REVIEW

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Generative Artificial Intelligence in Higher Education: Exploring Ways of Harnessing Pedagogical Practices with the Assistance of ChatGPT

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Abstract: There is a growing interest in using generative artificial intelligence (AI) for educational purposes within the higher education environments, while AI applications (such as ChatGPT) can transform traditional teaching and learning methods. ChatGPT is an advanced AI tool that generates new content and human-like responses. The purpose of this paper is to use ChatGPT as a research assistant in order to explore ways AI can be harnessed to enhance pedagogical practices in higher education. This is a qualitative study, in which the output and responses generated by ChatGPT provided a starting point for the investigation. AI can be harnessed to enhance pedagogical practices in higher education in various ways including personalized learning, automated assessment and feedback generation, virtual assistants and chatbots, content creation, resource recommendation, time management, language translation and support, research assistance, simulations, and virtual labs. Other educational affordances that can strengthen the teaching and learning experience regard collaboration and communication, accessibility and inclusivity, as well as AI literacy. When implementing AI tools such as ChatGPT in higher education, ethical considerations (e.g., data privacy, transparency, accessibility, cultural sensitivity), potential misuses, and concerns need to also be addressed. Although ChatGPT can aid the generation of content and ideas for further exploration, it is a complementary-supportive tool, and its output necessitates human evaluation and review. The integration of ChatGPT and other AI tools in the higher educational process/practices has implications for educators, students, design of curricula, and university policy makers.

Keywords: Artificial Intelligence, higher education, ChatGPT, research assistant, affordances, pedagogical practices, chatbot

1. Introduction

Generative artificial intelligence (AI) in education is an emerging field in educational technology [1–3]. Its potential affordances in higher education include the facilitation of personalized learning, practicing language skills [4, 5], the opportunity for students to simplify the learning process, its usability as an assistant of students' academic activities/assignments, and the personalized feedback [6]. Different AI educational applications include personalized learning systems, intelligent tutoring systems, natural language processing, assessment automation, technology-based learning platforms, and teacher–student collaboration [4, 7–9]. AI applications have the potential to transform traditional teaching and learning methods, since they include personalized instruction, student support and instant feedback, automated grading and assessment, course programs, and content development [4, 8]. Recent reviews of AI in higher education report an increasing interest in its use for educational purposes within the academic community [1, 10, 11]. The need to investigate further the role of AI in higher education, by prioritizing

the educational and social as much as the technical aspects, has also been reported [1, 12].

ChatGPT is an advanced AI chatbot, which was launched in November 2022, and since then it is fast-growing and has attracted wide interest and discussion in higher education [13–16]. It emerges as a dominant generative AI tool [7], and it seems to be the first among the new AI tools that will make necessary to rethink the educational process [17]. ChatGPT can generate new content and human-like responses, and it has displayed remarkable proficiency [18]. It is associated with various positive aspects such as personalized/adaptive learning experience, editing, abstracting, language translation, research aid, generating literature, as well as grading and assessment [19, 20]. With regard to ChatGPT's function as a research assistant, studies reported on the benefits and advantages associated with it, i.e., as an assistant/aid in conducting literature reviews, refining research questions, producing concise abstracts, finding relevant academic sources, and summarizing research papers [20, 21]. In parallel, challenges and concerns regarding AI and ChatGPT in higher education include cheating in assignments, overreliance on the AI tools such as ChatGPT [6], ethical and privacy concerns [4, 22], as well as uncertainty/anxiety among students about their future careers [23]. Indicatively, concerns related to the use of

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ChatGPT regard reliability and accuracy of the information, potential biases in the data, and academic integrity [4, 20].

