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Is artificial intelligence an opportunity for inclusive education? A case study in a fully online university

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Abstract:

Artificial intelligence in education has emerged as an opportunity to facilitate teaching and learning, especially in learning environments mediated by technology, such as online higher education. Despite its growing prominence, there is a lack of empirical research analysing how artificial intelligence affects inclusive education. Therefore, this study aims to analyse the perspectives and viewpoints of online course designers on leveraging these technologies to promote equal participation for all learners. Twelve professors participated in semi-structured interviews that were subsequently analysed through thematic analysis. The findings encompass two main themes. On one hand, the use of artificial intelligence in education as a tool for inclusive education within a human-centric pedagogy. Participants are cautious about using artificial intelligence to replace human work but recognise its potential contribution to facilitate content accessibility and comprehension. On the other, the adoption of a new approach for learning and assessment based on reflection and metacognition. Our participants' strategies include modifying some assessment practices when designing their courses for enabling learners to compare artificial intelligence creations, although they also highlight the lack of knowledge on using these technologies. Therefore, shifting to an assessment approach based on strengthening metacognition, reflection, and critical thinking skills emerges as a means to promote learners' inclusion supported by artificial intelligence. Our study also emphasises the importance of promoting artificial intelligence literacy for both professors and learners to effectively incorporate these technologies in the educational processes.

Keywords: Artificial intelligence, online higher education, inclusive education, educational technology, learners with disability.

Introduction

Artificial intelligence in education (AIEd) has disrupted the educational processes, highlighting an existent gap between professors and technology. Research about AIEd focuses on learning and teaching practices such as personalised learning, assessment, prediction and profiling, and tutoring (Tang et al., 2023; Zawacki-Richter et al., 2019). It is important to differentiate artificial intelligence (AI) and AIEd. AI is an umbrella term that includes a broad range of technologies and methods including machine learning, algorithms, data mining, natural language processing, deep learning, and artificial neural networks (Bond et al., 2024). AIEd, on the other hand, specifically applies these technologies and methods for educational purposes in areas such as instruction, learning, evaluation, and decision-making processes (del Gobbo et al., 2023). In online higher education, AIEd is often used to create suitable learning environments, learning and course recommendations, prediction models, and behaviour detection (Chen et al., 2020; Narimani & Barberà, 2024). Regarding learning and assessment, AIE technologies offer valuable support through resource recommendations, automatic assessment, prediction of learners' performance and satisfaction, and improvement of students' learning experience (Ouyang et al., 2022).

AIEd has the potential to assist both professors and learners in their educational duties. Some investigations suggest the promise for a dual teaching model in which educators utilise AIEd to accomplish bureaucratic and routinary duties while increasing efforts to personalise the learners' experience (Meron & Araci, 2023; Pedró et al., 2019). There are still some challenges for effectively leveraging AIEd in the classrooms, despite the integration of these technologies into higher education over the past three decades (Zawacki-Richter et al.,

2019). Apart from pedagogical uses, there are also concerns with ethical considerations such as the risk of compromising learners' privacy and replacing human work with AI (Bond et al., 2024). Institutions and professors also see AI as a source of increasing learners' plagiarism. For instance, the presence of technologies such as chatbots, could cause greater problems of deception and copying practices among students (Ivanov, 2023). The inaccuracy of the information given by AIEd tools also causes some preoccupation, so learners are exposed to learn wrong or incomplete concepts and procedures (Meron & Araci, 2023).

The application of AIEd encompasses various paradigms, offering diverse perspectives on its integration within online higher education. Ouyang and Jaio (2021) define three key paradigms that underpin AIEd in this context: AI-directed, learner-as-recipient; AI-supported, learner-as-collaborator; and AI-empowered, learner-as-leader. In the AI-directed paradigm, AI assumes a directive role, guiding and directing the learning process, whereas in the other two, learners are protagonists of their learning. So, the AI-supported paradigm shifts the focus towards collaborative learning environments, wherein AI technologies support learners' capabilities as collaborators in the educational process. Finally, in the AI-empowered paradigm, AI technologies empower learners to take on leadership roles in their educational journey. The last two paradigms emphasise learners taking control of their learning. In any case, institutions and faculty should consider that educational methods in the era of AIEd require a shift towards more dynamic, interactive, and learner-centred pedagogies (Walter, 2024).

