expanded partnerships, and professional development.

Therefore, ChatGPT represents an opportunity for HEIs to improve the quality and accessibility of education (Figueiredo, 2023). However, its

© Italian e-Learning Association

implementation should be approached with caution and with a clear understanding of the opportunities and challenges involved. Insofar as these new technologies can contribute to increasing the noise and complexity of the educational process and can jeopardise equity, especially in less developed countries where access to technology is unequal or scarce.

In spite of the framework already put forward by the European Union, with the preparation of a Law and the "Ethical guidelines on the use of artificial intelligence (AI) and data in teaching and learning for Educators" (European Commission, 2022), or by the USA, with the "Blueprint for an AI Bill of Rights" (White House Office, 2022), and the report "Artificial Intelligence and Future of Teaching and Learning: Insights and Recommendations" (U.S. Department of Education, 2023), we still lack regulations that allow artificial intelligence to evolve ethically and safely. Following the U.S. Department of Education, Office of Educational Technology, policies are urgently needed to highlight the importance of using AI to enhance learning outcomes while ensuring data quality, promoting equity, and maintaining human oversight in educational decision-making.

In its report "AI and education: guidance for policy-makers", UNESCO (2021) made several policy recommendations too, of which we emphasise: define a system-wide vision of AI, strategic priorities, and education policies; adopt a humanistic approach as an overarching principle for AI and education policies; or build a trusted evidence base to support the use of AI in education. That said, it is clear that is critical to analyse the influence of AI on higher education, including in initial teacher education, so that it can be the subject of legislation and framed in educational policy.

Xiao et al. (2023) examined ChatGPT policies implemented at the top 500 universities according to the 2022 QS World University Rankings from around the world, including their existence, content, and issuance dates, concluding that there is significant variation in university policies. Less than a third of the universities included in this study implemented ChatGPT policies, and of the universities with ChatGPT policies, approximately 67% (more than double the number of universities that banned it) adopted ChatGPT in teaching and learning.

Also, An et al. (2025), in a study of 50 leading US universities on the use of generative AI in academic and administrative activities, concluded that although there is growing adoption of AI, there are still significant gaps in institutional policies, highlighting the need for clear and comprehensive regulation.

4. Conclusions

Literacy in generative AI will be indispensable for providing students with the skills they need to use AI systems critically, ensuring that they become active and discerning users. At the same time, prompt engineering makes it possible to improve the outputs generated in a more precise way and enables educators and students to maximize the usefulness of the educational resources created by AI, as concluded by several authors (e.g. Bozkurt, 2023 or Lee & Palmer, 2025).

This study corroborates that, for the development of AI literacy, it is important to acquire proficiency in understanding, interacting with and critically evaluating Gen-AI technologies, which is essential not only for the current digital age, but also to face the future. It is also important to understand the ethical considerations, prejudices, and limitations inherent in such systems, as well as to promote critical thinking and digital citizenship among students, teachers, and researchers.

It will therefore be relevant to integrate Gen-AI literacy into the curriculum to cultivate a new generation of informed and responsible users, and teachers will be able to adapt their teaching methods to incorporate AI, preparing students for a future where it is an integral part of their personal and professional lives.

The impact of AI on education and higher education cannot be ignored, and it is essential to integrate it into teacher education as well, according to this study and others reported in the literature (e.g. Kelley & Wenzel, 2025). It is therefore suggested to look for new learning outcomes, such as learning and teaching skills with GenAI, AI literacy, promote interdisciplinarity, new pedagogies, learning and assessment centred on more practical activities in the classroom as Chiu (2023) also mentioned. In particular, contextualised assessment activities.

Despite existing international frameworks from the European Union and the US, the lack of comprehensive regulations and the necessary discussion and analysis regarding the integration of AI into education systems makes it difficult to move forward ethically and safely. Educational policies are needed to strengthen competences and control the risk factors of Gen-AI in order to ensure its equitable, inclusive and ethical use.

