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EDUCATORS' AI INTERACTİONS İN HİGHER EDUCATİON

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Abstract

The main aim of this pilot study is to explore how Artificial intelligence (AI) tools are being experienced by educators in higher education (HED) institutions. Drawing on a quantitative approach through an online questionnaire, this study reveals various AI tools' familiarity and usage, the perceived benefits and barriers of AI integration, and the training needs for better AI adoption based on higher educators' perspectives. Particularly, findings showcase that AI tools are applied across different contexts in learning and various advantages have been experienced in efficiency, personalization, and student engagement. Nevertheless, the levels of the barriers including AI literacy, technical issues, and ethical factors were also reported. Further, the study highlights the need for proper training programs that equip educators to stand ready to address the challenges that come with applying AI in HED settings. Therefore, the current study provides valuable insights into the current state of AI integration in HED and underlines the importance of further endeavours to assist educators with AI integration for their academic activities.

Keywords: AI integration, Higher education, Educators, True extent, Pilot study

YÜKSEKÖĞRETİMDE EĞİTİMCİLERİN YAPAY ZEKÂ ETKİLEŞİMLERİ

Özet

Bu pilot çalışmanın temel amacı, Yapay zekâ (YZ) araçlarının yükseköğretim (YÖG) kurumlarındaki eğitimciler tarafından nasıl deneyimlendiğini keşfetmektir. Çevrimiçi bir anket tekniği aracılığıyla nicel yaklaşıma dayanan bu çalışma, çeşitli YZ araçlarının aşinalığını ve kullanımını, YZ entegrasyonunun algılanan faydalarını ve engellerini ve yükseköğretim eğitimcilerinin bakış açılarına YZ için eğitim ihtiyaçlarını ortaya koymaktadır. Özellikle bulgular, YZ araçlarının öğrenmede farklı bağlamlarda uygulandığını ve verimlilik, kişiselleştirme ve öğrenci katılımı alanlarında çeşitli avantajlar sağladığını göstermektedir. Bununla birlikte, YZ hakkında bilgi eksikliği, teknik sorunlar ve etik faktörler de dahil olmak üzere çeşitli engeller de rapor edilmiştir. Çalışma ayrıca, eğitimcileri YÖG ortamında yapay zekanın uygulalarına daha hazır hale getirecek eğitim programların önemini de vurgulamaktadır. Bu nedenle, mevcut araştırma, YÖG'de YZ entegrasyonunun mevcut durumu hakkında değerli bilgiler sağlamakta ve eğitimcilerin akademik faaliyetleri için YZ entegrasyonuna yardımcı olacak daha fazla çabanın önemini göstermektedir.

Anahtar Kelimeler: Yapay zekâ entegrasyonu, Yükseköğretim, Eğitimciler, Gerçek kapsam, Pilot çalışma

1. Introduction

Artificial intelligence (AI) has been subject to the transformation of many professions in every industry field, revolutionizing workforce dynamics across multiple sectors (Huang & Rust, 2018). Nevertheless, although a tremendous shift has been experienced in the different sectors within various

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industries so far, the universities in the service industry have notably lagged behind the adaptation of AI technologies at the expected pace (McGrath et al., 2023). However, many studies have argued that the possibility of AI can bring reform in HED more than any other technological advancement (Bates et al., 2020).

Despite its benefits to HED, including enhancing efficiency (Cerratto Pargman & McGrath, 2019), reducing the workload (Burrows et al. 2015), and saving time for being more creative (Klutka et al., 2018), most research (e.g., Liu et al., 2020; Seufert et al., 2021) have demonstrated that educators are cautiously adapting this innovative cutting-edge technology, making this phenomenon more interesting for research (McGrath et al., 2023). Consequently, numerous studies identified some potential inaccuracies explaining educators' AI implementation hesitancy, such as fears of job displacement (Akata et al., 2019), concerns about ethical issues (e.g., privacy, transparency, and safety; Mittelstadt et al., 2016), biased and outdated information in response (Moundridou et al., 2024), lack of funding (Wheeler, 2019), and lack of universal guidance (Chu et al., 2022).

While these studies have showcased some key reasons for educators' reluctance against AI adaptation, none have adequately addressed a noticeable gap in the literature concerning hybrid intelligence from an augmentation perspective (Akata et al., 2019; Cukurova et al., 2019; Molenaar, 2022), particularly regarding the actual extent of educators' interactions with AI in practice and what specific forms these revolutionary interactions occur within educational settings (Dhawan & Batra, 2020; Molenaar, 2022). The relationship between humans and AI in HEDs can provide intriguing possibilities for enhancing teaching experiences and outcomes. AI is also extraordinary in quantitative computations, but it does not possess the personal insights and understanding that individuals have, which makes cooperation between humans and AI systems crucial (Holstein et al., 2019).

