A survey paper on Role of Artificial Intelligence in Education

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Abstract
This research offers details on intelligent education tools, looks at how AI is changing a variety of educational fields, and discusses the difficulties in putting AI into practice. Following a review of the literature on the effects of AI in education, this study suggests future research directions. To guarantee the creation of strong, intelligent e-learning systems. Creating intelligent eLearning and educational systems is a very challenging and complicated process that presents numerous technological and research issues that require interdisciplinary approaches to solve. Many of the technical issues of today are resolved by combining machine learning and computational intelligence techniques with knowledge acquisition methods. The primary goal of the study is to comprehend how artificial intelligence (AI) can be effectively employed in conjunction with traditional approaches to capitalize on technological advancements and promote equity in education. Additionally, the report will make recommendations for how the government and educational institutions might incorporate AI into their curricula to support long-term and sustainable learning. Lastly, the study also discusses how the teaching community should be prepared to embrace artificial intelligence (AI) and adjust to the new medium of mass education.
Keywords: AI driven tool; Artificial intelligence; Deep learning algorithm; Generative AI

1. INTRODUCTION (12 pt.)

Artificial intelligence (AI) has revolutionized the field of education, leveraging advancements in computing and information processing technologies. The application of AI in education (AIED) has brought forth a multitude of possibilities, opportunities, and challenges, profoundly impacting educational practices across various domains.

Within the realm of learning, instruction, and administration, AI has gained considerable acceptance and utilization in educational institutions. Educators are leveraging the AI tools to enhance the quality of instructional methods and streamline administrative tasks. With AI-powered systems, tasks such as evaluating and grading learner assignments can be accomplished more efficiently and expeditiously. Moreover, the use of cognitive computing and customization has facilitated the individualization and tailoring of syllabus and materials to meet the unique needs of learners. This

personalized approach has fostered increased absorption, engagement, and an enriched learning environment for students overall. The impact of AI in education extends beyond traditional boundaries, permeating multiple areas of educational practice. From personalized learning experiences to efficient administrative processes, AI has revolutionized how knowledge is disseminated and acquired. As AI continues to advance, it holds immense potential for further innovation and transformation within the education sector, propelling us into a new era of enhanced educational outcomes and opportunities for students worldwide.

This study provides information about intelligent education tools, examines the transformative impact of AI in diverse areas of education, and addresses the challenges associated with its implementation. After examining the existing literature on impact of AI in different areas of education, future research directions are also recommended in this paper.

2. RESEARCH METHODOLOGY

A systematic review follows a rigorous methodology, including predefined search criteria and systematic screening processes, to ensure the inclusion of relevant studies. This comprehensive approach ensures that a wide range of research is considered, minimizing the risk of bias and providing a comprehensive overview of the impact of AI in education. Firstly, we define the research questions and corresponding search strategies and then we filter the search results based on predefined inclusion and exclusion criteria. Secondly, we study selected articles and synthesize results and lastly, we report and discuss the findings.

AI systems are algorithmic models that carry out cognitive or perceptual functions in the world that were previously reserved for thinking, judging, and reasoning human beings.

AI refers to machine-based systems that can, given a set of human-defined objectives, make predictions, recommendations, or decisions that influence real or virtual environments. AI systems interact with us and act on our environment, either directly or indirectly. Often, they appear to operate autonomously, and can adapt their behavior by learning about the context

Learning with AI involves the use of AI-driven tools in teaching and learning, and includes: f the use of AI to support learners directly, involving tools such as those known as intelligent tutoring systems, dialogue-based tutoring systems, exploratory learning environments, automatic writing evaluation, learning network orchestrators, chatbots and AI to support learners with disabilities; f the use of AI to support administrative systems (such as recruitment, timetabling and learning management); f the use of AI to support teachers directly (although, with the exception of smart duration of learning materials, there are few examples). Using AI to learn about learning is not strictly AI, which almost always means some kind of automation, but does involve the analysis of the same or similar data to that used by "learning with AI" tools and uses similar analytical techniques. Here, the data are used to learn about how learners learn, learning progression, or which learning designs are effective – the aim being to inform learners', teachers' or other stakeholder practices, or to support admissions, retention of students and program planning. This overlapping but nonetheless distinct field is usually known as learning analytics or educational data mining.