The purpose of this paper is to explore ways that generative AI can be harnessed to enhance pedagogical practices in higher education (potential affordances), via using ChatGPT as a research assistant tool. Although applying/utilizing AI in higher education is not new [3, 24], ChatGPT was introduced at the end of 2022. This study also considered the research gap reported in a recent review [1], which indicated that little research was done on how AI can assist tutors in their roles in higher education. This study contributes to the ongoing debate on the potential of AI in higher education and on the role of ChatGPT as a research assistant tool. It aims to be of international interest because AI is a field under investigation, and it is expected to affect educational practices in higher education settings. It is noted that in this paper the focus is on generative AI and on ChatGPT, and the terms "Generative AI" and "AI" are used synonymously. Generative AI is used to describe models "that generate new content, such as text, images, or music, from their trained parameters . . . Generative AI, such as ChatGPT, is trained across Internet resources, published texts, and images to generate responses to user-provided prompts in a variety of conversational or academic styles, including journal papers, academic presentations, and various other formats" [25]. ChatGPT (Chat Generative Pre-Trained Transformer) is a large language model, introduced by OpenAI as a new version of chatbot. It is designed to mimic human conversation through text/ audio, generating natural language responses to human input in a conversational format [26]. ChatGPT is trained on large amounts of data from different sources and may be utilized as facilitator to produce ideas and give suggestions [13]. The following sections of the paper regard: Section 2 indicates the methodology, Section 3 discusses the ways AI can be harnessed to enhance pedagogical practices in higher education, while Sections 4 and 5 regard the discussion and conclusion, respectively.

2. Methods and Methodology

2.1. Research objectives

(1) To explore ways AI can be harnessed to enhance pedagogical practices in higher education.
(2) To use ChatGPT as a research assistant tool, for the aforementioned investigation.

2.2. Approach used

A qualitative approach was used, by interviewing ChatGPT. Due to the novelty of the subject, there is still a small number of studies which applied and employed ChatGPT as an interviewee instead of a human subject [27, 28]. For example, Iskender [27] asked questions in the field of tourism industry and education and reported that his study originality lies in using ChatGPT as an interviewee. Another study [28] interviewed ChatGPT in order to test its creativity in psychology, and the researcher reported that the output was similar in quality to that generated by human experts in certain fields. GPT-3.5 is one of the most advanced large language models [17]. According to GPT-3.5 (2023, November 11) "ChatGPT is a conversational artificial intelligence (AI) model developed by OpenAI . . . ChatGPT is designed for natural language understanding and generation in conversational

contexts. It can be used for a variety of natural language processing tasks, including answering questions, generating creative content, assisting with language-based tasks, and engaging in interactive conversations with users" (output of query "What is ChatGPT?", on 11-11-2023). A few studies indicated that ChatGPT has been used as a research assistant tool to support creation and generation of ideas and content [29–31], rephrase paragraphs and find references [32], and assist in qualitative research [33] or technological research [34]. In parallel to the benefits/strengths reported, all studies mentioned the need for its ethical, cautious, and responsible use. Indicatively, Hsu [29] used ChatGPT as assistance in research idea generation and design. He reported on its usefulness in the research process, by also highlighting the role of critical thinking for the evaluation of the output produced by ChatGPT. Experimenting with ChatGPT as a research assistant tool is a novelty, possibly opening new possibilities for research investigation. The potential of ChatGPT to assist and support the research process is mentioned in sub-Section 3.6.

In order to explore the main ways AI can be harnessed to enhance pedagogical practices in higher education, ChatGPT was interviewed and the following prompts/queries were submitted (on 15-12-2023): How can AI be harnessed to enhance pedagogical practices in higher education? What are the educational affordances of AI in higher education? How can AI assist university tutors? How can AI assist university students?

The output generated and produced by ChatGPT (based on the queries submitted and posed) was reviewed and evaluated by the author, in order to create main categories on how AI can be harnessed to enhance pedagogical practices in higher education. Afterwards, each category was explored for indicative recent studies (year 2023), via Google Scholar, searching with the category's main keywords in combination with "artificial intelligence" and "higher education". Next section presents the main ways AI can be harnessed to enhance pedagogical practices in higher education.

3. Ways Generative AI Can Be Harnessed to Enhance Pedagogical Practices in Higher Education

3.1. Personalized learning

AI (AI-powered adaptive learning platforms) can analyze students' learning patterns and adapt course content to their individual needs. This personalization has the potential to aid students learn at their own pace (according, for example, to their interests and learning styles), receive personalized support, and increase engagement [19, 35, 36]. In this way, students' strengths and weaknesses can be addressed, and learning experiences may be optimized. Teachers could guide students to use AI models like ChatGPT for extra help/support. ChatGPT can provide personalized assistance to students, as it can adjust explanations, and feedback to students' progress and preferences. AI can also provide personalized recommendations for improvement, by recommending additional resources, or study materials tailored to individual student needs. A recent review highlighted the need for future work on different means to support personalized learning with AI, as well as pedagogical issues, and the role of teachers [37]. Intelligent tutoring systems are among the most effective tools for personalizing instruction; the growth of this personalization is currently taking place as education researchers experiment with new models of

learning [26]. The potential of AI to affect the way educators provide support or personalized learning (with the possibility to improve student outcomes) is an ongoing research issue. There is need for research-based evidence because many studies report claims regarding potential affordances of AI.

