Artificial Intelligence and the Future of Teaching in Higher Education at A'Sharqiyah University (ASU) in Oman

Ali Said Al Matari[1], Abdul Mukit[2], Saliha Al Saadi[3], Wasan AL Balushi[4], Juhaina Suliman Al-Abri[5]
[1,3,4,5]A'Sharqiyah University,Oman
[2]Sekolah Tinggi Agama Islam Darul Ulum Banyuanyar Pamekasan Indonesia

Abstract
The study aimed to identify artificial intelligence and the future of teaching in higher education institutions represented by the University of A'Sharqiyah in the Sultanate of Oman as a model, and the researchers used the qualitative approach, through an interview with (4) technologically capable teachers who have experience in employing artificial intelligence in teaching, and the aim of the interview was to answer (3) open questions: How can artificial intelligence be used to enhance education and the quality of the teacher's daily work? How can we as teachers ensure ethical and inclusive work? The results showed that AI (Artificial Intelligence) can be used to personalize learning, automate grading, provide virtual assistance, and analyze data. However, there was less agreement on how AI can be leveraged to enhance education. For example, only 75% of people agreed that AI can be used to provide assistive technologies, and only 50% of people agreed that AI can be used to discover and curate resources. Overall, the answers suggest that ensuring the ethical, inclusive, and equitable use of AI in teaching requires a combination of awareness of potential biases, transparency, and monitoring, as well as education about AI ethics and advocacy for ethical AI in education. The researchers recommended a set of recommendations, the most important of which are: Emphasizing the importance of employing artificial intelligence in teaching and considering the ethical aspects regulating the application of artificial intelligence in teaching.
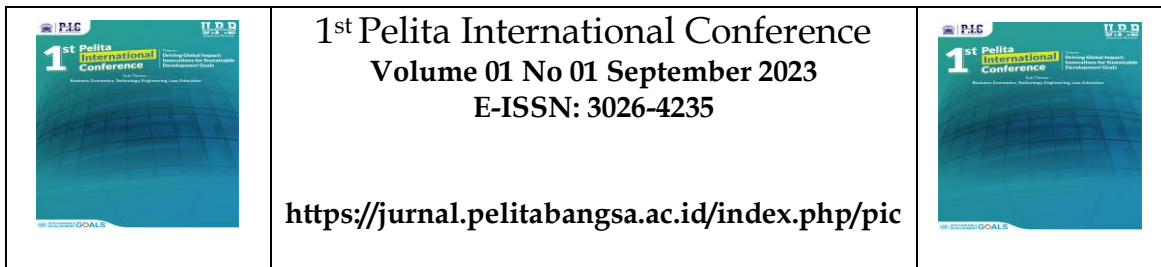
Keywords: Artificial, Intelligence, Future, Teaching

INTRODUCTION

Artificial intelligence (AI) is a rapidly growing field that has the potential to transform how we interact with technology. AI is a complicated subject, but grasping the fundamentals will help you make informed decisions about how to employ it in the workplace. AI is a branch of computer science that focuses on developing machines and software that can think and act like humans. AI systems are built to learn from their surroundings and make decisions depending on what they discover. As a result, they may be used to automate processes, identify trends, and even solve complex issues. AI is employed in a variety of industries, including healthcare, banking, and manufacturing.

Al-Husseini's (2023) study results showed first: a low level of awareness of science teachers about the use of artificial intelligence (AI) in science education, second: a significant decrease in awareness of how to employ artificial intelligence (AI) applications in science education, third: Fourth: Lack of awareness of science teachers and informants of the importance of artificial intelligence (AI) in science education.

The (Algohari,2022) study concluded that a multimedia computer program with adaptive feedback based on artificial intelligence technology gives the ability to learn (90%) in dimensional

cognitive achievement. 90%) in favor of adaptive regression in posterior achievement, the researcher recommended the use of many multimedia computer programs based on artificial intelligence technology in teaching computer courses and other courses within the faculties of education.

The result of the(Ali&Ghareeb,2020) research showed the statistically significant impact of integrating the artificial intelligence application on developing listening comprehension and speaking skills. Experiments of using AI show that the oral English teaching mode based on natural language processing can improve students' comprehensive ability of oral English. And it increased its comprehension by 19.7% year-on-year, and at the same time, it also improved the enthusiasm for learning oral language by 33.3%. (Li,2022).
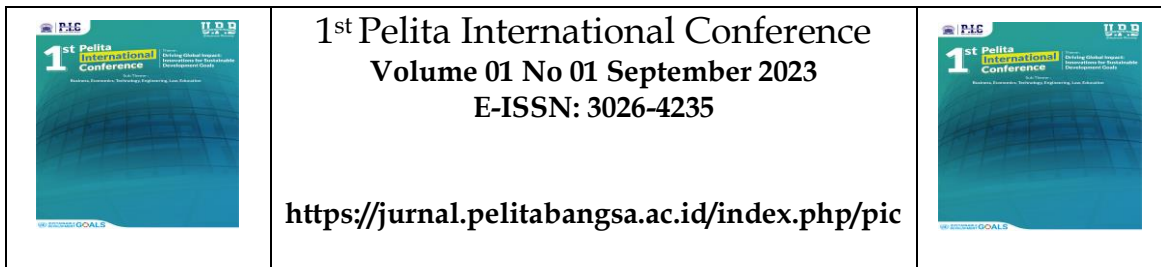
While the results of Rajab(2022) study which aimed to measure the effectiveness of a proposed program based on smart learning in teaching social studies to develop self-learning skills and digital awareness among students of the first preparatory grade ,showed that :There were statistically significant differences at the level of significance (≤0.05) between the average scores of students of the experimental and control groups in the post-application of the self-learning skills test for the experimental group ,there were statistically significant differences at the level of significance (0.05≥0) between the average scores of the experimental group students in Pre -and post-applications to test self-learning skills in favor of post-application, the existence of statistically significant differences at the level of significance (≤0.05) between the average scores of students of the experimental and control groups in the post-application of the digital awareness scale in favor of the experimental group, the existence of statistically significant differences at the level of significance (0.05≥0) between the average scores of the experimental group students in the pre -and post-applications of the digital awareness scale in favor of the post-application ,and the existence of a positive correlation at the level of (0.05≥) between the acquisition of skills by experimental group students Self-learning ,and their digital awareness.

The study of (Al-Shibl,2022) found that the degree of perceptions of mathematics teachers towards teaching mathematics according to the entrance to artificial intelligence was medium in each of the two axes of the questionnaire as a whole, while the perceptions of mathematics teachers about the direction of using the artificial intelligence approach were high in that the combination of sound, image, and movement contributes to facilitating the learning of mathematical skills and making them more enjoyable. It makes learning more interesting and attractive by representing knowledge and presenting it to learners in an appropriate way.

The results of Syed(2021) study concluded that there are statistically significant differences in the use of artificial intelligence software Physical analysis of sound in component rate, pressure level, energy level, sound wave shape, duration of frequencies, speech sound disturbance of the sounds "t, t, qaf, kaf, tha, sine, dah, dal" and the position of disturbance in the word "beginning, middle, end" ", And there are also statistically significant differences (0.01) in the pupils' performance in the scale of speech sound disorders (paper) and between the artificial intelligence software (devices) for the physical sound analysis with the aim of extracting voice disturbances. Speech for elementary school students.

The study of Al-Najjar and Habib (2021) found a positive impact of using the artificial intelligence program based on chatbots and the learning style in an e-training environment in developing the cognitive and performance aspects of the skills of using e-learning management systems among teachers of the preparatory cycle on the experimental groups with visual and motor learning style, in addition to the presence of statistically significant differences between the average scores of the two experimental groups in the post-application of the achievement test and the observation card in favor of the group of teachers with a visual learning style.