While many writers and government ministries have expressed their hope that AI will save teacher time (Bryant et al. 2020; Miao and Holmes 2021b), others have suggested that AI will at some point make teachers de facto redundant – or at least their role will be reconfigured as classroom There has been a focus over many years on AI tools that aim to automatically assess learner assignments, again mostly with the intention of saving teacher time (which neatly illustrates how the teacher-supporting/learner-supporting categories, although helpful, are not rigid). However, AI is not capable of the depth of interpretation or accuracy of analysis that
a human teacher can give.

3. LITERATURE SURVEY

Sr No	Year	Author	Title	Methodology	Conclusion
1	2023	Dagmar Mercedes Heegand, Lucy Avraamidou Centre for Learning. and Teaching, University of Groningen,	The use of Artificial intelligence in school science: a systematic literature review	To be included in this review, a study must endorse the following criteria: ●The study must focus on an AI application ●The context of the study must be in science education ●The context of the study must be in primary or secondary education ●The study must perform primary or empirical research.	The studies reviewed included nine different types of AI applications: automated assessment, automated feedback, learning analytics, adaptive learning systems, intelligent tutoring systems, multilabel text classification, chatbot, expert system, and mind wandering detection. These applications range from simulating con-versations with human users (i.e., chatbot) to the use of attention control mechanisms (i.e., mind wandering detection).
2	2023	Thomas K.F. Chiu [a], Qi Xia [b], Xinyan Zhou [b], Ching Sing Chai [b], Miao ting Cheng [c]	Systematic literature review on opportunities, challenges, and future research recommendations of artificial intelligence in education	(i) article selection, (ii) article screening and inclusion, and (iii) data coding, extraction, and analysis.	**The roles of AI in the four key domains and research challenges** The three roles that have been assigned to AI in teaching are (i) providing adaptive teaching strategies, (ii) enhancing teachers' ability to teach, and (iii) supporting teacher
3	2023	Abdel-Badeeh M. Salem*and Anastasia Y. Nikitaeva** * Professor Dr. of Computer Science and Head of Artificial	Knowledge Engineering Paradigms for Smart Education and Learning Systems	Constructing the knowledge-base Process Selecting the reasoning and inference methodology Selection of Intelligent Authoring Shells	to ensure the success of developing robust intelligent e-learning systems. In summary, the development of intelligent

		Intelligence and Knowledge Engineering Research Labs, Faculty of Computer and Information Sciences, Ain Shams University, Cairo, Egypt			eLearning/educational systems is a very difficult and complex process that raises a lot of technological and research challenges that have to be addressed in an interdisciplinary way. Today's the fusion of computational intelligence and machine learning techniques with the knowledge acquisition techniques solves many of the technical problems and difficulties
4	2023	Tannmay Gupta Centre for Interdisciplinary Research in Business and Technology,	Research on the Application of Artificial Intelligence in the Education and Teaching System	The educational administration infrastructure should conform to the expanding student population, address the progressively diversifying learning demands, and seek a more effective and smart management method to fulfill the real requirements of the present education administration sector. Thus, a smart education service and application unit is incorporated into the development of the smart administration solution.	Future developments are likely to further integrate AI technology into the educational and pedagogical infrastructure. Professionals in AI and teaching across the world will focus more on expanding AI's utilization in classrooms. Smart learning institutions and technologies are growing as innovations;
5	2022	Mir Murtaza , Yamina Ahmed, Jawwad Ahmed Shamsi, Fahad Sherwani and Mariam Usman	AI-Based Personalized E-Learning Systems: Issues, Challenges, and Solutions	What are the key factors in building a personalized e-leaning system? (Refer to section III) 2) What is the current state of the art on adaptive e-learning systems? (Refer to section IV) 3) How AI can be beneficial in	These include learning theories and models, adaptivity, adaptation of learning modality, assessments and user behavior, and personalized