To fill this omitted gap, this current pilot study is based on educators' interaction experiences with AI technologies since they are the ultimate decision-makers in educational settings (Kizilcec, 2024). Doing so offers better insights into the existing research agenda on how educators practically interact with AI technologies in HED. The results can be useful to policymakers, educators, and researchers in identifying the current level of utilizing AI in HED contexts. Consequently, they can be applied in devising sound approaches and mechanisms for enhancing educators' AI experiences.

In the following sections, the paper provides an overview regarding the research area, which involves sytematic literature review on the use of AI in HEDs. Following this, the methodology is outlined, detailing the sampling methods, data collection, and analysis technique. Subsequently, the results are presented in the paper. Finally, the paper concludes with its theoretical implications and practical recommendations for enhancing educators' competencies in utilizing AI effectively in their academic practices.

2. Conceptual background

Many studies (e.g., Celik et al., 2022; Holmes & Tuomi, 2022; Crompton et al., 2022; Chiu et al., 2023) provided valuable insights concerning AI's potential benefits, challenges, and impact on the educational process, specifically describing its incorporation into the HED settings. Many international reports- e.g. the EDUCAUSE Horizon Report in 2022, also underlined AI as one of the technologies that might have the greatest impact on HED (Pelletier et al., 2022). Because, AI has the potential to transform the traditional paradigm of education by redefining the roles of educators (Firat, 2023). It provides a capability of comprehension that may transcend human cognitive limits when dealing with complex issues and various learner profiles (Holstein et al., 2019). However, although AI can even outperform most educational trends, only a small percentage of the world's educators have a rudimentary understanding of what it is at best (Ocaña-Fernández et al., 2019).

Therefore, educators should adjust the ways they teach as well as the ways they assess students, to raise students' achievement and curb possible misuse of generative AI such as "AIgiarism" (Murugesan & Cherukuri, 2023: 119); in this respect, universities must devise sound policies and carry on researching the AI-related issues, including ethical dilemmas (Bearman et al., 2023). With regret, there is no universal educational context in which AI would be situated appropriately for educational settings since teaching and learning objectives are not fully aligned with the current AI's low capabilities.

Nevertheless, few countries have put in place measures to deal with this advanced technology in the education system so far. For example, in the U.S., the Department of Education issued a particular article of rights for AI within the synthesis of educational programs (U.S. Department of

Education, 2023); in Europe, the EU AI Act was also established because of the first general AI regulation (European Parliament, 2023); meanwhile, in Australia, a task force was developed to form the foundations for Gen-AIs within schools (NSW Government, 2023). However, while retaining potential utility for transforming teaching and learning- e.g. for some promising countries- not so much has been realized for AI-enhanced edtech around the principles rooted in research more generally (Zawacki-Richter et al., 2019).

On the other hand, the current status of AI still remains far from meeting Artificial General Intelligence where the capacity of the machines aligns with the cognitive capabilities of humans (Tegmark, 2017). Therefore, studies demonstrate that educators only limitedly use AI tools for specific tasks, including personalized teaching/ learning, educational gaming, creating smart content, automatic assessment, intelligent tutoring systems, and voice assistance for data transcription (Fitria, 2021). Especially, large language models (LLMs) consist of generative artificial intelligence (GenAI) capabilities present in products such as Microsoft Copilot, Bard, and Gemini. The most popular example of it is ChatGPT, which is based on the GPT-3 model and subsequent models in the form of a conversational interface. Beyond LLMs, there is a variety of other tools of AI that can be used in educational settings, as presented in Table 1.

Table 1. Examples of the AI tools

Subgroup	**Description**	**Example tools**
Plagiarism detection	Tools for plagiarism detection of academic papers and students' assays.	Plagiarism detection tools (e.g., Turnitin, Winston AI, Copyscape, ZeroGPT)
Grading	Automated grading systems for students' exams.	-Automated grading tools (e.g. Gradescope, Zipgrade, Socrative, Plickers)
Gaming	AI-powered educational games for interactive teaching and learning.	-AI-powered educational games (e.g., Kahoot! AI question generator, Minecraft Education Edition, Duolingo, Quizlet)
Personalized learning	Adaptive learning platforms for personalized learning.	-Adaptive learning platforms (e.g. Knewton, CogBooks, SmartSparrow, LearnSmart)
Course design	Intelligent tutoring systems personalize learning and assessments, while AI simulations provide immersive, hands-on experiences.	-Intelligent tutoring systems (e.g., My-Moodle, Course Builder, Teachable, ALEKS) -AI-enabled simulations (e.g. Labster, iCivics, Mursion)
Educational management	Personalize learning, automate tasks, and provide feedback to improve educational outcomes.	AI-powered learning management systems (e.g., Blackboard Learn - AI design assistant, Moodle AI plugins, Canvas LMS AI features, Docebo)
Lesson and activity planners		-AI quiz tools (e.g., Quizizz, Socrative, Wooclap, ClassPoint) - AI-powered learning analytics (e.g., Moodle Analytics, Dropout Detective, Learning Locker, Tableau, Power BI)
Voice/video/transcription	Tools for creating voice, videos, and transcription from texts or on a specific topic	-Speech recognition and transcription software (e.g., Whisper, VOSK, Silero, Otter.ai)