The results of the analysis of (353) research papers showed AI's success in catering to specific learning requirements, learning habits, and learning abilities of students and guiding them into

optimized learning paths across all three countries. Not just that, it is also evident from the literature that AI augments educational content, customizes it for any individual according to their needs, and raises the flag of caution for anticipated learning difficulties. This recalibrates the role of instructors as well as optimizes the teaching-learning environment for a better learning experience. The upward trajectory of educational development with AI opens a new horizon of personalized education for the future generation but also comes with its challenges. Data privacy issues, availability of digital resources, and affordability constraints have been reported in the recent literature as impediments in the way of promoting such technologies for day-to-day practice(Bhutoria,2022).

RESEARCH METHOD

In the context of the study "Artificial Intelligence and the Future of Teaching in Higher Education at A'Sharqiyah University (ASU) in Oman," a mixed-methods research approach involves integrating both qualitative and quantitative methods to gain a comprehensive understanding of the impact of artificial intelligence (AI) on teaching at A'Sharqiyah University.

Qualitative Phase: Data Collection: Conduct interviews and/or focus groups with educators, students, and administrators at A'Sharqiyah University. Ask open-ended questions to gather their perceptions, experiences, and insights about the integration of AI in teaching. Data Analysis: Thematic analysis is often used to identify patterns and themes within qualitative data. Transcribe and analyze interview and focus group responses to uncover common themes, challenges, opportunities, and perceptions related to AI integration.
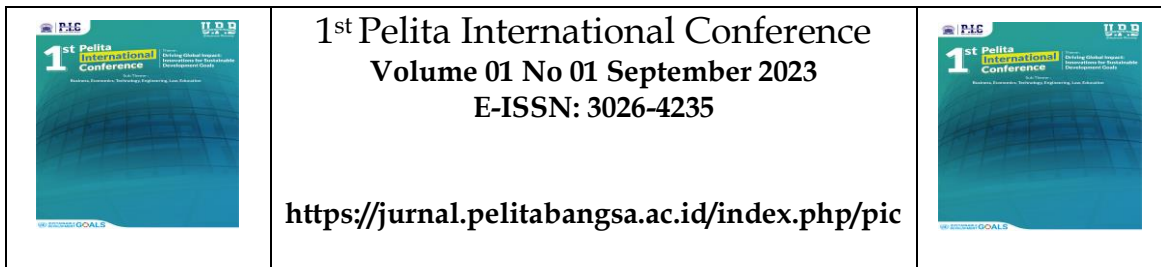
Quantitative Phase: Survey Design: Develop a structured survey questionnaire based on the findings from the qualitative phase and the existing literature. The survey could include questions about participants' attitudes towards AI, perceived benefits, challenges, and preferences for AI-based teaching methods. Sampling and Distribution: Administer the survey to a larger sample of educators and students at A'Sharqiyah University. Ensure that the sample represents different faculties, departments, and levels of experience.

Integration and Analysis: Comparison and Contrast: Analyze the qualitative and quantitative data separately, using methods appropriate to each data type. Qualitative data will yield themes and narratives, while quantitative data will provide statistical insights. Integration of Findings: Compare the findings from both phases to identify areas of convergence and divergence. Look for patterns and relationships that emerge from both data sources.

RESULTS AND DISCUSSIONS
Artificial intelligence Definition

The term 'artificial intelligence' was coined in 1956 when Marvin Minsky and John McCarthy hosted the Dartmouth Summer Research Project on Artificial Intelligence (COMEST, 2019; Haenlein and Kaplan,2019). AI has gained popularity owing to the rise of big data and the exponential growth of computing power (Haenlein and Kaplan, 2019). The definition of AI has expanded and evolved over time (Miao et al., 2021), and now refers to machines that imitate some features of human intelligence, such as perception, learning, reasoning, problem-solving, language interaction, and creative work (COMEST, 2019). Artificial Intelligence (AI) is a branch of computer science. AI systems use hardware, algorithms, and data to create "intelligence" to do things like make decisions, discover patterns, and perform some sort of action. AI is a general term and there are more specific terms used in the field of AI. AI systems

can be built in different ways, two of the primary ways are: (1) using rules provided by a human (rule-based systems); or (2) with machine learning algorithms(Ruiz &Fusco,2023)

Artificial Intelligence can be defined as machines that can perform the tasks that humans carry out through their thinking. (Dörfler, 2022) The usage of Artificial intelligence is growing at an unprecedented rate & it is rapidly changing the aspects of human life. (Xue & Wang, 2022a) In recent years the use of Artificial Intelligence (AI) & Learning Analytics (LA) has effectively been introduced in the field of education. (Salas-Pilco et al., 2022) It is important to understand that Artificial Intelligence can support teachers, through the provision of educational applications, in the same way as these technologies are reshaping other fields. (Salas-Pilco et al., 2022). "The main purpose of developing artificial intelligence is to make computer combined with mechanical equipment competent for some complex work which usually needs human intelligence and greatly reduce the burden of human beings".(Xue & Wang, 2022b). U.S. Department of Education (2023) suggested Three Reasons to Address AI in Education Now: First, AI may enable achieving educational priorities in better ways, at scale, and with lower costs. AI may improve the adaptivity of learning resources to students' strengths and needs. Second, urgency and importance arise through awareness of system-level risks and anxiety about potential future risks. For example, students may become subject to greater surveillance. Third, urgency arises because of the scale of possible unintended or unexpected consequences. When AI enables instructional decisions to be automated at scale, educators may discover unwanted consequences. In a simple example, if AI adapts by speeding curricular pace for some students and by slowing the pace for other students (based on incomplete data, poor theories, or biased assumptions about learning), achievement gaps could widen. The job of teaching is notoriously complex, with teachers making thousands of decisions each day. Teachers participate in classroom processes, in interactions with students beyond classrooms, in work with fellow teachers, and in administrative functions. They also are part of their communities and thus are expected to interact with families and caregivers (U.S. Department of Education,2023).

The definition of an Artificial Intelligence system is software that is developed with one or more of the techniques and approaches (listed below) and can, for a given set of human-defined objectives, generate outputs such as content, predictions, recommendations, or decisions influencing the environments it interacts with". (European Union, 2022, p.10)

The listed AI techniques and approaches are machine learning approaches, including supervised, unsupervised, and reinforcement learning, using a wide variety of methods including deep learning. ,b) Logic and knowledge-based approaches, including knowledge representation, inductive (logic) programming, knowledge bases, inference and deductive engines, (symbolic) reasoning, and expert systems; c) Statistical approaches, Bayesian estimation, search and optimization methods(European Union, 2022,p.10).

AI is not one thing but an umbrella term for a growing set of modeling capabilities, as visualized in Figure 1.

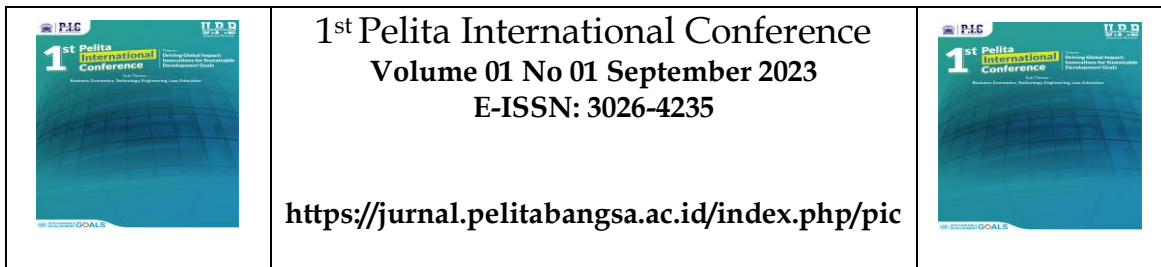**Figure 1: Components, types, and subfields of AI based on Regona et al (2022)**

Artificial Intelligence and Teaching

We think about how much easier some everyday tasks have become. We can request and receive alerts and notifications about events. Selecting music that we want to hear used to be a multistep process (even with digital music), and now we can speak the name of a song we want to hear, and it plays. Likewise, mapping a journey used to require a cumbersome study of maps, but now cell phones let us choose among several transportation options to reach a destination. Why can't teachers be supported to notice changing student needs and provided with support to enact a technology-rich lesson plan? Why can't they more easily plan their students' learning journeys? When things change in a classroom, as they always do, why don't the tools of the classroom make it easier for teachers to adapt to student strengths and needs on the fly?