3.2. Automated assessment and feedback generation

AI-powered systems can help with the automated grading of assignments, quizzes, and tests, thus saving tutors time and ensuring consistency in grading. For example, ChatGPT can automate the grading of tests, providing quick feedback to students and freeing up tutors to focus on more in-depth and personalized feedback/assessments. AI can create adaptive assessments that adjust difficulty based on a student's responses and also provide instant feedback to students (highlighting their strengths or areas that need improvement). Analysis of student feedback (by providing insights for continuous improvement of course content) is also a function of AI. A systematic review [1] indicated that AI was used for assessment/evaluation, while automatic assessment (marking of questions, grading thesis statements, essay grading, etc.) was the most common. Automated assessment may facilitate students to engage in self-regulated learning, in both face-to-face and blended learning educational contexts [38]. A recent review [39] suggests that higher education institutions may embrace AI tools within the assessment process. Implementing AI in assessment was associated with more robust assessment methods and increased educators' engagement levels [40]. Evaluating the impact of AI on teaching and learning outcomes requires careful consideration of various metrics and methodologies. Potential metrics and methodologies may include student performance metrics (possible changes in pre- and post-test scores, completion of courses), monitoring student engagement levels (when engaged in AI-aided activities), as well as measuring learners' perceptions and satisfaction. These issues are suggested to be explored in future research.

3.3. Virtual assistants and chatbots

AI-driven virtual assistants can help students and faculty with routine administrative tasks, answer questions, and provide information about courses, schedules, and campus services. An AI assistant is also called virtual assistant, virtual agent, intelligent agent/tutor, or intelligent helper [1]. A virtual assistant may provide technical support such as help with information retrieval or assistance in gathering citations [41]. Intelligent conversational chatbots enable students to interact online (e.g., in blended/online context), and tutors to create and manage their courses using generative AI tools [42]. Chatbots can address students' questions, provide information regarding courses and programs, and aid students with institutional services/resources, thus facilitating student support and engagement [43]. AI-driven chatbots can assist students and faculty with inquiries, information, and administrative tasks. Being available 24 h, during all days of the week, they can support students by, for example, replying to their questions, generating information about course schedules, assignments, and even offering guidance on administrative matters. For example, ChatGPT provides students with immediate access to information and assistance, while it can be utilized as a virtual instructor for students (e.g., to aid collaboration and answer questions) [44].

3.4. Content creation, resource recommendation, and time management

Educators can be assisted by AI in creating educational content/ material that will possibly facilitate student engagement (e.g., creating test questions, summarizing texts, generating quizzes, or suggesting relevant resources). AI chatbots can create conversational content in real-time, and apart from written content it can assist in generating images and videos. Generation of educational content can save educators time and also provide additional resources for students. Indicatively, ChatGPT can generate practice questions, and mock exams to help students prepare for assessments. AI models which can generate diverse content have brought innovation in different domains such as natural language processing, creative arts, and computer vision [45]. AI sophisticated models which can generate coherent and grammatically sound text are changing the area of human–machine interaction, providing various possibilities for practical applications such as drafting emails or personal assistants [45].

AI can recommend relevant research papers, textbooks, and online resources to both students and tutors to support their learning and teaching efforts. AI applications can analyze students' schedules, workload, and learning habits to provide personalized recommendations for effective study plans and time management. This can help students balance their academic responsibilities and avoid burnout. The use of AI for managing student learning was reported by Crompton and Burke [1]. Among others, the researchers reported on identification of learning patterns, curriculum sequencing, instructional design, student management, and provision of information and organization.

