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Ehsan Namaziandost et Afsheen Rezai

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Special Issue: Artificial Intelligence in Open and Distributed Learning: Does It Facilitate or Hinder Teaching and Learning?

Ehsan Namaziandost[1,*] and Afsheen Rezai[2]
[1]Department of General Courses, Ahvaz Jundishapur University of Medical Sciences, Ahvaz, Iran & Department of English *Language Teaching, Ahvaz Branch, Islamic, Azad University, Ahvaz, Iran; [2]Teaching English and Linguistics Department, University of Ayatollah Ozma Borujerdi, Borujerd City, Iran; *Corresponding author*

Artificial intelligence (AI) is a rapidly evolving field with the potential to revolutionize various aspects of education, especially in open and distributed learning, including distance education, hybrid learning, and blended learning. AI can transform curriculum design, content delivery, assessment, feedback, learner support, and learning analytics (Chen et al., 2020). AI offers personalized and adaptive learning paths based on learners' preferences, needs, goals, and performance, enhancing their educational experience (Holmes et al., 2023). It also provides timely feedback and guidance, fostering engagement and motivation. AI creates interactive and immersive learning environments, such as games, simulations, and virtual reality, sparking learners' interest and involvement. It promotes social and collaborative learning by facilitating communication and cooperation among learners, instructors, and resources (Holmes et al., 2023).

Additionally, AI optimizes various tasks like content creation, grading, assessment, and learning analytics, improving the quality and efficiency of education processes. However, AI in education also raises significant challenges and risks. Ethical, legal, social, pedagogical, and technical issues need consideration (Chen et al., 2022; Ouyang & Jiao, 2021). For example, maintaining AI applications' quality, validity, reliability, and fairness remains crucial. Protecting learners' and instructors' privacy, security, and autonomy in AI-mediated learning contexts is also vital (Holmes et al., 2023).

Moreover, fostering critical thinking, creativity, and human values in AI-enhanced learning experiences is crucial. Lastly, addressing the digital divide and potential marginalization of learners and instructors without access to or skills in AI technologies is paramount (Holmes et al., 2023). Overall, AI has immense potential in education, but its responsible and informed implementation is necessary to ensure its benefits are maximized while mitigating potential risks.

Given the above points, this special issue aims to explore the opportunities and challenges of AI in open and distributed learning, including distance education, hybrid learning, and blended learning, from multiple perspectives. We invited original research articles that address the following topics but were not limited to:

- theoretical and conceptual frameworks for understanding and evaluating AI in open and distributed learning;
- empirical studies on designing, developing, implementing, and evaluating AI applications like ChatGPT in open and distributed learning;
- best practices and case studies on integrating AI into open and distributed learning curricula, pedagogies, and policies;
- critical analyses and reflections on AI's ethical, legal, social, pedagogical, and technical implications in open and distributed learning; and
- future trends for AI in open and distributed learning.

This special issue features 20 papers, each peer reviewed by at least two experts in the field.

The first article, "AI application (ChatGPT) and Saudi Arabian primary school students' autonomy in online classes: Exploring students and teachers' perceptions" by **Ali Rashed Ibraheam Almohesh,** investigated the impact of an AI-powered application, namely ChatGPT, on the autonomy of Saudi Arabian primary students participating in online classes. The research used a mixed-method design involving 250 Saudi Arabian primary students from six primary schools in Riyadh, Saudi Arabia. The findings revealed that ChatGPT significantly affected the participants' perceptions of autonomy and its dimensions. The results also indicated that AI-powered applications contributed to the students' autonomy in 10 different ways. Participants also mentioned that AI-powered apps might have some negative consequences.

The second paper, entitled "Threats and opportunities of students' use of AI-integrated technology (ChatGPT) in online higher education: Saudi Arabian educational technologists' perspectives," written by **Prof. Mesfer Mihmas Mesfer Aldawsari** and **Dr. Nouf Rashed Ibrahim Almohish** uncovered the perspectives of 20 educational technologists from four Saudi Arabian universities regarding the integration of AI-powered technology, particularly ChatGPT, into online higher education. The study adopted a qualitative research method that relied on the principles of theoretical sampling to select participants and conducted in-depth interviews to collect their insights. Twenty Saudi Arabian educational technologists volunteered to take part in the research. The results uncovered a rich range of insights into the challenges and opportunities associated with students using AI-integrated technology in online higher education. Additionally, eight threats highlighted concerns about data security, privacy, and potential risks associated with AI technology in educational institutions.