Source: Authors own creation

3. Methodology

A quantitative research approach far a descriptive analysis was applied to unveil the true extent of educators' AI interactions with this current pilot study. A self-administered online questionnaire, consisting of demographic details (e.g., sex, age, type of institution, year of experience, position, and

level of prior AI experience) and multiple-item scales with a 5-point Likert-type were used for data collection (Please see Appendix A).

The development of the questionnaire was informed by previous literature and existing theoretical frameworks. Specifically, Technology Acceptance Model (TAM) was utilized, because TAM can be applied to understand educators' interactions with AI by examining two key components: Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) are two constructs that are proposed to be fully mediated by behavioural intentions when the technology is fully adopted (Chatterjee, & Bhattacharjee, 2020). This logic enabled the researchers to determine factors affecting the acceptance of AI by asking questions that explore PU, such as 'What are the main advantages of using AI?' and PEOU questions, such as 'Select all the barriers that you find relevant when using AI for teaching'. Exploring these results will allow for the identification of barriers to implementation and thus the development of support for professional development and better use of AI in the educational context.

The samples involved educators from social science in Turkish universities and the convenience sampling method was deemed appropriate for reaching potential participants from August 1 - September 10, 2024. According to the most recent data from the Council of Higher Education (Türkiye), there are a total of 184,566 academic staff across 208 higher education institutions for the 2022-2023 academic year (Council of Higher Education, 2024). Nevertheless, a total of 40 online questionnaires were obtained for descriptive data analysis in the SPSS software, which can be deemed appropriate for a pilot study (Kieser & Wassmer, 1996). The collected data were analyzed using SPSS software through descriptive statistics. A general profile of the participants' demographic characteristics and their interactions with artificial intelligence was created.

4. Findings

4.1. Respondents' Profiles

Of the 40 online data, 24 were completed by males (60%); 15 by females (37.5%), and one of the participants referred not to answer gender-related questions. Only two (5%) of the participants were under 24 years old; one of them (2.5%) was over 65 years old and the rest of them were middle-aged between 25-64 years old (92.5%). The number of married respondents was more than half of the total respondents (n = 24; 60%); in contrast, 16 (24%) were single.

Thirty-two (n=80%) participants were also employees in private universities, while 8 (20%) had been working for private universities (including NGOs). Eight participants (20%) reported having less than 5 years of experience in academia, while twelve participants (30%) had more than 20 years of experience; remainings (n=20, 50%) had between 5 and 19 years of experience. Most of the participants (n=12, 30%) held the title of full professor; 10 participants (25%) were associate professors; 9 of them (22.5%) were assistant professors, and the remainder held lecturer or non-teaching positions. Lastly, half of the participants (n = 20, 50%) reported having an intermediate level of experience with AI tools, meaning they were hands-on with basic tools. Eleven participants (27.5%) had a basic understanding, being familiar with the terms and concepts. Five participants (12.5%) were at an expert level, having published research or being deeply involved in AI. One participant (2.5%) had advanced experience, having developed models or worked on complex projects, while the remaining three participants (7.5%) had no experience with AI tools.

4.2. Findings of the descriptive analysis

In this section, participants primarily reveal which AI tools they use for their teaching/research practices, the advantages they have experienced from using AI tools, the barriers they face when using AI in teaching, and what they believe should be included in training programs for AI integration in HED.