3.5. Language translation and support

Students can practice language skills via, for example, AI-powered chatbots that can answer their questions [4]. Language learning apps and translation tools (powered by AI) can assist students and educators in overcoming language obstacles. By providing real-time language translation into other languages, education can become more accessible to a diverse range of students (e.g., international students). Chatbots can be useful complementary resources that can address language barriers and cultural differences, although these cannot replace the expertise/guidance of human tutors [46]. Indicatively, ChatGPT can support students learning a new language by offering vocabulary, grammar, and pronunciation guidance/feedback, as well as conversation practice exercises [47]. In these ways, language skills can be practiced and improved, (hopefully) leading to more engaging learning. Students and teachers may also be supported with language-related tasks, such as proofreading and language translation (which is helpful in multilingual educational settings).

3.6. Research assistance

AI-powered tools can assist tutors and students in literature review, data analysis, summary of readings, and identification of relevant research trends/patterns (procedures particularly beneficial for academic research). The benefits of using AI tools in research include text generation (saving effort and time for researchers, thus enabling them to focus on other aspects of their projects), literature review assistance (processing huge amounts of data quickly), data analysis and interpretation, as well as peer review assistance [48]. With a huge amount of data and knowledge, AI technologies are capable of quickly and effectively processing large amounts of data,

thus helping researchers stay up-to-date with the latest research trends [41]. For instance, ChatGPT can support and enrich students' and researchers' research activities [49] such as summarizing text or research papers, suggesting improvement of language, generating outlines/ideas, suggesting keywords, refining research questions, and finding relevant academic sources. Bibi and Atta [50] explored the role of ChatGPT as a writing assistant and suggested that future research could investigate students' ability to utilize it as an aid in writing and research.

3.7. Simulations and virtual labs

AI can be used to create interactive simulations and virtual reality to make learning experiences more engaging and immersive. Such experiences are personalized, since these can be in accordance with individual student's learning styles/preferences, and associated with customized feedback and support (to enhance student learning outcomes). Universities can harness virtual reality and simulation technologies to engage students in interactive and immersive learning experiences; such approaches enable students to be actively engaged in real-world scenarios, in order to deepen their comprehension and engagement [43]. This can be particularly beneficial in subjects that involve experimentation or scenarios that are challenging to replicate in a traditional classroom setting. For example, AI-powered simulations and virtual laboratories enable students to gain practical experience in fields like science and engineering without the need for physical resources (various skills such as problem-solving skills can be practiced in a safe and controlled environment). Indicatively, ChatGPT can simulate laboratory experiments, allowing students to practice and learn scientific concepts in a virtual environment.

3.8. Collaboration and communication

AI tools can facilitate collaboration among students and faculty through chat, video conferencing, and collaborative document editing, making it easier to work together on projects and assignments. Using AI tools, researchers can be facilitated to cooperate with colleagues toward common goals, and as a consequence academic research can be enhanced [43]. Students can use ChatGPT to facilitate collaborative discussions, brainstorming sessions, and work on group projects and assignments. A review indicated the possibilities of AI in collaborative learning, in face-to-face and computer-mediated interactions, and also highlighted the development of communicative, collaborative, and cognitive skills [51]. AI was also shown to give students an opportunity to easily access available communication training [52]. Others explored the affordances of AI for socially shared regulation in learning, highlighting the potential for human–AI collaboration (integration of human and AI strengths via hybrid intelligence) [53]. Opportunities for human–machine AI-mediated interactions are, in particular, associated with online education; this mode was accelerated in higher education context after the recent pandemic [12].

3.9. Accessibility and inclusivity

AI has the potential to address issues of inclusivity and equity in education, depending on the way of design and implementation. The characteristic of personalized learning allows for more inclusive education (e.g., on the basis of students' capabilities or styles). AI-powered platforms that offer online courses could be utilized by students with limited access to traditional higher educational institutions, and language translation tools enable accessing materials in students' native languages. AI has helped in improving the living standards of persons with disability [54]. Increased accessibility can aid students with different learning needs, making educational content more accessible and inclusive. For example, ChatGPT can assist students with disabilities by providing alternative formats for content such as text-to-speech or speech-to-text capabilities/functions. Students with learning disabilities, as well as non-native speakers of national languages will benefit most from natural language models [19].