The third article, by **Dan Wang**, is titled "Teacher- versus AI-generated (Poe application) corrective feedback and the language learners' writing anxiety, complexity, fluency, and accuracy." This study investigated the effects of corrective feedback (CF) on language learners' writing anxiety, writing complexity, fluency, and accuracy and compares the effectiveness of feedback from human teachers with an AI-driven application called Poe. Using a quasi-experimental design with pretest and posttest measures involving 75 participants, the results revealed the significant effects of teacher and AI-generated feedback on learners' writing anxiety, accuracy, and fluency. Interestingly, the group that received AI-generated feedback performed better than the group that received teacher feedback or no AI support.

The fourth article is by **Hong Duan** and **Wei Zhao**, titled "The effects of educational artificial intelligence-powered applications on teachers' perceived autonomy, professional development for online teaching, and

digital burnout." They explored the repercussions of AI-empowered technologies on teachers' autonomous behavior, digital burnout, and professional development. Using a sample of 320 high school teachers in China, the results indicated a discernible positive impact of AI-integrated technology intervention on teachers' professional development and autonomous behaviors. Incorporating AI-enhanced tools aided teachers' professional growth and bolstered their independent and self-directed instructional practices. Moreover, the study revealed that using AI-integrated technology significantly reduced teachers' susceptibility to digital burnout, signifying a potential alleviation of stressors associated with technology-mediated teaching.

The fifth article by **Ting Xiao, Sisi Yi,** and **Shamim Akhter** disclosed the interplay between self-esteem (S-E), cognitive-emotion regulation (CER), academic enjoyment (AE), and language success (LS) in artificial intelligence (AI)-supported online language learning. Three hundred eighty-nine English as a Foreign Language (EFL) learners in China participated. The results highlighted the vital function of online courses assisted by AI in enhancing students' CER and AE learning. This implies that students with a robust sense of self-efficacy can effectively regulate their cognitive and affective processes in AI-supported language learning.

In article 6, **Zhiqun Ouyang, Yujun Jiang,** and **Huying Liu** checked how language learners' willingness and engagement to communicate in English as a Foreign Language (EFL) classrooms are affected by Duolingo. The study was conducted on 80 first-year language learners from the Foreign Language Department of Hunan International Economics University in China. Using a quasi-experimental method, the findings confirmed the effects on learner engagement, which showed significant gains in affective, cognitive, and behavioral domains, indicating Duolingo's beneficial impact on engagement in general. Furthermore, the results confirmed Duolingo's contribution to improved language attitudes, engagement, and communicative confidence.

Next, in the seventh paper entitled "The auxiliary role of artificial intelligence applications in mitigating the linguistic, psychological, and educational challenges of teaching and learning Chinese language by non-Chinese students," **Jingfang Xia, Yao Ge, Zijun Shen,** and **Mudasir Rahman Najar** delved into the auxiliary role of AI-empowered applications in mitigating the educational, linguistic, and psychological challenges which none-Chinese learners face while learning Chinese/Mandarin language. Qualitative research was employed, and 20 Chinese language teachers were selected through theoretical sampling. The findings revealed that AI-empowered educational applications help language learners overcome the commonly reported educational, psychological, and linguistic challenges that non-Chinese learners and Mandarin teachers might encounter. Findings verify the effectiveness of AI-empowered applications like ChatGPT, Poe, Brainly, etc, in helping teachers and learners of the Chinese language learn grammar, structure, idioms, and cultural issues of the Chinese language.

Dongmin Ma, Human Akram, and **Hua Chen** in the eighth paper, checked the potential variations across Chinese and international students (from diverse countries across the world) in terms of attitudes (AU) and their behavioral intentions (BI) towards AI use. The data were collected from 689 valid cases from diverse schools of a Chinese University through a survey approach employing questionnaires. The results showed a substantial discrepancy between Chinese and international students' prevalence, attitudes, and behavioral intentions towards AI use. Findings further revealed a more robust Perceived Ease of Use

(PEOU) effect on AU and BI among international students compared to their Chinese counterparts. The findings also suggested that cultural backgrounds and prior technological exposure play intricate roles in shaping perceptions of AI technology.