Based on this study and literature, especially from UNESCO (2021, 2023), the recommendations include emphasizing humanistic approach, mobilizing interdisciplinary planning, empowering teachers, and enhancing trust and safety. From the latest update of the 2023 report, in 2025, highlight that the first step in regulating generative AI (GenAI) in education is to pass or develop national data protection laws with

© Italian e-Learning Association

consistent implementation. Specific government strategies should be reviewed or adopted, integrating AI regulations and ensuring provisions for the ethical use of AI in various sectors, namely education, where AI should be used responsibly and transparently. Copyright laws need to be updated to consider AI-generated content, as current laws, such as those in the EU and the US, do not address the implications of GenAI results. It is also important to develop institutional capacity for the appropriate use of generic AI in education through training programmes and ongoing support for teachers and researchers. Public debates and policy discussions are also recommended to explore the long-term implications of generic AI for education, knowledge creation and research, ensuring the development of human-centred AI policies.

Acknowledgements

This work was supported by National Funds through FCT-Portuguese Foundation for Science and Technology, I.P., under the scope of UIDEF - Unidade de Investigação e Desenvolvimento em Educação e Formação, UIDB/04107/2020, https://doi.org/10.54499/UIDB/04107/2020

References

Amado, J., & Freire, I. (2014). Estudo de caso na Investigação em Educação. In J. Amado (Org.), *Manual de investigação qualitativa em educação [Handbook of qualitative research in education]* (2nd ed., pp.121-168). Imprensa da Universidade de Coimbra.

An, Y., Yu, J. H. & James, S. (2025). Investigating the higher education institutions' guidelines and policies regarding the use of generative AI in teaching, learning, research, and administration. *International Journal of Educational Technology in Higher Education, 22*(10). https://doi.org/10.1186/s41239-025-00507-3

Banihashem, S. K., Kerman, N. T., Noroozi, O. et al. (2024). Feedback sources in essay writing: peer-generated or AI-generated feedback? *International Journal of Educational Technology in Higher Education, 21*(23). https://doi.org/10.1186/s41239-024-00455-4

Bardin, L. (2013). *Análise de Conteúdo [Content Analysis]*. Edições 70.

BERA (2011). *Ethical Guidelines for Educational Research*. https://eera-ecer.de/about-eera/ethical-guidelines

Bogdan, R., & Biklen, S. (1994). *Investigação Qualitativa em Educação. Uma introdução à teoria e aos métodos [Qualitative Research in Education. An introduction to theory and methods]*. Porto Editora.

Bolívar, A., Domingo, J., & Fernández, M. (1998). *La investigación biográfico–narrativa en educación. Guía para indagar en el campo [Biographical-narrative research in education. A guide to investigating the field]*. Grupo FORCE, Universidad de Granada, y Grupo Editorial Universitario.

Bozkurt, A. (2023). Unleashing the Potential of Generative AI, Conversational Agents and Chatbots in Educational Praxis: A Systematic Review and Bibliometric Analysis of GenAI in Education. *OpenPraxis, 15*(4), 261–270. https://doi.org/10.55982/openpraxis.15.4.609

Chiu, T. K. F. (2023). Future research recommendations for transforming higher education with generative AI. *Computers and Education: Artificial Intelligence*, 100197. https://doi.org/10.1016/j.caeai.2023.100197

Chomsky, N. (2023, May 2). ChatGPT contra o pensamento crítico [ChatGPT against critical thinking]. *Outras Palavras Newspaper*. https://outraspalavras.net/tecnologiaemdisputa/chomsky-o-chatgpt-contra-o-pensamento-critico/

Damásio, A. (2024, February 23). Ciclo Futuros da Educação, Cátedra UNESCO. *Diário de Notícias Newspaper*. https://files.quickcom.pt/Files/Imprensa/2024/02-23/0/5_3332029_B32CE058F3214B9EB0FD5B8474DD604F.pdf

Denzin, N. K., & Lincoln, Y. S. (2000). Introduction: The Discipline and Practice of Qualitative Research. In N. K. Denzin, & Y. S. Lincoln (Eds.), *Handbook of Qualitative Research* (2nd ed., pp. 1-34). Sage Publications.