Table 2. Familiarity with AI Tools for Educational Purposes

AI TOOLS	Not at all	Rarely	Occasionally	Often	Very often
Chatbots (e.g., ChatGPT, Gemini, Bard, Microsoft Copilot)	18 (45.0%)	8 (20.0%)	7 (17.5%)	4 (10.0%)	3 (7.5%)
Plagiarism detection systems (e.g., Turnitin, Winston AI, Copyscape, ZeroGPT)	28 (70.0%)	8 (20.0%)	2 (5.0%)	1 (2.5%)	1 (2.5%)
Automated grading systems (e.g. Gradescope, Zipgrade, Socrative,	31 (77.5%)	7 (17.5%)	1 (2.5%)	0 (0.0%)	1 (2.5%)

Plickers)					
AI-powered educational games (e.g., Kahoot! AI question generator, Minecraft Education Edition, Duolingo, Quizlet)	1 (2.5%)	11 (27.5%)	5 (12.5%)	6 (15.0%)	17 (42.5%)
Adaptive learning platforms (e.g. Knewton, CogBooks, SmartSparrow, LearnSmart)	4 (10.0%)	7 (17.5%)	6 (15.0%)	7 (17.5%)	16 (40.0%)
Intelligent tutoring systems (e.g., My-Moodle, Course Builder, Teachable, ALEKS)	30 (75.0%)	5 (12.5%)	2 (5.0%)	2 (5.0%)	1 (2.5%)
AI-powered learning analytics (e.g., Moodle Analytics, Dropout Detective, Learning Locker, Tableau, Power BI)	30 (75.0%)	7 (17.5%)	0 (0.0%)	2 (5.0%)	1 (2.5%)
AI-powered learning management systems (e.g., Blackboard Learn - AI design assistant, Moodle AI plugins, Canvas LMS AI features, Docebo)	25 (62.5%)	6 (15.0%)	5 (12.5%)	3 (7.5%)	1 (2.5%)
AI quiz tools (e.g., Quizizz, Socrative, Wooclap, ClassPoint)	29 (72.5%)	7 (17.5%)	1 (2.5%)	1 (2.5%)	2 (5.0%)
AI-enabled simulations (e.g. Labster, iCivics, Mursion)	33 (82.5%)	3 (7.5%)	3 (7.5%)	0 (0.0%)	1 (2.5%)

Table 2 summarizes the frequency of engagement with various tools of AI applications in educational settings. The findings reveal that most AI tools were not used frequently. Among these, educational games, adaptive learning platforms, and chatbots were the most frequently used AI-powered tools.

Table 3. AI-Integrated Teaching and Research Practices Already in Use

Teaching/research practices	**Not at all**	**Rarely**	**Occasionally**	**Often**	**Very often**
Design adaptive learning	20 (50.0%)	6 (15.0%)	4 (10.0%)	7 (17.5%)	3 (7.5%)
Generate learning analytics	19 (47.5%)	7 (17.5%)	7 (17.5%)	2 (5.0%)	5 (12.5%)
Prepare the curriculum and syllabus	9 (22.5%)	12 (30.0%)	7 (17.5%)	6 (15.0%)	6 (15.0%)
Generate course content and material	7 (17.5%)	13 (32.5%)	9 (22.5%)	6 (15.0%)	5 (12.5%)
Evaluate the quality of the course	12 (30.0%)	13 (32.5%)	4 (10.0%)	7 (17.5%)	4 (10.0%)
Predict student performance	17 (42.5%)	8 (20.0%)	7 (17.5%)	3 (7.5%)	5 (12.5%)
Assess the students' emotional state	24 (60.0%)	9 (22.5%)	6 (15.0%)	-	1 (2.5%)
Provide personalized feedback	17 (42.5%)	7 (17.5%)	6 (15.0%)	6 (15.0%)	4 (10.0%)
Obtain the student's opinions about teaching/learning	18 (45.0%)	8 (20.0%)	3 (7.5%)	7 (17.5%)	4 (10.0%)
Form student working groups	18 (45.0%)	9 (22.5%)	4 (10.0%)	5 (12.5%)	4 (10.0%)
Assessment	15 (37.5%)	8 (20.0%)	7 (17.5%)	6 (15.0%)	4 (10.0%)
Enhance student experience in class	17 (42.5%)	6 (15.0%)	7 (17.5%)	3 (7.5%)	7 (17.5%)
Professional learning and development	10 (25.0%)	10 (25.0%)	9 (22.5%)	3 (7.5%)	8 (20.0%)
Create in-class activities	12 (30.0%)	9 (22.5%)	7 (17.5%)	5 (12.5%)	7 (17.5%)
Detect plagiarism	6 (15.0%)	6 (15.0%)	3 (7.5%)	6 (15.0%)	19 (47.5%)
Identify learning gaps and student needs	16 (40.0%)	9 (22.5%)	2 (5.0%)	6 (15.0%)	7 (17.5%)
Speech recognition and transcription	13 (32.5%)	9 (22.5%)	4 (10.0%)	5 (12.5%)	9 (22.5%)
Data analysis	10 (25.0%)	7 (17.5%)	8 (20.0%)	7 (17.5%)	8 (20.0%)

The respondents were also asked about the main activities and motivations of AI utilization in teaching. It seems AI was more frequently used to detect plagiarism, data analysis, speech recognition, and transcription, and create in-class activities. While AI was less frequently used in assessing the student's emotional state, enhancing student experience in class, and forming student work groups.