Using a mixed-methods study based on the technology acceptance model (TAM), **Hanwei Wu, Yunsong Wang,** and **Yongliang Wang** investigated the determinants of behavioral intention to use AI among 464 Chinese EFL college learners in the ninth article. The results showed that perceived ease of use significantly and positively predicted perceived usefulness and attitude toward AI. Moreover, attitude toward AI significantly and positively predicted behavioral intention to use AI. However, contrary to the TAM assumptions, perceived usefulness did not significantly predict either attitude toward AI or behavioral intention to use AI. In addition, mediation analyses suggested that perceived ease of use significantly and positively impacted students' behavioral intention to use AI through their attitude toward AI rather than through perceived usefulness. Lastly, semi-structured interviews with 15 learners provided a nuanced understanding of the statistical patterns.

In paper 10, **Jingyu Xiao**, **Goudarz Alibakhshi, Alireza Zamanpour, Mohamad Amin Zarei, Shapour Sherafat,** and **Seyyed-Fouad Behzadpoor** investigated the structural relationship among Iranian undergraduate students' AI literacy, academic well-being, and educational attainment. Through a convenience sampling approach, 400 undergraduate students from virtual universities equipped with LMS platforms and facilities were selected. The results demonstrated that the hypothetical model enjoyed acceptable psychometrics (divergent and convergent validity, internal consistency, and composite reliability). Results also showed that the general model had goodness of fit. The direct effect of AI on academic well-being and educational attainment was confirmed. Moreover, findings also indicated that AI literacy in India significantly affects educational attainment by measuring variables of academic well-being.

In paper 11, **Sha Gao** checked the effect of AI applications on enhancing undergraduate students' academic emotions and test anxiety. Using a convenience sampling approach, data were collected from 160 undergraduate students majoring in different fields of study who were divided into control and experimental groups. The findings showed that using AI-empowered applications significantly reduced the students' test anxiety and negative academic emotions but enhanced the students' positive academic emotions. Students can use ChatGPT as an auxiliary instrument to overcome negative emotions and improve their educational attainment.

In article 12, **Gürhan Durak, Serkan Çankaya, Damla Özdemir,** and **Seda Can** aimed to present a comprehensive bibliometric analysis of 1726 academic studies from among those indexed by the Web of Science database between 2013 and 2023 to provide a general framework for the concept of artificial intelligence in education (AIEd). Several bibliometric analysis techniques were applied, and the motivations behind each analysis's execution and method of producing findings were documented. The findings showed that the number of studies on AIEd has increased significantly, with the USA and China being the most common countries of origin. Institutions in the USA stand out from those around the world. Pioneering journals in education have also emerged as prominent in AIEd. On the other hand, collaboration between authors is limited. The study was supplemented with keyword analysis to reveal thematic AIEd concepts and to reflect changing trends.

In the 13th paper, **Tahereh Heydarnejad** and **Fidel Çakmak** investigated the links between teacher immunity (TI), work passion (WP), job satisfaction (JS), occupational success (OS), and psychological well-being (PW-B) in the context of AI-assisted online linguistic learning. Three hundred eighty-nine Iranian teachers of English as a Foreign Language (EFL) were given the Language Teacher Immunity Instrument, the Work Passion Scale, the Job Satisfaction Questionnaire, the Occupational Well-Being Scale, and the Psychological Well-Being at Work Scale. The findings emphasized the crucial role that TI and WP play in providing a balance in their JS, OS, and PW-B while applying AI in their language instruction.

Article 14 was the effort of **Ying He.** This study intended to picture the effects of employing automated writing evaluation (AWE) in fostering learners' writing skills, motivation to write, enjoyment in writing, and academic buoyancy in open and distributed English as a foreign language (EFL) learning. Eighty-six intermediate EFL students from China took part in this research. The participants in the experimental group (n=44) receive instruction and feedback only from their teachers, while the control group (n=42) is exposed to their teachers' instruction and AWE. The data analysis results indicated that the experimental group participants outperformed their peers in the control group in learners' motivation to write, enjoyment in writing, academic buoyancy, and academic success in writing.