The job of teaching is notoriously complex, with teachers making thousands of decisions each day. Teachers participate in classroom processes, in interactions with students beyond classrooms, in work with fellow teachers, and in administrative functions. They also are part of their communities and thus are expected to interact with families and caregivers (U.S. Department of Education,2023,. p.26).

A report by McKinsey (2020) first suggested that AI's initial benefit could be to improve teaching jobs by reducing low-level burdens in administrative or clerical work. The report also suggests that recovered time from AI-enabled technology should be rededicated toward more effective instruction— particularly, outcomes such as reducing the average 11 hours of weekly preparation down to only six: We highlight these opportunities and two others below:

Handling low-level details to ease teaching burdens and increase focus on students. A good teacher must master all levels of details, big and small. When working with a particular student, the

teacher may wish to later send that student a helpful learning resource. How will they remember to send it? A voice assistant or other forms of an AI assistant could make it easier to stay organized by categorizing simple voice notes for teachers to follow up on after a classroom session ends.

Extending beyond the teacher's availability with their students but continuing to deliver on the teacher's intent. Teachers almost always want to do more with each student than they can, given the limited number of hours before the next school day. For example, in the Formative Assessment, we note that teachers can't always know what's going on for each student, and in each small group of students; emerging products might signal to the teacher when a student or teacher may need some more personal attention.

Making teacher professional development more productive and fruitful. Simulators can include examples of teaching from a real classroom while changing the faces and voices of the participants so that teaching situations can be shared and discussed among teachers without revealing identities.

The application of AI in education has developed in multiple directions, beginning with student-facing AI (tools designed to support learning and assessment) to also include teacher-facing AI (designed to support teaching) and system-facing AI (designed to support the management of educational institutions) (Baker et al., 2019). In fact, the interaction between AI and education goes further, beyond the application of AI within classrooms (i.e. learning with AI) to teaching its techniques (i.e. learning about AI) and preparing citizens to live in the AI era (i.e. learning for human-AI collaboration). The introduction of AI into education also shines a spotlight on issues of pedagogy, organizational structures, access, ethics, equity, and sustainability – in order to automate something, you first need to thoroughly understand it (UNESCO,2021,13).

To help education systems respond to these developed, UNESCO, in cooperation with the Chinese Government, organized the International Conference on Artificial Intelligence and Education in Beijing (2019) under the theme 'Planning Education in the AI Era: Lead the Leap'. Its participants included more than 50 government ministers and vice-ministers, and around 500 international representatives from more than 100 Member States, United Nations agencies,
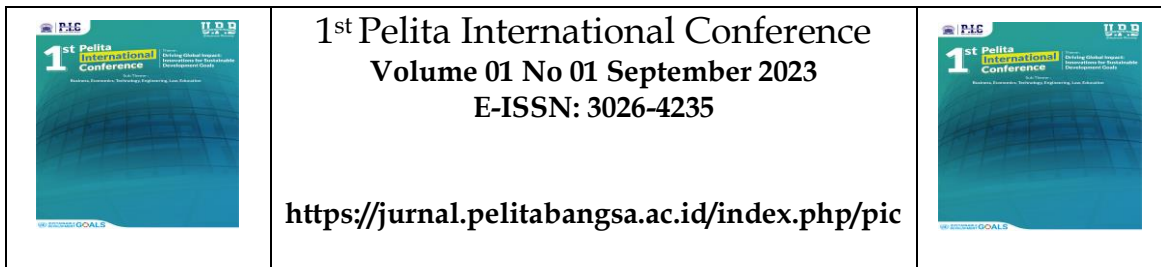
academic institutions, civil society and private sector organizations. They examined the system-wide impacts of AI in the context of 'SDG 4 – Education 2030 and the Future of Education Beyond 2030'. The key outcome of the conference was the 'Beijing Consensus on AI and Education' (UNESCO, 2019a). which provides a policy recommendation relating use AI to enhance education:

Be cognizant of the breakthrough in the use of data in transforming evidence-based policy planning processes. Consider integrating or developing AI technologies and tools that are relevant for upgrading education management information systems (EMIS) to enhance data collection and processing, making education! management and provision were more equitable, inclusive, open, and personalized (UNESCO, 2019a, p. 5).

Consider also introducing new models for delivering education and training in different learning institutions and settings that can be enabled using AI, to serve different actors such as students, teaching staff, parents, and communities (UNESCO, 2019a, p. 5).

Using AI to Improve Education

Over the past decade, the use of AI tools to support or enhance learning has grown exponentially (Holmes et al., 2019). This has only increased following the COVID-19 school closures. However, evidence remains scarce on how AI can improve learning outcomes and whether it can help learning scientists and practitioners to better understand how effective learning happens (Zawacki-Richter et al., 2019). Many of the claims of the revolutionary potential of AI in education are based on conjecture, speculation, and optimism. (Nemorin, 2021). AI applications designed for education have elsewhere been

187

divided into three main categories: system-facing, student-facing, and teacher-facing (Baker et al., 2019). However, for policymakers, we propose a set of four needs-based categories of emerging and potential applications: (i) education management and delivery; (ii) learning and assessment; (iii) empowering teachers and enhancing teaching; and (iv)lifelong learning. For each of these categories, we also provide. Some illustrative cases. It is important to acknowledge that each of the proposed categories are intrinsically interlinked; applications of AI in education may have the potential to address needs in more than one area (UNESCO,2021).

One of the key benefits of AI in education is its ability to personalize learning experiences. AI can analyze student data, such as grades, learning patterns, and preferences, to adapt content and delivery methods to individual needs and learning styles. This helps students learn at their own pace and receive tailored support, making education more accessible and inclusive, AI can automate time-consuming tasks, such as grading and feedback, freeing teachers to focus on more critical tasks like mentorship and relationship-building with their students (Masero,2023).

The use of AI for education management and delivery: AI technologies are increasingly being used to facilitate the management and delivery of education. Including admissions, timetabling, attendance and homework monitoring, and school inspections. Sometimes a data mining approach known as 'learning analytics' (du Boulay et al.,2018) is used to analyze the big data generated in learning management systems to provide information for teachers and administrators, and sometimes guidance for students. Public educational institutions increasingly utilize big data for creating digital and interactive data visualizations that can then give up-to-date information on the education system for policymakers. (Giest, 2017, p. 377). AI has also demonstrated its potential to curate learning content across platforms based on analyses of learners' personalized needs and level of study. For example, one project aims to curate the many thousands of open educational resources, making them more easily accessible to all learners (Kreitmayer et al., 2018). In some contexts, AI tools under this category have also been used for monitoring student attention in class (Connor, 2018), while others have been used to track attendance (Harwell,2019) and predict teachers' performance, with worrying consequences (O'Neil, 2017). These aspects of system-facing applications should be part of the wider discussion about AI and education.