Table 4. Key Advantages of Using AI

Advantages	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Can process large numbers of data	1 (2.5%)	2 (5.0%)	5 (12.5%)	14 (35.0%)	18 (45.0%)
Delivers immediate feedback	4 (10.0%)	4 (10.0%)	14 (35.0%)	14 (35.0%)	18 (45.0%)
Saves time	1 (2.5%)	2 (5.0%)	3 (7.5%)	7 (17.5%)	27 (67.5%)
Reduces workload	2 (5.0%)	4 (10.0%)	8 (20.0%)	26 (65.0%)	-
Provides innovative ideas and different perspectives	2 (5.0%)	8 (20.0%)	15 (37.5%)	15 (37.5%)	-
Enhances student engagement	8 (20.0%)	10 (25.0%)	10 (25.0%)	12 (30.0%)	-
Improves teaching performance	2 (5.0%)	2 (5.0%)	7 (17.5%)	15 (37.5%)	14 (35.0%)
Automates repetitive mechanic tasks	2 (5.0%)	5 (12.5%)	6 (15.0%)	13 (32.5%)	14 (35.0%)
Assists with information processing and retrieval	3 (7.5%)	5 (12.5%)	7 (17.5%)	15 (37.5%)	10 (25.0%)
Reduces bias	5 (12.5%)	7 (17.5%)	11 (27.5%)	12 (30.0%)	5 (12.5%)
Customizes learning	1 (2.5%)	5 (12.5%)	11 (27.5%)	15 (37.5%)	8 (20.0%)
Provides a variety of materials	1 (2.5%)	3 (7.5%)	6 (15.0%)	16 (40.0%)	14 (35.0%)
Enhances student experience	2 (5.0%)	6 (15.0%)	10 (25.0%)	8 (20.0%)	14 (35.0%)
Supports instructional decision-making	3 (7.5%)	4 (10.0%)	12 (30.0%)	12 (30.0%)	9 (22.5%)

The findings also indicate strong approval across various AI usage advantages. For example, two of the advantages of using AI tools, namely ‘Can process large numbers of data’, ‘Deliver immediate feedback' and “Save time” were rated as the most important advantages. Majority of the respondents also agreed on the rest of the advantages as important except enhancing student engagement. Therefore they believe that human interaction is still important for student engagement.

Table 5. Barriers to Using AI in Teaching

Barriers	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Costs involved in installation, training, and maintenance	1 (2.5%)	8 (20.0%)	6 (15.0%)	15 (37.5%)	10 (25.0%)
Restricted applicability (some teaching activities are difficult to automate)	3 (7.5%)	5 (12.5%)	8 (20.0%)	16 (40.0%)	8 (20.0%)
Limited understanding of student thinking	4 (10.0%)	6 (15.0%)	10 (25.0%)	15 (37.5%)	5 (12.5%)
Technical errors	1 (2.5%)	9 (22.5%)	13 (32.5%)	9 (22.5%)	8 (20.0%)
Restricted perception of context in understanding the reason behind an AI response	8 (20.0%)	12 (30.0%)	12 (30.0%)	8 (20.0%)	- (-)
Reduced social interaction (student-teacher and students among themselves)	2 (5.0%)	6 (15.0%)	8 (20.0%)	15 (37.5%)	9 (22.5%)
Limited understanding of nuanced responses	3 (7.5%)	8 (20.0%)	11 (27.5%)	10 (25.0%)	8 (20.0%)
Ethical issues and paligriasm	4 (10.0%)	4 (10.0%)	3 (7.5%)	10 (25.0%)	19 (47.5%)
Accountability (who is responsible for AI-generated information)	4 (10.0%)	3 (7.5%)	8 (20.0%)	9 (22.5%)	16 (40.0%)
Potential adverse personal and social impacts on students	3 (7.5%)	8 (20.0%)	11 (27.5%)	13 (32.5%)	5 (12.5%)
Insufficient technological infrastructure	3 (7.5%)	6 (15.0%)	7 (17.5%)	14 (35.0%)	10 (25.0%)
Lack of AI literacy among instructors	1 (2.5%)	3 (7.5%)	6 (15.0%)	11 (27.5%)	19 (47.5%)
Lack of standard guidelines and methods for AI use in education	1 (2.5%)	3 (7.5%)	4 (10.0%)	11 (27.5%)	21 (52.5%)
Biased information	2 (5.0%)	4 (10.0%)	15 (37.5%)	10 (25.0%)	9 (22.5%)