De Winter, J.C.F., Dodou, D., & Stienen, A.H.A. (2023). ChatGPT in Education: Empowering Educators through Methods for Recognition and Assessment. *Informatics, 10,* 87. https://doi.org/10.3390/ informatics10040087

Dempere, J., Modugu, K., Hesham, A., & Ramasamy, L.K. (2023). The impact of ChatGPT on higher education. *Frontiers in Education, 8,* 1206936. https://doi.org/10.3389/feduc.2023.1206936

Elicit (2023). *AI Research Assistant* (Dec 28th) [Large language model]. https://elicit.com

Elicit (2025). *AI Research Assistant* (Jul 29th) [Large language model]. https://elicit.com

BERA (2011). Ethical Guidelines for Educational Research. https://eera-ecer.de/about-eera/ethical-

© Italian e-Learning Association

guidelines_European Commission (2022). *Ethical guidelines on the use of artificial intelligence (AI) and data in teaching and learning for educators*. Directorate-General for Education, Youth, Sport and Culture. Publications Office of the European Union. https://data.europa.eu/doi/10.2766/153756

Figueiredo, A. D. (2023, June 30). Inteligência Artificial Generativa e Construção de Conhecimento [Generative Artificial Intelligence and Knowledge Construction]. [Personal communication]. In *Processamento de Linguagem Natural: Tendências e Aplicações Práticas Conference.* Coimbra University, Portugal. https://doi.org/10.13140/RG.2.2.25801.52328

Freire, P. (1987). *Pedagogia do oprimido [Pedagogy of the Oppressed]* (17th ed.). Paz e Terra.

Fuchs, K. (2023). Exploring the opportunities and challenges of NLP models in higher education: is Chat GPT a blessing or a curse. *Frontiers in Education, 8*. https://doi.org/10.3389/feduc.2023.1166682

Ganuthula, V. R. (2025). The Solo Revolution: A Theory of AI-Enabled Individual Entrepreneurship, *Computers and Society*, https://doi.org/10.48550/arXiv.2502.00009

Han, B.C. (2022). *Não-Coisas. Transformações no mundo em que vivemos. [Non-Things. Transformations in the world we live in].* Relógio d´Água.

Heimans, S., Biesta, G., Takayama, K., & Kettle, M. (2023). ChatGPT, subjectification, and the purposes and politics of teacher education and its scholarship. *Asia-Pacific Journal of Teacher Education, 51*(2), 105-112. https://doi.org/10.1080/1359866X.2023.2189368

Hong, W.C.H. (2023). The impact of ChatGPT on foreign language teaching and learning: Opportunities in education and research. *Journal of Educational Technology and Innovation, 5*(1), 37-45. https://jeti.thewsu.org/index.php/cieti/article/view/103

Jardim, J. (2022). Competências Empreendedoras para Ser Bem-Sucedido no Mundo Global e Digital: proposta de um quadro de referência. [Entrepreneurial Skills for Success in the Global and Digital World: Proposal for a Reference Framework]. *Video Journal of Social and Human Research, 1*(2), 1-24. https://doi.org/10.18817/vjshr.v1i2.24

Jarvis, C., Gaggiotti, H., & Kars S. (2021). Is It All in the Mindset? Team Coaching, Psychological Capital, and the Collaborative Development of an Entrepreneurial Mindset. In E. Vettraino, & B. Urzelai (Eds.), *Team Academy: Leadership and Teams* (1st ed.). Routledge. https://doi.org/10.4324/9781003163121