Using AIEd may cause inequalities and exclusion for marginalised communities as organisations such as the United Nations have warned (Pedró et al., 2019). Nowadays, the intersection between AIEd and disability has only been studied in the early educational levels, focussing on assistive perspectives (Knox et al., 2019; Toyokawa et al., 2023). Although research on employing AIEd for inclusion is lacking in higher education, a substantial body of literature has addressed learning personalisation as one of the most promising roles of AI in online universities (Ouyang et al., 2022; Tang et al., 2023). Personalising learning for learners belonging to marginalised communities through automated technologies has emerged as a real opportunity. However, adopting these technologies entails using a significant amount of personal information from learners, which may pose risks to their security and data protection if suitable protocols are not carefully applied. Furthermore, the main goal of inclusive education is not only providing individualised learning experiences but fair and equitable opportunities to all. That is, promoting the active participation of everyone in the social life (Knox et al., 2019). Taking these issues into account, this paper aims to provide an understanding of how to leverage AIEd to promote inclusion in online higher education beyond automation, assistance, and profiling.

This study is part of a broader project aimed at exploring professors' experiences in designing inclusive online courses. The investigation has been conducted in a Spanish fully online and asynchronous university with a learner-based educational model. In this institution, a group of professors design the courses including learning resources, learning activities, and assessment. So, we have incorporated their experiences and reflections on incorporating AIEd for inclusive purposes while designing online learning and assessment activities.

The following research questions guided our research:

What are the experiences of course designers with incorporating AIEd for inclusive purposes in online higher education?

How can course designers leverage AIEd to make online higher education suitable for everyone?

Methodology

This is an exploratory qualitative research based on a case study. This research design is suitable for delving deeply into a phenomenon by thoroughly exploring a particular context (Yin, 2012). The data has been collected via semi-structured interviews with 12 online course designers. Participants were recruited by inviting them directly through the institutional email and then contacting the ones interested in the study. All respondents were informed of the research project and its objectives, their rights, and the conditions of their participation through informed consent. Next, we used thematic analysis (Braun & Clarke, 2006) to analyse the collected information with the assistance of Atlas.ti software.

Findings

We have identified two main themes in this study: professors' learning strategies based on AIEd and their insights on using it as a tool for inclusive education within a human-centric pedagogy and the adoption of a

new approach for learning and assessment that includes developing all learners' critical thinking and metacognitive skills. These themes are shaped by narratives and recurring aspects that explain the current practices incorporated in participants' courses, their reflections on how to incorporate AIEd for inclusive purposes in the curricular design, as well as the challenges it currently entails. Table 1 synthesises participants' overall narratives, which are discussed throughout the Findings section.

Table 1: Participants' narratives about inclusive education based on AIEd.

Narratives	Current applications	Future lines of work	Challenges
AIEd as a tool	Facilitates professors' and learners' task development. Improves content accessibility and reading comprehension.	Professors could use AIEd to enhance all learners' academic achievements. Learners should use AIEd to improve their understanding and critical thinking.	Risk of dependency and getting incomplete information.
Literacy	Professors lack knowledge about AIEd for inclusive education. Learners need training on using AIEd adequately.	Professors need adequate knowledge to incorporate AIEd in inclusive course design. Learners should learn how and when using AIEd.	Marginalised learners remain invisible. Inexistence of training policies and protocols.
Assessment approach	Learning strategies based on comparing and appraising AI-created outcomes.	Learners should utilise AIEd to enhance their reflexive and critical-based skills.	Difficulties in distinguishing AI-based and human-based outcomes.