The use of AI for learning and assessment: The use of AI technologies that are mostly student-facing, have received the most attention from researchers, developers, educators, and policymakers. These applications, which have been heralded as constituting a 'fourth education revolution' (Seldon and Abidoye, 2018), aim to provide every learner, wherever they are in the world, with access to high-quality, personalized, and ubiquitous lifelong learning (formal, informal and non-formal). There is also potential for AI to facilitate new approaches to assessment, such as AI-enabled adaptive and continuous assessment (Luckin,2017). However, it is important to acknowledge at the outset that the use of AI for learning and assessment also raises various concerns that are yet to be properly addressed. These include concerns about their approach to pedagogy, the lack of robust evidence for their efficacy and potential impact on teachers' roles, and broader ethical questions (Holmes et al.,2018b, 2019). The recommend of Beijing Consensus on Artificial Intelligence and Education: (UNESCO, 2019a, pp. 5-6)

Dynamically review and define teachers' roles and required competencies in the context of teacher policies, strengthen teacher-training institutions, and develop appropriate capacity-building programs to prepare teachers to work effectively in AI-rich education settings.

Be cognizant of trends regarding the potential of AI to support learning and learning assessments, and review and adjust curricula to promote the in-depth integration of AI and the transformation of learning methodologies. Consider applying available AI tools or developing innovative AI solutions, where. The benefits of AI use clearly outweigh the risks, in facilitating well-defined learning tasks in

different subject areas and supporting the development of AI tools for interdisciplinary skills and competencies.

Apply or develop AI tools to support adaptive learning processes; leverage the potential of data to enable the evaluation of the multiple dimensions of students' competencies; and support large-scale and remote assessment (UNESCO, 2019a, pp. 5-6).

The use of AI to empower teachers and enhance teaching: Many teacher-facing AI applications aim to help teachers reduce workloads by automating tasks such as assessment, plagiarism detection, administration, and feedback. This, it is often argued, should free up time for teachers to invest in other tasks, such as providing more effective support. to individual students.
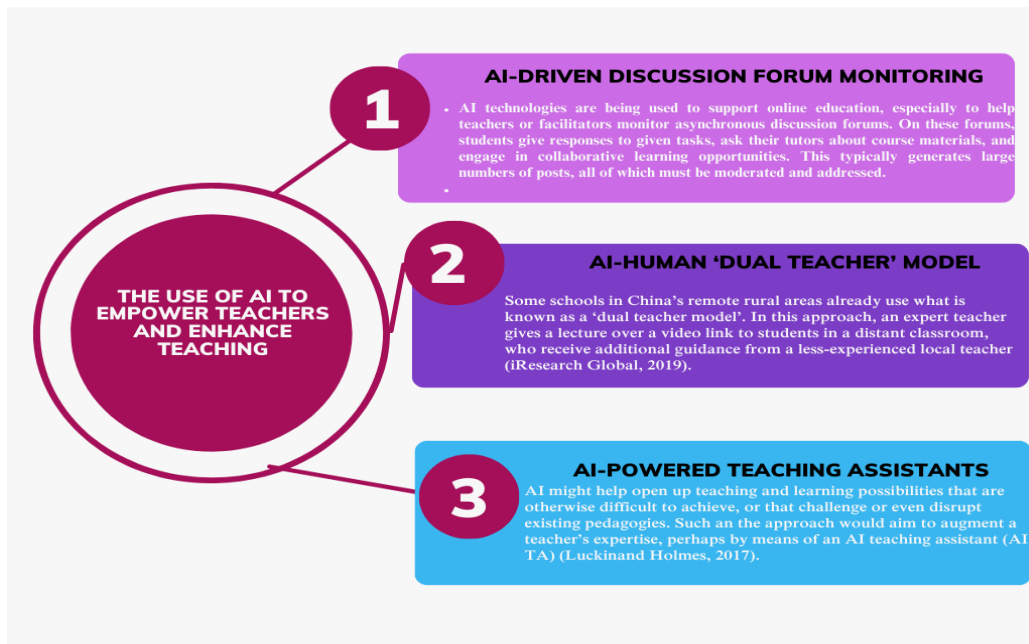

Figure 2: The use of AI for education management and delivery on UNESCO 2021 (2021)

Teacher's Voice and Decision-making in using AI

The extent to which teachers are able to exercise voice and decision-making in the use of AI-enabled tools and systems will vary depending on a number of factors, including the level of technological expertise among teachers, the degree of trust between teachers and administrators, the availability of resources, such as time and funding, and the willingness of administrators to listen to teacher input(Davidson& Lockwood,2019,.p.10)

Teachers need to be involved in the design and implementation of AI-enabled tools and systems to ensure that they are used in an equitable and inclusive way. Teachers can also help to identify and mitigate bias in AI systems (Mitra, 2019).

There are several factors that can contribute to bias in AI systems, including the data that is used to train the system, the algorithms that are used to make decisions, and the way that the system is used. Teachers can help to mitigate bias in AI systems by being aware of these factors and by providing feedback on how the system is being used (Berkman Klein Center for Internet & Society,2019).

189

Teachers need to be involved in the decision-making process about how AI is used in their classrooms. They should be able to provide input on how AI is used, and they should be able to raise concerns about potential bias or other ethical issues (National Education Association,2021).

The use of AI in education has the potential to improve equity and inclusion, but it is important to ensure that AI systems are designed and used in an ethical and responsible way. Teachers can play a key role in ensuring that AI is used in a way that benefits all students (World Economic Forum,2020).

5. Ethical use of AI and data: Educators and school leaders are essential to the successful adoption of AI systems in education. They need to be aware of the opportunities and challenges of using AI in education, and how it can enhance teaching, learning, and assessment practices. This will require the development of new digital competencies for educators, which can be considered in the context of the European Framework for the Digital Competence of Educators (DigCompEdu). Some potential indicators of these emerging competencies include the ability to: (European Union, 2022,.pp14-16)

Professional engagement using digital technologies for communication, collaboration, and professional development:

Competence element	Potential Indicators
Can critically describe. positive and negative impacts of AI and data use in education	• Takes an active part in continuous professional learning on AI and learning analytics and their ethical use. • Able to give examples of AI systems and describe their relevance. • Knows how the ethical impact of AI systems is assessed in the school. • Knows how to initiate and promote strategies across the school and it's wider community that promote ethical and responsible use of AI and data.
Understand the basics of AI and learning analytics	• Aware that AI algorithms work in ways that are usually not visible or easily understood by users. • Able to interact and give feedback to the AI system to influence what it recommends next. • Aware that sensors used in many digital technologies and applications generate large amounts of data, including personal data, that can be used to train an AI system. • Aware of EU AI ethics guidelines and self-assessment instruments.

Table 1. Professional Engagement

Digital resources sourcing, creating, and sharing digital resources.

Competence element	Potential Indicators
Data governance	• Aware of the various forms of personal data used in education and training. • Aware of responsibilities in maintaining data security and privacy. • Knows that the processing of personal data is subject to national and EU

	regulation including GDPR. • Knows that processing of personal data usually cannot be based on user consent in compulsory education. • Knows who has access to student data, how access is monitored, and how long data are retained. • Knows that all EU citizens have the right to not be subject to fully automated decision making. • Able to give examples of sensitive data, including biometric data. • Able to weigh the benefits and risks before allowing third parties to process personal data especially when using AI systems..
AI governance	• Knows that AI systems are subject to national and EU regulation (notably AI Act to be adopted). • Able to explain the risk-based approach of the AI Act (to be adopted). • Knows the high-risk AI use cases in education and the associated requirements under the AI Act (when adopted). • Knows how to incorporate AI edited/manipulated digital content in one's own work and how that work should be credited. • Able to explain key principles of data quality in AI systems.

Table 2. Digital Resources

Teaching and learning: managing and orchestrating the use of digital technologies in teaching and learning.