Inclusive learning environments can open the way for academic success among students with disabilities, but ethical concerns and challenges (data privacy, algorithmic bias, etc.) should be carefully addressed to fully harness the potential of AI tools [55]. Indicatively, biases in the data AI systems are trained, might disadvantage certain groups, and bring inequalities. Or the digital divide may be widened if students lack access to the AI-powered educational technology tools.

3.10. (Other areas of) Teaching and learning support

Integration of generative AI in higher educational practices was found to improve teaching efficiency, and it also saved time for preparation and feedback provision in assignments [56]. Indicative areas of support for teachers include assistance in preparing course materials, generating content, answering student questions, making decisions to improve curriculum teaching methods, and student support services (by processing large amounts of data). For example, ChatGPT has the potential to assist educators by generating course materials or providing suggestions [44]. Virtual teaching assistants and ChatGPT can aid routine administrative tasks/processes such as course scheduling, resource allocation, managing student records, or calendars. Such tasks may help teachers stay organized and focused on teaching. Since AI can handle routine tasks, educators could focus more on the pedagogical aspects of teaching.

For students, AI-powered tutoring systems can provide instant feedback or additional resources, recommend relevant courses, and learning activities. For example, ChatGPT (which is available at any time) can aid and support students in completing assignments, improving their writing skills, structuring essays, or assisting with citations/references. Distance learning support is also relevant (e.g., by tracking student progress). Finally, learning analytics and predictive analytics are potential areas for enhancement of educational practices in higher education [57]. Learning analytics regard analysis of large sets of data to identify patterns, trends, and areas for improvement; this information can be used by educators to enhance their teaching methods. With regard to predictive analytics, AI may aid in identifying students at risk so as educators could intervene on time [57].

4. Discussion

This paper explored ways AI can be harnessed to enhance pedagogical practices in higher education, and in this investigation ChatGPT was utilized as a research assistant tool. The output and responses generated by ChatGPT (based on the questions posed to ChatGPT) provided a starting point for the subsequent investigation, thus facilitating the research procedure. The content created by ChatGPT was trustworthy, while there was some overlap among the output generated after the prompts. The output was evaluated, explored via recent studies, and finalized by the author (see Section 3). In line with recent research, it was shown that AI can be harnessed to enhance pedagogical practices in higher education in various ways including personalized learning [35–37], automated assessment and feedback generation [1, 40], virtual assistants and

chatbots [1, 41], content creation [45], language translation and support [4], research assistance, simulations, and virtual labs [43]. Additionally, educational affordances that have the potential to enhance the teaching and learning experience for educators and students regard collaboration and communication [43], resource recommendation, time management, and accessibility [1]. It is noted that there may be an interrelation among elements of the aforementioned ways. For example, resource recommendation is associated with the tool's function/role as an assistant to support students and teachers in the educational process. AI tools have significant potential to empower educators and provide support so as to facilitate informed decisions about student learning. Since several studies report claims regarding the potential affordances of AI, there is a need for more research-based evidence that measures the effectiveness of AI tools in enhancing pedagogical practices.

In this study, the utilization of ChatGPT as research assistant supported the research process, while its output was validated and reviewed by the author. ChatGPT has the potential for innovating the educational process in higher education [13], opening up new directions for future research. However, it is useful to be utilized in association with human guidance, while the output generated necessitates human evaluation. AI tools such as ChatGPT are complementary tools to support the educational practices in higher education but not to replace human tutors. ChatGPT's output necessitates the researcher's evaluation and personal judgment (in order to avoid potential inaccurate or misleading information). Researchers/teachers/students should not be fully dependent on AI-generated text and, in particular, when the content is outside one's expertise.

4.1. Ethical considerations

In the context of implementing generative AI tools like ChatGPT in (higher) educational settings, it is crucial to address ethical considerations/issues, potential misuses, concerns, and risks. Ethical concerns regard data privacy, bias in AI algorithms, transparency, accessibility, cultural sensitivity, and possible impact on students' critical thinking and creativity. Limitations are associated with biases or misleading information (depending on the training data), false results, and lack of transparency on how data are selected/analyzed [58]. For instance, Cao et al. [59] reported that ChatGPT exhibits a strong alignment with American culture, while it adapts less effectively to other cultural environments.