				implementing an effective personalized e-learning system? (Refer to section V) 4) What are the future research directions in the domain?	recommendation systems. Various techniques have been studied to improve these components in the field of online learning. Basic requirements for personalization are discussed in brief
6	2022	Junaid Qadir Department of Computer Science and Engineering, College of Engineering,	Engineering Education in the Era of ChatGPT: Promise and Pitfalls of Generative AI for Education	ChatGPT as a Virtual Intelligent Tutor ChatGPT, or an NLP model like it, can potentially be used to provide a virtual intelligent tutoring service, in which a student can ask questions and receive personalized responses and feedback. This personalized feedback-enabled iterative learning leads to significant learning gains, as demonstrated by the "Two Sigma Effect,	ChatGPT and other AI language models have the potential to be helpful and convenient tools for engineering education These models can generate human-like text, engage in conversation, answer questions, write essays, and solve homework tasks. Potential applications include language editing, virtual tutoring, language practice, generating and solving technical and non-technical questions, and research assistance.
7	2023	Shengnan Chen Faculty of Artificial Intelligence in Education Central China Normal University Wuhan, China shengnanC@mails.ccnu.edu.cn 3 rdBin He Faculty of Artificial Intelligence in Education Central China Normal	A Generative AI-based Teaching Material System Using a Human-In-The-Loop Model	Text/Image Tools Applications of GAI in Education • Intelligent Teaching Agent GAI-BASED TEACHING MATERIAL GENERATION SYSTEM	This article takes the perspective of automatic generation of teaching materials and reviews successful applications of Authorized licensed use limited to: Indian Institute of Technology - Jodhpur. Downloaded on February 02,2024 at

		University Wuhan, China hebin@mail.ccnu.edu 2 ndQifang Liu Wuhan Fiberhome Technical Services Co.,Ltd Wuhan, China liuqf@fiberhome.com			11:00:34 UTC from IEEE Explore. Restrictions apply. generative AI technology in content generation. It analyzes the potential demands for content generation in the field of education and establishes an all-in-one teaching material generation system based on generative AI. Finally, through experiments, the feasibility of the system is demonstrated, aiming to provide ideas and insights for future content generation in the field of education
8	2021	Xuesong Zhai , 1 Xiaoyan Chu , 1 Ching Sing Chai , 2 Morris Siu Yung Jong , 2 Andreja Istenic , 3,4,5 Michael Spector , 6 Jia-Bao Liu , 7 Jing Yuan,8 and Yan Li 1	A Review of Artificial Intelligence (AI) in Education from 2010 to 2020	*The hierarchy of artificial intelligence in educational implementation. (a) The dimension of system development, (b) the dimension of extraction, and (c) the dimension of application.	It is found that the research to date could be classified into three dimensions: the dimension of development including classification, matching, recommendation, and deep learning; the dimension of an extraction involving feedback, reasoning, and adaptive learning; and the dimension of application including affection computing, role-playing, immersive learning, and gamification. Moreover, based on

					the research questions and the related AI techniques, four research trends were identified
9	2019	Adoption of AI-Chabot to Enhance Student Learning Experience in Higher Education in India	Adoption of AI-Chabot to Enhance Student Learning Experience in Higher Education in India	Quantitative method was used through data collection from surveys of some of the prominent higher education institutes using Chabot technology to explore the factors that influence the adoption of Chabot technology in Indian higher Education.	The integration of AI-Chabot in the education sector will Facilitate the achievement of student-centered learning. The above research indicates that students are embracing use of Chabot and immense benefits have been achieved. Chabot can assist students to communicate well, conduct research and mark online exams.
10	2021	Eric C. K. Cheng, Rekha B. Koul, Tianchong Wang, Xinguo Yu	Artificial Intelligence in Education: Emerging Technologies, Models and Applications	A Two-Stage NER Method for Outstanding Papers Comprehensibility of documents. deep learning techniques for *Automatic Short Answer Grading*	Deep learning techniques introduce for role of education in AI
11	2022	Sonya Yeprem	A Review to Artificial Intelligence in Education	How Predictive Data Analysis Is Helpful to Education Department Management Information Systems (EMIS) and the Evolution to Learning Management Systems (**LMS**)	It need to transform educational programming to make use of prediction algorithms of artificial intelligence ought to be a continual and essential procedure. Indeed, there are many examples of the positive and negative effects of AI in different areas of human education