Kasneci, E., Sessler, K., Küchemann, S., Bannert, M., Dementieva, D., Fischer, F., Gasser, U., Groh, G., Günnemann, S., Hüllermeier, E., Krusche, S., Kutyniok, G., Michaeli, T., Nerdel, C., Pfeffer, J., Poquet, O., Sailer, M., Schmidt, A., Seidel, T., Stadler, M., Weller, J., Kuhn, J., & Kasneci, G. (2023). ChatGPT for good? On opportunities and challenges of large language models for education. *Learning and Individual Differences, 103,* 102274. https://doi.org/10.1016/j.lindif.2023.102274

Kelley, M., & Wenzel, T. (2025). Advancing Artificial Intelligence Literacy in Teacher Education Through Professional Partnership Inquiry. *Education Sciences, 15*(6), 659. https://doi.org/10.3390/educsci15060659

Khalid, N., Kolivand, H., Balas, V.E., Paul, A, & Ramachandran, V. (2020).Artificial intelligence learning and entrepreneurial performance among university students: evidence from Malaysian higher educational institutions. *Journal of Intelligent & Fuzzy Systems, 39*(4), 5417-5435. https://doi.org/10.3233/JIFS-189026

Knoth, N., Tolzin, A., Janson, A., & Leimeister, J. M. (2024). AI literacy and its implications for prompt engineering strategies. *Computers and Education: Artificial Intelligence, 6*, 100225. https://doi.org/10.1016/j.caeai.2024.100225.

Lee, D., & Palmer, E. (2025). Prompt engineering in higher education: a systematic review to help inform curricula. *International Journal of Educational Technology in Higher Education, 22*(7). https://doi.org/10.1186/s41239-025-00503-7

Lo, C.K. (2023). What Is the Impact of ChatGPT on Education? A Rapid Review of the Literature. *Education Sciences*, *13*, 410. https://doi.org/10.3390/educsci13040410

Morse, J. M., Barrett, M., Mayan, M., Olson, K., & Spiers, J. (2002). Verification Strategies for Establishing Reliability and Validity in Qualitative Research. *International Journal of Qualitative Methods, 1*(2), 13-22. https://doi.org/10.1177/160940690200100202

Moura, A., & Carvalho, A. A. (2024). Literacia de Prompts para Potenciar o Uso da Inteligência Artificial na Educação. [Prompt Literacy to Enhance the Use of Artificial Intelligence in Education.]. *RE@D - Revista de Educação a Distância e Elearning, 6*(2), e202308. https://doi.org/10.34627/redvol6iss2e202308

Ng, D. T. K., Leung, J. K. L., Su, J., Ng, R. C. W., & Chu, S. K. W. (2023). Teachers' AI digital competencies and twenty-first century skills in the post-pandemic world. *Educational*

© Italian e-Learning Association

Technology Research and Development, *71*,137–161. https://doi.org/10.1007/s11423-023-10203-6

OpenAI. (2023). *ChatGPT* (Mar 14, 3.5 version) [Large language model]. https://chat.openai.com/chat

OpenAI. (2025). *ChatGPT* (Jul 29, 4 version). [Large language model]. https://chat.openai.com/chat

1. Park, J.-H., Kim, S.-J., & Lee, S.-T. (2025). AI and Creativity in Entrepreneurship Education: A Systematic Review of LLM Applications. *AI, 6*(5), 100. https://doi.org/10.3390/ai6050100

Rabelo, A. O. (2011). A importância da investigação narrativa na educação. [The importance of narrative research in education]. *Educação & Sociedade*, *32*(114), 171-188. https://doi.org/10.1590/S0101-73302011000100011

Ratten, V., & Jones, P. (2023). Generative artificial intelligence (ChatGPT): Implications for management educators. *The International Journal of Management Education, 21*(3), 100857. https://doi.org/10.1016/j.ijme.2023.100857

Rawas, S. (2023). ChatGPT: Empowering lifelong learning in the digital age of higher education. *Education and Information Technologies*. https://doi.org/10.1007/s10639-023-12114-8