In the 15th paper, **Ferdi Çelik, Ceylan Yangın Ersanlı,** and **Goshnag Arslanbay** investigated the impact of ChatGPT-simplified authentic texts on university students' reading comprehension, inferencing, and reading anxiety levels. One hundred five undergraduate EFL students engaged in original and ChatGPT-simplified text readings, serving as their controls. The findings revealed a significant improvement in reading comprehension and inferencing scores following ChatGPT intervention. However, no significant change in reading anxiety levels was observed. The study suggests that ChatGPT-simplification positively influences reading comprehension and inferencing, but its impact on reading anxiety remains inconclusive.

The 16th article by **Fatih Karataş and Erkan Yüce** investigated the experiences and perceptions of 141 preservice teachers engaged with AI, mainly through ChatGPT, over a three-week implementation on Zoom to understand its influence on their evolving professional identities and instructional methodologies. Employing Strauss and Corbin's methodological approach of open, axial, and selective coding to analyze reflective narratives, the study unveils significant themes that underscore the dual nature of AI in education. Key findings revealed ChatGPT's role in enhancing educational effectiveness and accessibility while raising ethical concerns regarding academic integrity and balanced usage. Specifically, ChatGPT was found to empower personalized learning and streamline procedures, yet challenges involving information accuracy and data security remained.

In article 17, **His-Hsun Yang** proposed a hypothetical model combining the Unified Theory of Acceptance and Use of Technology (UTAUT) with Self-Determination Theory (SDT) to explore design professionals' behavioral intentions toward using AI tools. Surveying design professionals in regions influenced by Confucian culture, using Chinese speaking, and analyzing 565 valid cases with AMOS supported the structural model hypothesis. The model explains 52.1% of the variance in behavioral intention to use (BIU), proving its effectiveness in explaining these variances. The results further validate the greater importance of performance expectancy (PE) over effort expectancy (EE) in influencing BIU. Additionally, it has been shown that the impact on intrinsic motivation (IM) and extrinsic motivation (EM) can either be amplified

or diminished by anxiety about JR. For individuals experiencing higher levels of JR anxiety, there is a marked increase in IM. They may perceive adopting AI tools as an opportunity to enhance their skills and job security. Conversely, this anxiety also significantly boosts EM, as the potential for improved efficiency and productivity with AI use becomes a compelling incentive.

The 18th article by **Selay Arkün-Kocadere** and **Şeyma Çağlar Özhan** compared the impact of human and AI-generated instructors in video lectures on video engagement and academic performance. In addition, they examined students' opinions on both types of videos. A convergent-parallel approach mixed method was used in this study. A total of 108 undergraduate students, 48 in the experimental group, 52 in the control group, and 8 in the focus group interview participated. The findings of the experimental part revealed that learners' video engagement was higher in the course with the human instructor compared to the course with the AI-generated instructor. However, the instructor type did not significantly affect academic performance. The results based on the qualitative part showed that students thought the AI-generated instructor caused distraction, discomfort, and disconnectedness. However, when the video lesson topic is exciting, or students focus on the video with the intention of learning, these situations can be ignored. In conclusion, even in today's conditions, there is no difference in performance between human and AI-generated instructors.

The 19th article by **Odiel Estrada-Molina, Juanjo Mena,** and **Alexander López-Padrón** intended to determine the trends, the applied computational techniques, and the areas of educational use of deep learning in open learning through a systematic review. Among the main results, it is worth noting that the scientific literature focuses on the following areas: (1) predicting student dropout, (2) automatic grading of short answers, and (3) recommendation of MOOC courses. It was concluded that pedagogical challenges include the effective personalization of content for different learning styles and the need to address possible inherent biases in the datasets (socio-demographics, traces, competencies, learning objectives, etc.) used for training. Regarding deep learning, the authors observed an increase in pre-trained models, the development of more efficient architectures, and the growing use of interpretability techniques.

The last article, titled "ChatGPT in ESL writing classrooms: Potentials and implications" by **Karim Ibrahim** and **Robert Kirkpatrick** used a systematic review design to synthesize available research on the educational potentials of ChatGPT as an instructional assistant, outline the implications of these potentials for L2 writing instruction, and discuss their practical implications. Based on a meta-analysis of 42 research articles, the findings demonstrate that ChatGPT can enhance L2 writing instruction by boosting learners' motivation, automating instructional tasks, and offering instantaneous, personalized feedback.

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