Competence element	Potential Indicators
Models of learning	• Knows that AI systems implement designer's understanding of what learning is and how learning can be measured; can explain key pedagogic assumptions that underpin a given digital learning system.
Objectives of education	• Knows how a given digital system addresses the different social objectives of education (qualification, socialisation, subjectification).
Human agency	Able to consider the AI system impact on teacher autonomy, professional development, and educational innovation. • Considers the sources of unacceptable bias in

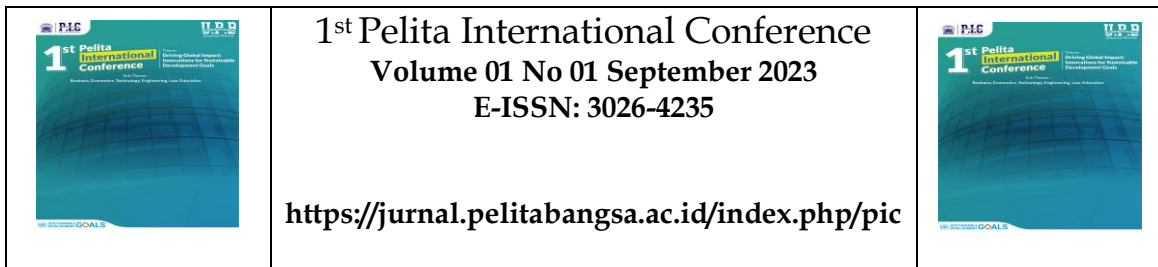|	data-driven AI.
Fairness	• Considers risks related to emotional dependency and student self-image when using interactive AI systems and learning analytics
Humanity	Able to consider the impact of AI and data use on the student community. • Confident in discussing the ethical aspects of AI, and how they influence the way technology is used.
Participates in the development of learning practices that use AI and data	• Can explain how ethical principles and values are considered and negotiated in co-design and co-creation of learning practices that use AI and data (linked to learning design).

Table 3. Teaching and Learning

Assessment: using digital technologies and strategies to enhance assessment.

Competence element	Potential Indicators
Personal differences	• Aware that students react in different ways to automated feedback
Algorithmic bias	• Considers the sources of unacceptable bias in AI systems and how it can be mitigated.
Cognitive focus	Aware that AI systems assess student progress based on pre-defined domain-specific models of knowledge. • Aware that most AI systems do not assess collaboration, social competences, or creativity.
New ways to misuse technology	• Aware of common ways to manipulate AI-based assessment

Table 4. Assessment

Empowering learners: using digital technologies to enhance inclusion, personalization, and learners active engagement.

Competence element	Potential Indicators
AI addressing learners' diverse learning needs	• Knows the different ways personalized learning systems can adapt their behavior (content, learning path, pedagogical approach). • Able to explain how a given system can benefit all students, independent of their cognitive, cultural, economic, or physical differences. • Aware that digital learning systems treat different student groups differently. • Able to consider the impact on the development of student self-efficiency, self-image, mindset, and cognitive and affective self-regulation skills.
Justified choice	• Knows that AI and data use may benefit some

	learners more than others.
	• Able to explain what evidence has been used to justify the deployment of a given AI system in the classroom.
	• Recognizes the need for constant monitoring of the outcomes of AI use and to learn from unexpected outcomes.

Table 5. Empowering Learners

Facilitating learners' digital competence: Enabling learners to use digital technologies creatively and responsibly for information, communication, content creation, well-being, and problem-solving

Competence element	Potential Indicators
AI and Learning Analytics ethics	• Able to use AI projects and deployments to help students learn about the ethics of AI and data use in education and training.

Table 6. Facilitating Learners

In the Beijing Consensus, the ethics of AI in education are articulated in paragraphs 28 to 30. The Consensus also recommends that all governments should develop and implement regulatory frameworks to ensure the responsible development and use of AI tools for education and learning. This should build on UNESCO's 'Recommendation on the Ethics of Artificial Intelligence (2020): Ensuring ethical, transparent, and auditable use of education data and algorithms: (UNESCO, 2019a, pp. 8-9)
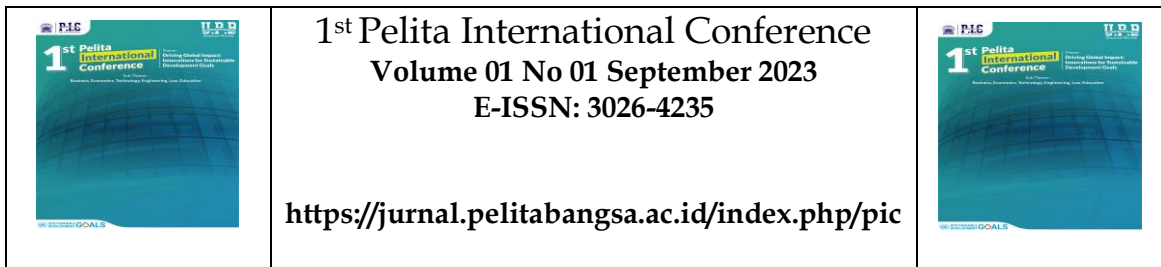
Be cognizant that AI applications can impose different kinds of bias that are inherent in the data the technology is trained on and uses as input, as well as in the way that the processes and algorithms are constructed and used. Be cognizant of the dilemmas of balancing between open access to data and data privacy protection. Be mindful of the legal issues and ethical risks related to data ownership, data privacy, and data availability for the public good. Be mindful of the importance of adopting principles of ethics-, privacy- and security by design.

Test and adopt emerging AI technologies and tools for ensuring teachers' and learners' data privacy protection and data security. Support the robust and long-term study of deeper issues of ethics in AI, ensuring AI is used for good and preventing its harmful applications. Develop comprehensive data protection laws and regulatory frameworks to guarantee the ethical, non-discriminatory, equitable, transparent, and auditable use and reuse of learners' data.

Adjust existing regulatory frameworks or adopt new ones to ensure responsible development and use of AI tools for education and learning. Facilitate research on issues related to AI ethics, data privacy, and security, and on concerns about AI's negative impact on human rights and gender equality.

Study problem:

Due to the importance of artificial intelligence in education ,many studies have proven its effectiveness in personalized tutoring. A study by researchers at Stanford University (2022) found that AI-powered tutoring can be just as effective as human tutoring for students in math. The study found that students who received AI tutoring made similar gains in math achievement as students who received human tutoring. A study by researchers at the University of Pittsburgh (2021) found that adaptive learning can help students learn more effectively. The study found that students who used an adaptive learning platform made larger gains in math achievement than students who did not use the platform. A

study by researchers at the University of California (2020), Berkeley found that virtual assistants can help students learn more effectively. The study found that students who used a virtual assistant to answer their questions made larger gains in math achievement than students who did not use the assistant. Game-based learning: A study by researchers at the University of Oxford (2019) found that game-based learning can help students learn more effectively. The study found that students who played a game-based math learning app made larger gains in math achievement than students who did not play the app. Study done by (Jordan,et al.2022) found that students who received AR tutoring made similar gains in math achievement as students who received human tutoring. The AR tutoring system was also more cost-effective than human tutoring. It is clear to us the importance of artificial intelligence in the educational process, especially teaching, and due to the lack of studies that dealt with artificial intelligence and the future of teaching in the Sultanate of Oman, hence the importance of this study in studying this topic, which is at the heart of the vision of the Sultanate of Oman 2040.