Using ChatGPT as a research aid in this study was associated with certain limitations. It does not have access to the broader internet and missed the most recent scientific publications and/or developments (access to latest studies is essential when conducting scientific research). It is emphasized that while ChatGPT can be a valuable tool, it should complement rather than replace the researcher's role and expertise. Indicatively, educational-related risks associated with using ChatGPT include incredible, inaccurate, inappropriate output-content, privileging AI-generated text over human-generated text, giving personal data and sensitive information, or widening the digital divide [17]. Concerns associated with academic integrity, cheating, and plagiarism have also been reported [6, 39]. The easy access to automatically generated content may be considered as threat [45], while a main issue of the current debate regarding AI in education is the concern for its potential misuse [18]. A systematic review on large language models in education [60] identified practical and ethical challenges including low technological readiness, lack of transparency, and inadequate privacy.

Ethical and educational approaches [3, 43], as well as the influence of AI emerging technologies on blended/online higher education post-pandemic [61] need to be explored in future research. For example, Hutson et al. [62] stress the potential of AI tools such as ChatGPT to support the writing process in the context of blended pedagogical practices.

4.2. Implications: Technological literacy and training

The integration of ChatGPT and other generative AI tools in the educational process has implications for educators, students, design of curricula, and university policy. In order to effectively implement AI tools into pedagogical practices, training and support are needed. Recent studies stressed the necessity for students' understanding of generative AI as an essential component of digital literacy [63]. Appropriate training and support will enable and empower students and educators to overcome technological barriers, understand the functionalities of the tools, interpret the generated responses, harness AI's affordances, and ensure ethical usage. Training programs/workshops could focus on improving students' and educators' AI literacy, so as to use with confidence AI tools. AI literacy skills include critical thinking (e.g., understanding limitations and biases), problem-solving (e.g., applying AI techniques to solve real problems), and communication skills.

Educators' training (professional development), including both pedagogical and technical dimensions, is essential to harness the full potential and power of generative AI tools such as ChatGPT. Educators could act as guides, capable of incorporating AI into their teaching practices and also guiding students on responsible and ethical AI use [64]; dilemmas such as data privacy, plagiarism, and transparency need to be addressed. Educators can motivate university students to utilize ChatGPT, emphasizing the critical analysis of the generated content and output (to facilitate understanding of both strengths and limitations of this new tool). AI tools can improve efficiency but cannot replace human expertise, while in tasks such as scientific writing ethical considerations [48] need to be considered.

ChatGPT literacy training among students could support academic writing. ChatGPT represents a significant opportunity for higher education for the improvement of educational quality and/or accessibility, but its usage should be carefully approached, considering both the opportunities and the challenges involved [65]. Researchers [66] discussed the potential of ChatGPT (as well as of other AI chatbots) for educational transformation, pointing out the need for its responsible and safe adoption. Technological literacy and student training constitute a necessity. Indicatively, as recent advancements have improved the quality and realism of AI-generated photos, videos, and voice cloning [67], students need to be aware of new AI capabilities in images, video, etc.

Curricula should be carefully designed to encourage higher order cognitive skills such as critical thinking, creativity, and problem-solving. Integration of AI tools such as ChatGPT in curricula could be supportive, and overreliance on such tools should be avoided. A balance between utilizing AI tools as aids and keeping the integrity of human learning experiences is essential [68]. Ethical concerns may necessitate re-designing curricula in different academic fields. New curricula could explore the issues of ethics and bias associated with AI tools.

It is suggested that universities provide guidelines and regulations to ensure ethical and responsible use of AI tools; in order to make advantage of the affordances, in alignment with educational goals and values, and minimize the limitations. Stakeholders (administrators, policy makers, educators) should cooperate in formulating ethical guidelines.

Assessment methods in higher education could be modified to avoid plagiarism. Such methods necessitate to evaluate higher order skills rather than merely technical knowledge. Universities could provide ongoing training because the technology develops rapidly, and updating skills and knowledge become a necessity. Staff and student training in ethical issues and potential risks (e.g., privacy issues, plagiarism, generating unreliable/inaccurate information) will raise awareness of AI limitations.

It is suggested that higher education institutions collaborate with AI designers to create systems that align with pedagogical principles and educational goals. Policy implications include flexible and adaptable curricula, professional development opportunities for educators, integration of AI ethics courses in the curriculum, continuous learning for students, and support of their self-directed learning [69].