The human-centric pedagogy: AIEd is just an auxiliary tool for inclusive education.

The role of AI in inclusive online courses should be auxiliary rather than replacing professors' involvement. Our participants consider that AI technologies offer a prominent contribution to the learning of all students, but they also emphasise the importance of supervision by professors to prevent inconsistencies and to incorporate reflection, creativity, and empathy. P12 commented: "For me, it's just another tool and it will never replace something as fundamental and human as comprehension, the ability to reflect... That's where you have your role as an expert". While these technologies may improve learners' learning possibilities, human mediation remains essential: "It could be an aid, but not a substitute for either professors or learners" (P5).

AIEd technologies such as Chatbots can help learners with accessing and comprehending learning content. Our participants are aware that accessibility is the primary barrier preventing full inclusion of learners with disabilities in online learning environments. Therefore, incorporating support mechanisms based on AI could help to enhance learners' interaction with learning contents. P1 reflected:

> It is important to be able to adapt and incorporate this type of tools. Thinking on people who may have specific educational needs, it [AIEd] may also provide great solutions. For instance, if we create learning materials in a single format, they can use these tools to convert them [learning materials] into a more convenient format.

Participants also reflect on the importance of defining a clear strategy that orientates on deciding when and where AIEd can be used. For instance, employing specific tools to improve reading comprehension emerges as a good opportunity for enhancing accessibility. However, professors should also ensure that learners develop learning competencies by themselves. Accordingly, P8 commented: "I would distinguish between different levels of reading for different types of texts. For some cases, i.e. great literature texts, yes –I myself use it– and for others like critical thinking-based texts, no".

Therefore, participants' perceptions on using AI to support learners with disabilities are ambivalent. On the one hand, there are concerns about learners' dependency on these technologies, as well as on getting

incomplete information or inconsistencies of some topics. “The problem with artificial intelligence is the illusion that you are learning. [Students] believe they have completed the activity and that it is done correctly.” (P10). And, on the other hand, participants show their willingness to orientate learners on using it properly. “It's probably better to advise students to try reading the text first and then summarise it with ChatGPT if they find difficulties. However, it’s important to caution them to be careful, sometimes it may miss things or give you wrong answers” (P9).

Learners with disabilities remain invisible from both AIEd and institutions’ policies. In some participants’ views, these technologies nowadays are more focused on meeting the needs of majorities, creating an exclusion of minorities with different needs such as those with disabilities. Yet, institutions are not especially concerned on addressing this gap. P3 conveyed: “The main issues regarding the use of artificial intelligence are sustainability and academic rigour, but inclusivity is handled more like an anecdote”.

A new approach to evaluating learners focusing on metacognition and reflection.

The use of AI as a tool for inclusive education should start with both learners’ and professors’ literacy. Our participants highlight a lack of knowledge and preparation on how to use AIEd for supporting and assessing learning from an inclusive perspective. “We need to know how [to use AIEd]. What do we tell learners with a specific need about using AI tools? How does it help them and how should they leverage what it is offering to them?” (P12). Some participants have proactively begun exploring the potential of this technology, driven by their awareness of the opportunities it offers for enhancing students’ learning: “I am training myself in AI, and for me, it's quite useful to supporting students... it can be a tool that assists you on that matter” (P1).

Professors’ knowledge of using AIEd has to be transferred to learners as well, so students can use it in a way that positively impacts their learning and skills. Learners’ literacy on AI should be focused on learning-to-learn strategies so that they are able to “formulate questions and create prompts that teach and give them what they really need and can be useful to them” (P11).

The incorporation of AIEd involves professors to revolutionise their teaching and assessment methods. Our participants consider that the integration of these technologies should shift the focus of learning and evaluation processes toward developing learners’ metacognitive skills. P7 commented: “AIEd has allowed us or forced us –or both– to rethink a little bit how questions [within assessment activities] are formulated”. Given the importance of developing marginalised learners’ autonomy, assessment should be designed for learners to demonstrate the achievement of competencies in a way that AI has a secondary role: “What we shouldn't do is evaluate only what AI can already provide, that is, we need to push it a little further” P3.