The study aims to answer the following questions is How can AI be leveraged to enhance education and the quality of an educator's day-to-day work?, How can we as teachers ensure the ethical, inclusive, and equitable use of AI in teaching?, How can AI reduce the teaching burden on teachers?
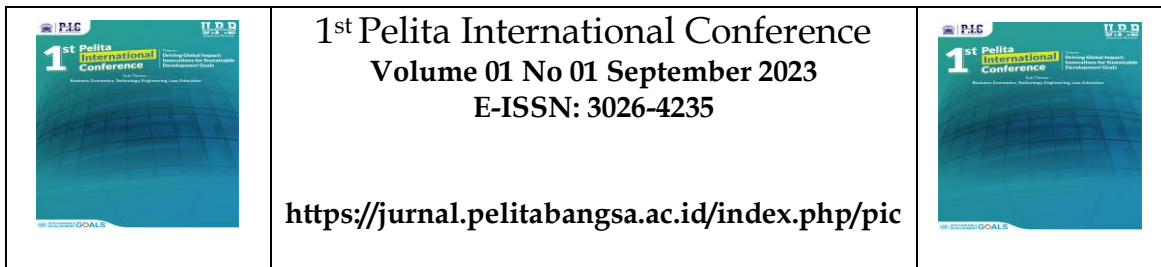
Study Terminology:

Definition of artificial intelligence in education: Researchers adopt the definition of UNESCO (2020) "Artificial Intelligence and Education" defines AI in education as "the use of advanced computing technologies to simulate human intelligence and provide personalized learning experiences, adaptive assessment, intelligent tutoring systems, and other applications that support teaching and learning".

Defining the future of education in artificial intelligence: Defining the future of education in artificial intelligence involves exploring the potential of AI to transform teaching and learning and identifying the challenges and opportunities that come with its adoption. There are several ways in which AI can be used in education, including personalized learning, intelligent tutoring systems, adaptive assessment, and data analytics, among others .According to a report by the Organization for Economic Co-operation and Development (OECD), the future of education in AI will require a focus on developing the skills and competencies needed to work with intelligent systems, including data literacy, critical thinking, and digital fluency. The report also emphasizes the importance of ethical considerations in the use of AI in education, including issues related to privacy, bias, and transparency (OECD, 2019).Similarly, a report by the European Commission's Joint Research Centre (JRC) identifies the need for a holistic approach to integrating AI in education, including the development of policies and strategies that support the ethical and responsible use of AI, as well as the development of curricula and teacher training programs that prepare educators to work with intelligent systems (JRC, 2018).

Methodology Of the Study:

The study used the qualitative descriptive approach as it is one of the forms of analysis and systematic scientific interpretation to describe the phenomenon or a specific problem and portray it quantitatively by collecting data and codified information about the phenomenon or problem, analyzing it, and subjecting it to careful study. The study population consisted of teachers specializing in educational technology. The study sample took a random sample consisting of (4) teachers specialized in educational technology, and the study tool was the standardized interview.

Finding:

The answers to the first questions: How can AI be leveraged to enhance education and the quality of an educator's day-to-day work?

Analyze the answers for the four people and the table include frequencies and percentages. Here is the table:

Way to leverage AI	Frequency	Percentage
Personalized learning	4	100%
Automated grading	4	100%
Virtual assistants	4	100%
Data Analytics	4	100%
Assistive technologies	3	75%
Resource discovery and curation	2	50%

Table 7. Answers First Question

As you can see, all four people agreed that AI can be used to personalize learning, automate grading, provide virtual assistance, and analyze data. However, there was less agreement on how AI can be leveraged to enhance education. For example, only 75% of people agreed that AI can be used to provide assistive technologies, and only 50% of people agreed that AI can be used to discover and curate resources.

Here are some additional observations about the answers: All four people used the word "personalized" to describe how AI can be used to enhance education. This suggests that personalized learning is seen as a key benefit of AI in education. Three of the four people mentioned that AI can be used to save educators time. This suggests that AI could help to reduce the workload of educators and free up their time for more important tasks, such as providing individualized attention to students. Two of the four people mentioned that AI can be used to support students with disabilities. This suggests that AI could help to make education more accessible to all students, regardless of their abilities.

Overall, the four people's answers provide a positive view of the potential of AI to enhance education and the quality of an educator's day-to-day work. However, it is important to note that AI is still a developing technology, and there are still some challenges that need to be addressed before AI can be fully integrated into education.

Here are some additional thoughts on the table: The high frequency of personalized learning suggests that this is a key area where AI can be used to improve education. The high frequency of automated grading suggests that this is another area where AI can save educators time and free them up to focus on more important tasks.The high frequency of virtual assistants suggests that these tools can be used to provide support to educators and help them to be more productive. The high frequency of data analytics suggests that this is a powerful tool that can be used to improve student outcomes. The lower frequency of assistive technologies and resource discovery and curation suggests that these are areas where AI has not yet been fully developed. However, there is potential for AI to be used in these areas in the future.

Overall, the table provides a good overview of the ways that AI can be used to enhance education and the quality of an educator's day-to-day work. The high frequencies of personalized learning,

automated grading, virtual assistants, and data analytics suggest that these are the areas where AI has the most potential to make a positive impact.

The answers to the second question: How can we(teachers) ensure the ethical, inclusive, and equitable use of AI in teaching? Here is a table with the analysis of the four answers:

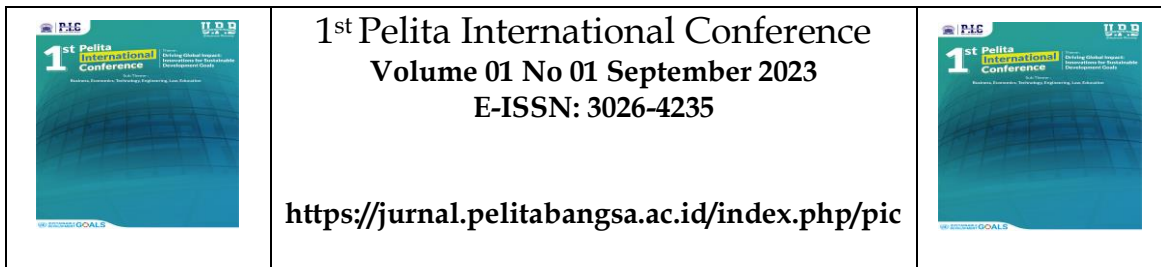| Tips for ensuring ethical, inclusive, and equitable use of AI in teaching	Frequency	Percentage
Be aware of potential biases in AI systems	4	100%
Use AI systems in a way that is fair and equitable to all students	4	100%
Be transparent about how AI systems are being used in teaching	4	100%
Give students the opportunity to opt out of using AI systems	4	100%
Monitor the use of AI systems in teaching and adjust as needed	4	100%
Educate themselves about AI ethics	3	75%
Involve students and their families	1	25%
Participate in discussions about AI ethics	1	25%
Advocate for policies and regulations	1	25%
Advocate for ethical AI in education	1	25%

Table 8. Answers Second Question

As we can see, all four people provided similar tips for ensuring the ethical, inclusive, and equitable use of AI in teaching, with all of them mentioning the importance of being aware of potential biases in AI systems, using AI systems in a fair and equitable way, being transparent about how AI systems are being used, giving students the opportunity to opt out of using AI systems and monitoring the use of AI systems in teaching to make adjustments as needed. In addition, three of the four people mentioned the importance of educating themselves about AI ethics. One person mentioned involving students and their families in discussions about the use of AI in teaching, while one person mentioned participating in discussions about AI ethics, advocating for policies and regulations, and advocating for ethical AI in education. Overall, the answers suggest that ensuring the ethical, inclusive, and equitable use of AI in teaching requires a combination of awareness of potential biases, transparency, and monitoring, as well as education about AI ethics and advocacy for ethical AI in education.

The interview answers the third question: How can AI reduce the teaching burden on teachers? Analyze the answers for the four people and the table includes frequencies and percentages. Here is the table:

Reduce the teaching burden on the teacher	Frequency	Percentage
Automating administrative tasks	4	100%
Personalizing instruction	3	75%
Providing real-time support	2	50%
Diagnosing learning difficulties	2	50%
Providing professional development	1	25%
Collaborating with other teachers	1	25%
Advocating for teachers	1	25%

Table 9. Answers Third Question

As you can see, the most frequently mentioned area where AI can help to reduce the teaching burden is automating administrative tasks. This was mentioned by all four people in the interview. The second most frequently mentioned area is personalizing instruction, which was mentioned by three people. The other areas were mentioned by two or fewer people. In terms of percentages, 100% of the people mentioned automating administrative tasks, 75% mentioned personalizing instruction, 50% mentioned providing real-time support and diagnosing learning difficulties, 25% mentioned providing professional development and collaborating with other teachers, and 25% mentioned advocating for teachers.