Different disciplines have different needs	2 (5.0%)	3 (7.5%)	7 (17.5%)	13 (32.5%)	15 (37.5%)
Rapid developments in AI make it harder to adopt	3 (7.5%)	15 (37.5%)	11 (27.5%)	11 (27.5%)	- (-)
Risk of overreliance on AI	1 (2.5%)	5 (12.5%)	10 (25.0%)	12 (30.0%)	12 (30.0%)
Maintaining the social and cultural aspects of education in AI-integrated teaching	2 (5.0%)	5 (12.5%)	8 (20.0%)	16 (40.0%)	9 (22.5%)
Reduction of human role in teaching	2 (5.0%)	7 (17.5%)	10 (25.0%)	12 (30.0%)	9 (22.5%)
Privacy and data security issues	1 (2.5%)	3 (7.5%)	9 (22.5%)	9 (22.5%)	18 (45.0%)
Accessibility and equity	2 (10.0%)	11 (27.5%)	11 (27.5%)	14 (35.0%)	- (-)
Copyright issues	3 (7.5%)	4 (10.0%)	5 (12.5%)	11 (27.5%)	17 (42.5%)

The quantitative data reveals a few serious barriers regarding the use of AI in learning systems. The most highly rated challenges of AI integration include lack of standard guidelines and methods of AI use in education, lack of AI literacy among instructors, ethical issues and plagiarism, different needs of different disciplines, ethical issues and copyright issues, and privacy and data security issues.

Table 6. Key Topics to Cover in AI Integration Training for Higher Education

AI Integration Trainings	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
The history and development of AI	6 (15.0%)	9 (22.5%)	8 (20.0%)	11 (27.5%)	6 (15.0%)
Principles of AI and its socio-economic implications	1 (2.5%)	5 (12.5%)	4 (10.0%)	21 (52.5%)	9 (22.5%)
Technical skills for AI use in education	1 (2.5%)	2 (5.0%)	-	14 (35.0%)	23 (57.5%)
Pedagogical skills for AI use in education	2 (5.0%)	2 (5.0%)	5 (12.5%)	13 (32.5%)	18 (45.0%)
Prompting skills in AI	2 (5.0%)	1 (2.5%)	5 (12.5%)	12 (30.0%)	20 (50.0%)
Addressing academic honesty in AI	3 (7.5%)	3 (7.5%)	4 (10.0%)	11 (27.5%)	19 (47.5%)
Enhancing student engagement with AI tools	2 (5.0%)	-	5 (12.5%)	14 (35.0%)	19 (47.5%)
Strategies for evaluating and detecting AI-generated content	2 (5.0%)	4 (10.0%)	10 (25.0%)	24 (60.0%)	-
Developing AI-driven lesson plans and syllabi	2 (5.0%)	1 (2.5%)	5 (12.5%)	12 (30.0%)	20 (50.0%)
AI-driven in-class presentation and teaching	1 (2.5%)	2 (5.0%)	6 (15.0%)	12 (30.0%)	19 (47.5%)
Assessment with AI	1 (2.5%)	1 (2.5%)	5 (12.5%)	11 (27.5%)	22 (55.0%)

Frequently, the key areas of the AI tools integration training are reported which suggests training requirements among the participants. Technical skills for AI use in education, Enhancing student engagement with AI, assessment with AI, prompting skills in AI, and developing AI-driven lesson plans and syllabi were rated as the most important topics in an AI training module addressing instructor needs in higher education. All other items were also rated as important.

5. Conclusion

This current pilot study clearly supports that AI tools have been trending in the teaching and research activities in HED settings, filling an omitted gap regarding hybrid intelligence from an augmentation perspective (Akata et al., 2019; Cukurova et al., 2019; Molenaar, 2022), specifically about the actual extent of educators' interactions with AI tools in practice (Dhawan & Batra, 2020; Molenaar, 2022). By addressing the practical implications and offering concrete recommendations for educators and policymakers, this research contributes significantly to the literature on AI in education, paving the way for future advancements in teaching and learning practices.

According to the findings, different reflective AI technologies are now being used at various levels; for example, chatbots, games based on artificial intelligence, and plagiarism checking tools. In this regard, findings clearly showcase the various reflective AI technologies—such as chatbots, AI-based games, and plagiarism detection tools—are increasingly utilized by educators. Although these tools are very effective and have several advantages such as time-saving, increased efficiency and adaptability, and learner-centeredness, some of the barriers (e.g., lack of guidance, AI literacy gap, and

occasionally ethical issues) were highly noted by participants, supporting prior studies (e.g., Chu et al., 2022; Mittelstadt et al., 2016; Moundridou et al., 2024; Wheeler, 2019).