					and activity, as indicated by the examples provided in this article.
12	2023	Mohammad Amin Kuhail, Nazik Alturki, Salwa Alramlawi, Kholood Alhejori	Interacting with educational chatbots: A systematic review	Chabot technology demonstrated a substantial impact on overall learning outcomes, regardless of factors such as intervention duration and learning content (b) When it comes to specific aspects of learning, chatbots exhibited significant enhancements in knowledge retention (c)	The research revealed no significant effect of chatbots on critical thinking, learning engagement, and motivation
13	2021	Lijia Chen; Pingping Chen; Zhijian Lin	**Artificial Intelligence in Education: A Review**	AI revolutionizes the methods of instruction employed by educators and the approaches to knowledge acquisition adopted by students (b) (c) AI is bringing about significant transformations in the field of education, while recognizing that it won't entirely supplant the conventional education system	The integration of AI into educational systems leads to the advancement of teaching and learning programs
14	2021	Tahiru,	AI in Education: A Systematic Literature Review ()	AI is already being implemented in education and various other sectors in developed nations.There are challenges involved in	AI presents extensive opportunities in education for teachers and students to harness and attain its

				adopting AI in education, including ethical concerns, technological factors such as data usage and ownership, and organizational considerations like the potential replacement of humans by AI	necessary advantages
15	2023	Crompton & Burke	Artificial intelligence in higher education: the state of the field	AI is also being used to improve research and create new educational opportunities Challenges associated with AI in education include the need for data privacy and security, the potential for bias, and the need for educators to be trained in how to use AI effectively	AI has the potential to make education more accessible, affordable, and effective AI is being used to personalize learning, provide support to students, and automate administrative tasks

4. RESULT & CONCLUSION

Artificial intelligence has already entered the education sector. Implementing artificial intelligence is a strategic and critical factor in educational development. Furthermore, artificial intelligence is increasingly being used as a digital assistant. They assist teachers and students in various ways, including giving students access to a wide range of learning materials based on their specific learning needs and subjects. However, some risks are associated with artificial intelligence advancements, such as safety, security, and privacy concerns. As a result, artificial intelligence technologies positively and negatively affect the education sector. Artificial intelligence technologies have positive and negative effects on education. Thus, it is critical to prioritize artificial intelligence in education and implement appropriate strategies to meet teachers' and students' needs and expectations through AI technologies. As a result, academic performance will be excellent.

References:
1. Helen Crompton & Diane Burke Artificial intelligence in higher education: the state of the field. International Journal of Educational Technology in Higher Education, Springer Science & Business Media, 2023.
2. Ashwin Kataria and Rahul Mishra and Pooja Lalwani, Role of Artificial Intelligence in Education, SSRN Electronic Journal, 2020.
3. Danielle R. Chine and Cassandra Brentley and Carmen G. Thomas-Browne and J. Richey and Abdulmenaf Gul and Paulo F. Carvalho and Lee G. Branstetter and K. Koedinger, Educational Equity Through Combined Human-AI Personalization: A Propensity Matching Evaluation, www.semanticscholar.org/paper,2022.
4. D. Mishra and K. Parish and R. Lugo and Hao Wang, A Framework for Using Humanoid Robots in the School Learning Environment, Electronics,2021.
5. V. V. Vikhman, Technological trends of Industry 4.0 in education: opportunity navigator, Professional education in the modern world, 2022.
6. Akshara Pande and Deepti Mishra, The Synergy between a Humanoid Robot and Whisper:

Bridging a Gap in Education, Electronics, 2023.

7. K. VanLehn and Fabio Milner and Chandrani Banerjee and Jon Wetzel, A Step-Based Tutoring System to Teach Underachieving Students How to Construct Algebraic Models, International Journal of Artificial Intelligence in Education, 2023.

8. Fati Tahiru, AI in Education: A Systematic Literature Review, Journal of Cases on Information Technology, 2021

9. Lijia Chen; Pingping Chen; Zhijian Lin Artificial Intelligence in Education: A Review, IEEE Explorer, volume 8, 2021.

10. Mohammad Amin Kuhail, Nazik Alturki, Salwa Alramlawi, Kholood Alhejori, Interacting with educational chatbots: A systematic review, Springer Access, volume 28,2022.