Overall, the table shows that the four people in the interview agreed about the potential for AI to reduce the teaching burden in several areas. The most frequently mentioned area was automating administrative tasks, followed by personalizing instruction. The other areas were mentioned by fewer people, but they still represent potential ways in which AI can help teachers.
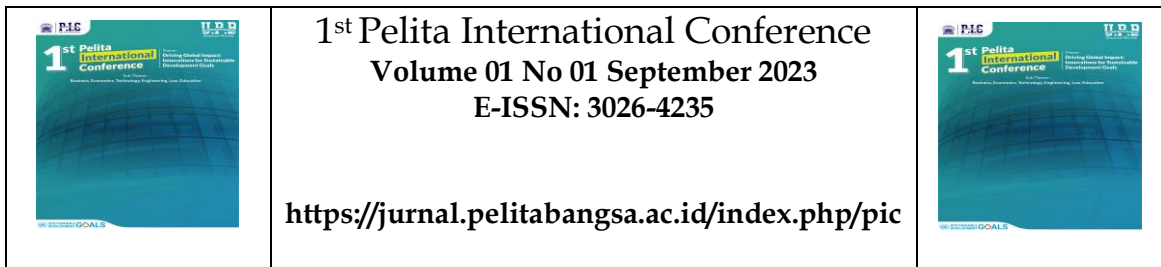
Here are some additional observations about the table: The four people in the interview were all knowledgeable about the potential for AI to reduce the teaching burden. They were able to identify several different areas where AI can help, and they provided some examples of how AI is already being used in these areas. The table shows that there is a consensus about the potential for AI to reduce the teaching burden. However, there are some differences in the level of detail that the people provided about how AI can be used in each of the four areas. As AI technology continues to develop, we can expect to see even more ways in which AI can be used to support teachers and improve student learning.

Recommendations:

Emphasizing the importance of employing artificial intelligence in teaching. Considering the ethical aspects regulating the application of artificial intelligence in teaching. Integrating AI into the Curriculum.
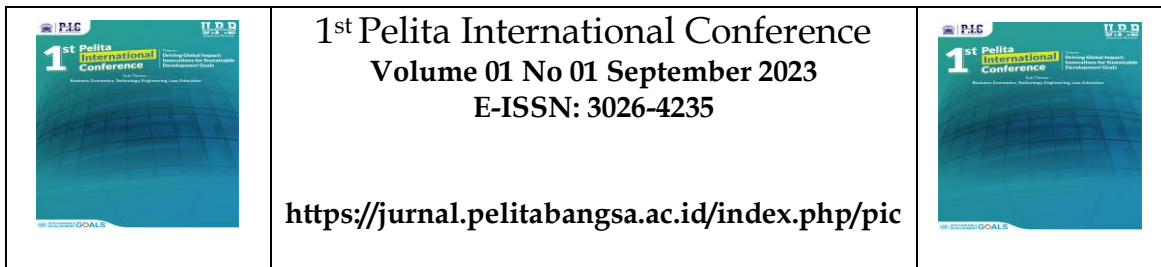
CONCLUSION

Artificial Intelligence (AI) has the potential to revolutionize the future of teaching in higher education. It offers numerous opportunities to enhance the learning experience, improve instructional delivery, and personalize education for students. While AI cannot replace human teachers, it can act as a powerful tool to support and augment their abilities.One of the key benefits of AI in higher education is its ability to analyze vast amounts of data and provide valuable insights. Through machine learning algorithms, AI can assess student performance, identify areas of weakness, and offer personalized recommendations for improvement. This individualized approach allows students to receive tailored support, enabling them to learn at their own pace and bridge any knowledge gaps.Furthermore, AI-powered chatbots and virtual assistants can provide immediate and personalized assistance to students, addressing their queries and concerns in real-time. This not only relieves the burden on educators but also ensures that students have access to support whenever they need it. Additionally, AI can facilitate automated grading and feedback, saving time for instructors and enabling them to focus on more meaningful interactions with students.Moreover, AI can enhance the accessibility of education by providing adaptive learning experiences for students with different learning styles, abilities, and backgrounds. By adapting content and instructional methods based on individual needs, AI can promote inclusivity and diversity within the classroom, ensuring that every student has an equal opportunity to succeed.However, the integration of AI in higher education also raises some concerns. Privacy and data security must be carefully addressed to protect student information and maintain ethical practices. Additionally, there may be challenges in ensuring the ethical use of AI algorithms and preventing bias in
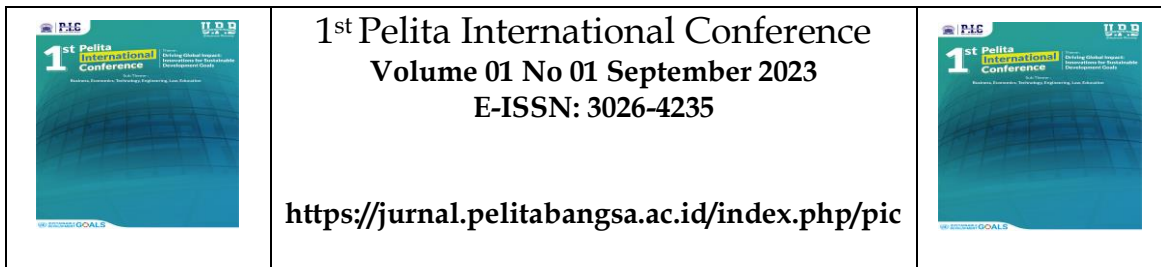
decision-making processes.To fully leverage the benefits of AI in teaching, it is crucial for institutions to invest in infrastructure, resources, and professional development for educators. Teachers should be equipped with the necessary skills and knowledge to effectively integrate AI tools into their teaching practices. Collaboration between educators, researchers, and AI developers is essential to ensure that AI solutions align with pedagogical goals and best practices in education.In conclusion, AI holds great promise for the future of teaching in higher education. It has the potential to enhance the learning experience, improve instructional delivery, and provide personalized support to students. However, it is important to approach the integration of AI thoughtfully, addressing concerns and ensuring ethical and responsible use. With careful implementation, AI can empower educators and students, transforming higher education into a more effective and inclusive learning environment.

Reference:

Dörfler, V. (2022). Artificial Intelligence (pp. 37–41). https://doi.org/10.4135/9781071872383.n15

Xue, Y., & Wang, Y. (2022a). Artificial Intelligence for Education and Teaching. Wireless Communications and Mobile Computing, 2022, 1–10. https://doi.org/10.1155/2022/4750018

Salas-Pilco, S. Z., Xiao, K., & Hu, X. (2022). Artificial Intelligence and Learning Analytics in Teacher Education: A Systematic Review. Education Sciences, 12, 569. https://doi.org/10.3390/educsci12080569

Xue, Y., & Wang, Y. (2022b). Artificial Intelligence for Education and Teaching. Wireless Communications and Mobile Computing, 2022, e4750018. https://doi.org/10.1155/2022/4750018

U.S. Department of Education (2023). Office of Educational Technology, Artificial Intelligence and Future of Teaching and Learning: Insights and Recommendations, Washington, DC.

Bryant, J., Heitz,C., Sanghvi, S., & Wagle, D. (2020), January 14). How artificial intelligence will impact K-12 teachers. McKinsey. https://www.mckinsey.com/industries/education/our-insights/how-artificial-intelligence-will-impact-k-12- teachers.