Beyond using AIEd for creating new learning outcomes, learners' activity should focus on reflecting, comparing, and apprising the ones created by these technologies. Another alternative is leveraging these tools to make online learning more interactive, as P5 exemplified:

> Using it [AIEd] in contexts where you could assess certain competencies –not only regarding students with difficulties, but with all students– which are now very difficult to evaluate. For example, activities in which students simulate certain things and artificial intelligence takes on the other role.

Discussion and conclusion

The results of this study give us an understanding of course designers’ perspectives on effectively incorporating AIEd to promote the inclusivity of online higher education. Three main arguments have emerged from the analysis. First, these technologies serve as a significant means of support to favour the engagement of diverse learners in online higher education, particularly on accessibility, interactivity, and reading comprehension. Second, there is an important need to enhance professors’ and learners’ literacy in integrating AIEd while designing learning and assessment activities, thus levering all the advantages it could grant for teaching and learning. And third, professors must shift their learning and assessment strategies toward more reflexive and critical thinking-based paradigms to benefit the entire student body.

AIEd is an emergent topic. Therefore, the near future interventions should focus on training both professors and learners on how to take profit of it to promote learners’ holistic development. As the existing literature suggests, there are multiple initiatives based on supporting learners from a generalised approach on topics such as personalisation, tutoring, and resource recommendation (Bond et al., 2024; Tang et al., 2023; Zawacki-Richter et al., 2019). However, knowledge circulates primarily among professionals in informatics and computational sciences and it is not adequately transferred to other disciplines (Toyokawa et al., 2023).

The need to advise learners on learning-to-learn strategies is now more crucial than ever (Walter, 2024). There is a need to boost literacy programmes aimed at preparing both professors to apply AIEd in curricular design for inclusive purposes and learners to enhance their learning possibilities. Our results suggest that professors are more concerned on learners' development than on cheating practices, which is quite positive for promoting the application of inclusive pedagogies based on AIEd. As observed by Knox et al. (2019) and Walter (2024), there is a significant opportunity to transform educational processes towards student-centred innovative practices that enable both personalised learning and collective integration for everyone. In this regard, it is important to focus AIEd-based learning strategies on social constructivism (learner-as-collaborator) and connectivism (learner-as-leader) paradigms (Ouyang & Jiao, 2021).

Marginalised learners such as those with disabilities remain unnoticed both by institutions and AIEd technology designers. UNESCO warns of the risk of creating inequalities if access to AIEd technologies becomes challenging for certain communities of learners (Pedró et al., 2019). That is, supporting this group of learners is essential to ensure they take profit of this tools for their learning. The available evidence indicates that the few initiatives aimed at addressing this gap have been ran within the earliest educational levels and focused mainly on an individualised approach, rather than emphasising the inclusion of all learners in the educational processes (Knox et al., 2019; Toyokawa et al., 2023).

Conclusion

The emergence of AIEd has brought significant changes to online higher education, requiring faculty to adapt their teaching and assessment methods. While current practices predominantly emphasise personalisation, it is crucial to recognise that these technologies can extend beyond individualised learning. The incorporation of these tools in the educational processes has the potential to contribute to other areas such as improving accessibility and fostering autonomy and metacognition. It also contributes to liberating professors from administrative tasks, enabling them more time to provide quality feedback to students. Therefore, adopting these technologies will help online universities to promote learning opportunities for everyone. In this regard, professor need support to effectively apply AIEd benefits towards enhancing the involvement of marginalised communities in the learning processes. Ultimately, the use of these technologies should focus on enhancing accessibility, comprehension, and text production, as well as on interacting, collaborating, and developing critical thinking skills for all learners.

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