The latest phase of digital transformation in higher education (2020s) is the integration of AI, which has the potential to revolutionize higher education by providing, for example, personalized feedback to students, automating administrative tasks, and improving the quality of education [43]. AI integration together with other practices such as mobile learning holds the potential to strengthen university digitalization, hopefully leading toward more sustainable education [70]. Future research could investigate the most effective and sustainable ways, implemented by higher education institutions, to harness the full potential of AI tools. Research by Chiu [2] suggests that future higher education should be transformed in order that students and educators are trained in learning and teaching with generative AI, and develop and enhance AI literacy skills.

4.3. Limitations and future research

Regarding the limitations of this study, initially, the queries submitted to ChatGPT did not identify the specific context of AI in terms of, for example, education mode (face-to-face, online, blended mode) or discipline (field of study). Since the pandemic accelerated the digitalization of higher education, and blended/online education is on the rise [70], it is suggested to investigate AI affordances within different education modes. For instance, Dogan et al. [71] reviewed AI affordances and uses in online education environments. It is also suggested to explore AI's affordances, possibilities, and limitations within specific academic subjects. Indicatively, Liang et al. [47] reviewed the potential of AI in the field of language education, while others indicated that engineering, computer sciences, and language education arise as popular application areas of AI in higher education [1, 7, 61].

Another limitation of this study is that ChatGPT can only provide information up to a specific date, because it does not access real-time and latest data/information. Additionally, the output generated by ChatGPT was reviewed and evaluated only by the author of this paper. Since the author's prior knowledge has influenced the evaluation and utilization of the output (outstanding recent studies in the field may have been missed), the advice of specialists would add value in future relevant explorations. This study did not investigate specific case studies or examples of how ChatGPT has been used in higher education settings, and it is suggested as an issue for future research.

Future research could explore long-term implications of integrating AI into higher education practices. Since many studies include claims, future research is useful to be, predominantly, evidence-based. Generative AI has advanced rapidly; it is an essential part of digital literacy, while there is a convergence of emerging technologies. The integration of new AI technologies with existing educational technologies is crucial [26, 36] and this is suggested as an issue for future research.

5. Conclusion

This study indicated that AI can be harnessed in various ways to enhance pedagogical practices in higher education, and that ChatGPT (a major AI tool) can aid the generation of content and ideas for further investigation. ChatGPT is a useful research assistant tool that aids educators and students in the research process. However, human supervision, expertise, and engagement are essential. This study contributes to the ongoing debate on the role of ChatGPT as a research assistant in higher education (it may be useful for researchers, students, and teachers). ChatGPT can be a valuable resource, but it should be used as a complementary-supportive tool to assist and enhance higher education (traditional) pedagogical practices, without replacing human educators. Its limitations need to be explored in order to balance researchers'/tutors'/students' experiences. Potential risks, misuses, and concerns need to also be addressed. Such issues include incredible/inaccurate output, ethical considerations, potential bias, academic integrity, and widening of the digital divide. The implementation of generative AI tools such as ChatGPT in higher education has implications for educators, students, design of curricula, and university policy. Appropriate training will facilitate thoughtful implementation of AI in higher education settings.

As the AI field continues to evolve rapidly, responsible implementation of AI tools makes it necessary to understand both potential advantages and misuses/risks. The effect of AI on higher education continues to unfold, with its potential to transform teaching and learning. Integrating AI in higher education practices should be done thoughtfully in conjunction with human educators (they bring unique expertise/qualities to the educational experience such as understanding of student needs, empathy, and mentorship). This process will aid to maximize the affordances, while also addressing ethical issues and concerns. It becomes essential to explore further ethical and educational approaches. It is crucial to maintain a balance between technology and human actions in order to foster an engaging learning environment. Identification of the ways AI can be harnessed to support/enhance educational practices in higher education constitutes an open research issue. Ongoing research continues to explore pedagogical practices with AI in higher education, teachers' (new) roles, as well as the evolving nature of AI implementation in formal educational settings.

Ethical Statement

This study does not contain any studies with human or animal subjects performed by the author.

Conflicts of Interest

The author declares that she has no conflicts of interest to this work.

Data Availability Statement

Data sharing is not applicable to this article as no new data were created or analyzed in this study.

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