In this regard, the paper also indicates and calls for enhanced professional development programmes to improve educators' competencies in using AI in pre-class, in-class, and post-class activities. These programs should focus on several key areas: improving educators' awareness of AI, providing techniques for educators to use when supporting the learning of AI, explaining how educators can ensure that AI content is not plagiarised, and presenting options on how the content generated by AI can be evaluated. Such areas as employing general knowledge of AI, knowledge on how to teach and use AI in the classroom, concerns about academic integrity, and how to teach and assess students on AI-based content are areas that require pieces of training. Through meeting these pieces of training, the HED institutions would optimise the potential of AI while at the same time reducing the risks associated with these technologies and applying ethical standards in the use of such AI tools in HED. In this way, it becomes possible for higher education institutions to gain the greatest value from AI implementation together with the appropriate minimization of the risks connected with it as well as compliance with the standards of ethics.

The result helps to establish the significance of the AI in the HED context. When used effectively, AI means a lot in both future teaching and learning practices and; hence, the importance of preparing educators for the future. Education institutions would provide various platforms to train the instructors and students if the above-stated challenges are adressed. Being a pilot study the findings however cannot be generalized because of the scope and sample size of the research. Thus, future studies should include a diverse sample (e.g., educators, students, and managers) from different countries, which can also help to compare countries regarding AI usage in the HED context. Future research might also address other factors (e.g. personal, organizational, and external) that affect the integration of AI in HED. The potential impacts of AI on students, instructors, educational institutions, the jobs market, and future transformations might also be addressed in future studies.

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Appendix A.

I. Demographics						
Sex?	□ Female □ Male □ Prefer not to answer □ Other (please specify)					
Age?	□ 24 or under □ 25 to 34 □ 35 to 44 □ 45 to 54 □ 55 to 64 □ 65 or over					
In which country do you currently reside?	……					
Nationality?	……					
Institution of work?	□ Private (including NGOs) □ Public					
How many years of teaching experience do you have in higher education?	□ 0–5 years □ 6–10 years □ 11–15 years □ 16–20 years □ 20+ years					
What is your current position?	□ Non-teaching position □ Lecturer □ Assistant professor □ Associate professor □ Full Professor □ Other…….					
GoogleScholar H-index?	……..					
Prior AI experience?	□ No experience □ Basic understanding (familiar with terms and concepts) □ Intermediate experience (hands-on with basic tools) □ Advanced experience (developed models or working on complex projects) □ Expert (published research, deep involvement in AI)					
II. Levels of AI tools involvement						
Which AI tools are you familiar with for educational purposes? Please rate each tool using the scale: **1. Not at all** **2. Rarely** **3. Occasionally** **4. Often** **5. Very often**	**AI Tools**	**1**	**2**	**3**	**4**	**5**
	Chatbots (e.g., ChatGPT, Gemini, Bard, Microsoft Copilot)	□	□	□	□	□
	Plagiarism detection systems (e.g., Turnitin, Winston AI, Copyscape, ZeroGPT)	□	□	□	□	□
	Automated grading systems (e.g. Gradescope, Zipgrade, Socrative, Plickers)	□	□	□	□	□
	AI-powered educational games (e.g., Kahoot! AI question generator, Minecraft Education Edition, Duolingo, Quizlet)	□	□	□	□	□
	Adaptive learning platforms (e.g. Knewton, CogBooks, SmartSparrow, LearnSmart)	□	□	□	□	□
	Intelligent tutoring systems (e.g., My-Moodle, Course Builder, Teachable, ALEKS)	□	□	□	□	□
	AI-powered learning analytics (e.g., Moodle Analytics, Dropout Detective, Learning Locker, Tableau, Power BI)	□	□	□	□	□