Schulz, W., Ainley, J., Fraillon, J., Losito, B., Agrusti, G., Damiani, V., & Friedman, T. (2022). *Education for Citizenship in Times of Global Challenge*. IEA International Civic and Citizenship Education Study International Report. https://www.iea.nl/sites/default/files/2023-12/ICCS-2022-International-Report.pdf

Strzelecki, A. (2023a). To use or not to use ChatGPT in higher education? A study of students' acceptance and use of technology. *Interactive Learning Environments*. https://doi.org/10.1080/10494820.2023.2209881

Strzelecki, A. (2023b). Students' Acceptance of ChatGPT in Higher Education: An Extended Unified Theory of Acceptance and Use of Technology. *Innovative Higher Education*. https://doi.org/10.1007/s10755-023-09686-1

an den Berg, G., & du Plessis, E. (2023). ChatGPT and Generative AI: Possibilities for Its Contribution to Lesson Planning, Critical Thinking and Openness in Teacher Education. *Education Sciences, 13,* 998. https://doi.org/10.3390/educsci13100998UNESCO (2021). *AI and education: Guidance for policy-makers.* United Nations Educational, Scientific and Cultural Organization. https://doi.org/10.54675/PCSP7350

UNESCO (2023). *Guidance for generative AI in education and research*. United Nations Educational, Scientific and Cultural Organization. https://doi.org/10.54675/EWZM9535

U.S. Department of Education (2023). *Artificial Intelligence and Future of Teaching and Learning: Insights and Recommendations*. Office of Educational Technology, Washington, DC, US. https://tech.ed.gov

Usher, M. (2025). Generative AI vs. instructor vs. peer assessments: a comparison of grading and feedback in higher education. *Assessment & Evaluation in Higher Education*, 1-16. https://doi.org/10.1080/02602938.2025.2487495

UNESCO (2021). Van den Berg, G., & Du Plessis, E. (2023). ChatGPT and Generative AI: Possibilities for Its Contribution to Lesson Planning, Critical Thinking and Openness in Teacher Education. *Education Sciences, 13*, 998. https://doi.org/10.3390/educsci13100998

Wang, N. C. (2025). Scaffolding Creativity: Integrating Generative AI Tools and Real-world Experiences in Business Education. In *Extended Abstracts of the CHI Conference on Human Factors in Computing Systems (CHI EA '25)*, April 26-May 01, Yokohama, Japan. ACM, New York, NY, USA (pp.1-9). https://doi.org/10.1145/3706599.372028

White House Office (2022). *Blueprint for an AI Bill of Rights*. White House Office of Science and Technology Policy. https://www.whitehouse.gov/wp-content/uploads/2022/10/Blueprint-for-an-AI-Bill-of-Rights.pdf

Xiao, P., Chen, Y, & Bao, W (2023). *Waiting, Banning, and Embracing: An Empirical Analysis of Adapting Policies for Generative AI in Higher Education*. http://dx.doi.org/10.2139/ssrn.4458269

Xie, Y., & Wang, S. (2025). Generative artificial intelligence in entrepreneurship education enhances entrepreneurial intention through self-efficacy and university support. *Scientific Reports, 15*, 24079. https://doi.org/10.1038/s41598-025-09545-3

Zemlyak, S., Naumenkov, A., & Khromenkova, G. (2022). Measuring the Entrepreneurial Mindset: The Motivations behind the Behavioral Intentions of Starting a Sustainable Business. *Sustainability, 14*(23), 15997. https://doi.org/10.3390/su142315997

Zhou, J., & Cen, W. (2023). Investigating the Effect of ChatGPT-like New Generation AI Technology on User Entrepreneurial Activities. *Innovation & Technology Advances, 2*(2), 1–20. https://doi.org/10.61187/ita.v2i2.124

© Italian e-Learning Association