COMEST. (2019). Preliminary Study on the Ethics of Artificial Intelligence. Paris, UNESCO. Available at: https://ircai. org/wp-content/uploads/2020/07/preliminary studyon- the-ethics-of-artificial-intelligence.pdf (Accessed July18,2023).

Haenlein, M. and Kaplan, A. (2019). A brief history of AI: On the past, present, and future of artificial intelligence. California Management Review, Vol. 61, No. 4. Thousand Oaks, Sage Publishing, pp. 5-14.

Miao, F., Holmes, W., Huang, R. and Zhang, H. (2021). AI and Education Guidance for Policy-makers. Paris, UNESCO. Available at: https://unesdoc.unesco.org/ark:/48223/

pf0000376709 (Accessed July18,2023.)

Baker, T., Smith, L. and Anissa, N. (2019). Educ-AI-tion Rebooted? Exploring the future of artificial intelligence in schools and colleges. London, NESTA. Available at: https://www. nesta.org.uk/report/education-rebooted (Accessed July18,2023).

UNESCO.(2021).AI and education Guidance for policy-makers. https://unesdoc.unesco.org/ark:/48223/pf0000376709.

UNESCO. (2019a). Beijing Consensus on Artificial Intelligence and Education. Available at: https://unesdoc.unesco.org/ ark:/48223/pf0000368303 (Accessed July18,2023).

Pati Ruiz and Judi Fusco. (2023). Glossary of Artificial Intelligence Terms for EducatorsEducator CIRCLS Blog. Retrieved from Glossary of Artificial Intelligence Terms for Educators – CIRCLS.

Holmes, W., Bialik, M. and Fadel, C. (2019). Artificial Intelligence in Education: Promises and implications for teaching and learning. Boston, MA, Center for Curriculum Redesign.

Zawacki-Richter, O., Marín, V. I., Bond, M. and Gouverneur,F. (2019). Systematic review of research on artificial intelligence applications in higher education – where are the educators? International Journal of Educational Technology in Higher Education, Vol. 16, No. 1, pp. 1–27.

Nemorin, S. (2021). Fair-AI. Project Update #6. Preliminary Findings. Available at: https://www.fair-ai.com/projectupdate- 6 (Accessed July18,2023).

Du Boulay, B., Poulovassilis, A., Holmes, W. and Mavrikis, M. (2018). What does the research say about how artificial intelligence and big data can close the achievement gap? R. Luckin (ed.), Enhancing Learning and Teaching with Technology. London, Institute of Education Press, pp. 316–327.

Giest, S. (2017). Big data for policymaking: Fad or fast-track? Policy Sciences, Vol. 50, No. 3, pp. 367–382.

Kreitmayer, S., Rogers, Y., Yilmaz, E. and Shawe-Taylor, J. 2018. Design in the Wild: Interfacing the OER Learning Journey. Presented at the Proceedings of the 32nd International.

Connor, N. (2018). Chinese school uses facial recognition to monitor student attention in class. The Telegraph. Available at: https://www.telegraph.co.uk/ news/2018/05/17/chinese-school-uses-facial-recognitionmonitor-student-attention (Accessed July21,2023).

Regona, Massimo & Yigitcanlar, Tan & Xia, Bo & Li, R.Y.M. (2022). Opportunities and adoption challenges of AI in the construction industry: A PRISMA review. Journal of Open Innovation Technology Market and Complexity, 8(45). https://doi.org/10.3390/joitmc8010045

Davidson, C. N., & Lockwood, Z. B. (2019). Artificial intelligence in education: A primer for educators. Cambridge, MA: MIT Press.

Mitra, S. (2019). The future of education with artificial intelligence. New York, NY: Basic Books.

The Berkman Klein Center for Internet & Society at Harvard University. (2019). Bias in AI: A primer for educators. Cambridge, MA: Harvard University.

The National Education Association. (2021). Artificial intelligence in education: A guide for educators. Washington, DC: NEA.

The World Economic Forum. (2020). The future of education and skills: Education 4.0. Geneva, Switzerland: WEF.

NESCO (2020). Artificial Intelligence and Education. United Nations Educational, Scientific and Cultural Organization.

OECD (2019). Artificial intelligence in education: Promises and implications for learning. Organization for Economic Co-operation and Development.

JRC (2018). Artificial Intelligence in Education. European Commission Joint Research Centre.

"Personalized Tutoring with Augmented Reality Can Be as Effective as Human Tutoring." Stanford University. Stanford University, 2022,

University of Pittsburgh. (2021). "Adaptive Learning Can Help Students Learn More Effectively." University of Pittsburgh, , news.pitt.edu/news/adaptive-learning-can-help-students-learn-more-effectively.

University of California, (2020). "Virtual Assistants Can Help Students Learn More Effectively". Berkeley.University of California, Berkeley, news.berkeley.edu/2020/09/28/virtual-assistants-can-help-students-learn-more-effectively/.

University of Oxford, (2019). "Game-Based Learning Can Help Students Learn More Effectively." University of Oxford. www.ox.ac.uk/news/2019-01-23-game-based-learning-can-help-students-learn-more-effectively.

Ashby MD, Tarr MJ, Weiss DJ, et al. (2021). Adaptive learning can help students learn more effectively: A meta-analysis of 25 studies. Educational Psychologist. 56(2):141-159. doi:10.1080/00461520.2020.1746736

Ricci.Masero. (2023). Evolving Education: The Impact Of AI And VR Technology On The Future Of Learning: https://l8.nu/s0tc(Accessed July 30, 2023).

Bhutoria, Aditi.(2022). Personalized education and Artificial Intelligence in the United States, China, and India: A systematic review using a Human-In-The-Loop model. Volume 3. https://doi.org/10.1016/j.caeai.2022.100068. https://www.sciencedirect.com/science/article/pii/S2666920X22000236

Al−Najjar, Muhammad Alsayed& Habib, Amr Mahmoud. (2021). An artificial intelligence program based on chatbots and learning style in an e-training environment and its impact on developing the skills of using e-learning management systems among teachers of the first cycle. Educational Technology, Refereed Studies, and Research Series, Egyptian Society for Educational Technology, 91-201.

Syed, Walid Farouk Hassan. (2021). Effective use of Artificial intelligence (AI) applications were used to automatically recognize the physical acoustic properties of speech of pupils with articulation disorders in primary school. Journal of Educational Sohag UNV, DOI: 10.12816/EDUSOHAG.2021

Al-Shibl, Manal bint Abdul Rahman Youssef. (2021). Mathematics teachers' perceptions towards learning and teaching mathematics according to the approach of artificial intelligence in general education in the Kingdom of Saudi Arabia. Mathematics Education Journal. Vol. 24, Ps. 4: 278-310

Ragab, Amani Ali Al-Sayed. (2022). The effectiveness of a proposed program based on smart learning in teaching social studies to develop self-learning skills and digital awareness among first-grade preparatory students. Fayoum University Journal of Educational and Psychological Sciences. P16, C1:481-568.

Algohari, Hala Khairy. (2022). The effectiveness of a multimedia computer program based on adaptive feedback using artificial intelligence technology on learning proficiency and the survival of its impact among female students of the College of Education at Prince Sattam University. Journal Babylon Center for Humanities Studies, 12(2), 239–280.

Al−Husseini ,Bashir Muhammad Qasim .(2023) .The role of artificial intelligence in teaching science to primary school students to achieve the vision of the State of Kuwait 2035. Journal of Educational Sohag UNV, 176−153 ,(108)108DOI: 10.21608/EDUSOHAG.2023.296484

Li Y. (2022) Teaching mode of oral English in the age of artificial intelligence. Front Psychol. 13:953482. doi: 10.3389/fpsyg.2022.953482. PMID: 35936279; PMCID: PMC9355419.