	AI-powered learning management systems (e.g., Blackboard Learn - AI design assistant, Moodle AI plugins, Canvas LMS AI features, Docebo)	□	□	□	□	□
	AI quiz tools (e.g., Quizizz, Socrative, Wooclap, ClassPoint)	□	□	□	□	□
	AI-enabled simulations (e.g. Labster, iCivics, Mursion)	□	□	□	□	□
	Speech recognition and transcription software (e.g., Whisper, VOSK, Silero, Otter.ai)	□	□	□	□	□
What other teaching/research practices have you already used with AI? Please rate each practice using the scale: 1. Not at all 2. Rarely 3. Occasionally 4. Often 5. Very often	**Teaching Practice**	**1**	**2**	**3**	**4**	**5**
	Design adaptive learning	□	□	□	□	□
	Generate learning analytics	□	□	□	□	□
	Prepare the curriculum and syllabus.	□	□	□	□	□
	Generate course content and material.	□	□	□	□	□
	Evaluate the quality of the course.	□	□	□	□	□
	Predict student performance	□	□	□	□	□
	Assess the student's emotional state.	□	□	□	□	□
	Provide personalized feedback	□	□	□	□	□
	Obtain the student's opinions about teaching/learning.	□	□	□	□	□
	Form student working groups	□	□	□	□	□
	Assessment	□	□	□	□	□
	Enhance student experience in class.	□	□	□	□	□
	Professional learning and development	□	□	□	□	□
	Create in-class activities	□	□	□	□	□
	Detect plagiarism	□	□	□	□	□
	Identify learning gaps and student needs.	□	□	□	□	□
	Speech recognition and transcription	□	□	□	□	□
	Data analysis	□	□	□	□	□
What are the main advantages of using AI? Please rate each practice using the scale: 1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree	**Variables**	**1**	**2**	**3**	**4**	**5**
	Can process large numbers of data	□	□	□	□	□
	Delivers immediate feedback	□	□	□	□	□
	Saves time	□	□	□	□	□
	Reduces workload	□	□	□	□	□
	Provides innovative ideas and different perspectives	□	□	□	□	□
	Enhances student engagement	□	□	□	□	□
	Improves teaching performance	□	□	□	□	□
	Automates repetitive mechanic tasks	□	□	□	□	□
	Assists with information processing and retrieval	□	□	□	□	□
	Reduces bias	□	□	□	□	□
	Customizes learning	□	□	□	□	□
	Provides a variety of materials	□	□	□	□	□
	Enhances student experience	□	□	□	□	□
	Supports instructional decision-making	□	□	□	□	□
	Identifies students' performance	□	□	□	□	□
Select all the barriers that you find relevant when using AI for teaching. Please rate each practice using the scale: 1. Strongly Disagree 2. Disagree 3. Neutral 4. Agree 5. Strongly Agree	**Variables**	**1**	**2**	**3**	**4**	**5**
	Costs involved in installation, training, and maintenance	□	□	□	□	□
	Restricted applicability (some teaching activities are difficult to automate)	□	□	□	□	□
	Limited understanding of student thinking	□	□	□	□	□
	Technical errors	□	□	□	□	□
	Restricted perception of context in understanding the reason behind an AI response	□	□	□	□	□
	Reduced social interaction (student-teacher and students among themselves)	□	□	□	□	□
	Limited understanding of nuanced responses	□	□	□	□	□

	Ethical issues and paligriasm	□	□	□	□	□
	Accountability (who is responsible for AI-generated information)	□	□	□	□	□
	Potential adverse personal and social impacts on students	□	□	□	□	□
	Insufficient technological infrastructure	□	□	□	□	□
	Lack of AI literacy among instructors	□	□	□	□	□
	Lack of standard guidelines and methods for AI use in education	□	□	□	□	□
	Biased information	□	□	□	□	□
	Different disciplines have different needs.	□	□	□	□	□
	Rapid developments in AI make it harder to adopt	□	□	□	□	□
	Risk of overreliance on AI	□	□	□	□	□
	Maintaining the social and cultural aspects of education in AI-integrated teaching	□	□	□	□	□
	Reduction of human role in teaching	□	□	□	□	□
	Privacy and data security issues	□	□	□	□	□
	Accessibility and equity	□	□	□	□	□
	Copyright issues	□	□	□	□	□
If there was a training on AI integration in higher education which topics would you consider as more important to be covered in such security training? Please rate each practice using the scale: **1. Strongly Disagree** **2. Disagree** **3. Neutral** **4. Agree** **5. Strongly Agree**	**Variables**	**1**	**2**	**3**	**4**	**5**
	History and development of AI	□	□	□	□	□
	Principles of AI and its socio-economic implications	□	□	□	□	□
	Technical skills for AI use in education	□	□	□	□	□
	Pedagogical skills for AI use in education	□	□	□	□	□
	Prompting skills in AI	□	□	□	□	□
	Addressing academic honesty in AI	□	□	□	□	□
	Enhancing student engagement with AI tools	□	□	□	□	□
	Strategies for evaluating and detecting AI-generated content	□	□	□	□	□
	Developing AI-based lesson plans and syllabi	□	□	□	□	□
	AI-driven in-class presentation and teaching	□	□	□	□	□
	Assessment with AI	□	□	□	□	□