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LITERATURE REVIEW ON ARTIFICIAL INTELLIGENCE (AI) INTEGRATION INTO HIGHER EDUCATION TEACHING AND LEARNING: A CHALLENGE OR OPPORTUNITY?

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Abstract

Technological advancements have significantly transformed various facets of human existence, including the realm of education. An important transformation that has taken place is the rise of artificial intelligence, which has become an essential component of the educational process, particularly among students in higher education. The primary objective of this essay is to examine the comprehension of artificial intelligence and the potential hazards it poses within the realm of education. The methodology employed involves doing a comprehensive literature review by examining pertinent scholarly articles, books and researches. The data that was gathered was subjected to analysis in order to examine the effects of dependence on artificial intelligence in the field of education. The study was conducted at Ambon State Polytechnic, where the findings indicated the presence of various risks linked to the utilisation of artificial intelligence in the field of education. These risks encompassed the possibility of errors and inaccuracies within artificial intelligence systems, ethical concerns, and psychological ramifications. This article additionally presents a number of strategies for the prudent utilisation of artificial intelligence in order to mitigate these potential hazards. The primary objective of this article is to enhance comprehension regarding the utilisation of artificial intelligence in the field of education, while also providing recommendations on effectively managing potential hazards that may emerge.

***Keywords**: artificial intelligence, higher education, challenge, opportunities*

INTRODUCTION

The advent of the digital era has revolutionised the methods of learning and teaching, presenting lecturers with novel obstacles. Amidst the ongoing transformations, the utilisation of Artificial Intelligence (AI) technology has emerged as a subject that is garnering growing interest within the realm of education. In the contemporary digital landscape, educators, particularly those in the realm of higher education, encounter a multitude of issues that significantly impact their roles and responsibilities. One of the primary obstacles is in effectively handling the copious amount of information. In order to facilitate students' learning processes, teachers must possess the ability to properly filter, assess, and utilise information, given the convenient availability of digital tools and online learning content (Mumtaz, 2000).

In addition, each college student possesses distinct requirements and preferred methods of learning. Lecturers must address this difficulty by delivering tailored instruction that caters to the unique requirements of each student. The procedure of personalising learning necessitates substantial exertion, encompassing a profound comprehension of student requirements and the capacity to impart educational content on an individualised level (Buabeng-Andoh, 2012). The selected technique should also be a matter of significant importance to educators for implementation inside the classroom, with the aim of promoting effective learning and teaching methodologies. An additional obstacle is in delivering efficient feedback to students. Effective feedback plays a crucial role in enhancing students' comprehension and facilitating the improvement of their learning deficiencies (Laurillard, 2013). Nevertheless, in a bustling classroom setting, delivering prompt and comprehensive feedback to every student poses a difficulty.

Artificial intelligence (AI) is a rapidly advancing technological field that is now seeing significant growth. According to Alam (2021), artificial intelligence is a scholarly domain that focuses on the development of computational capabilities to do jobs that were formerly exclusive to human beings. Artificial intelligence aims to emulate human cognition and actions through the utilisation of algorithms and computer software.

Artificial Intelligence (AI) technology has promising opportunities in addressing these difficulties. Artificial intelligence can assist educators in efficiently and expeditiously handling data and information (Knox, 2020). AI utilizes sophisticated algorithms to evaluate and interpret student data, offering profound understanding of particular student requirements and advancement. In addition, AI technology has the capability to facilitate individualized learning through the utilization of machine learning algorithms. AI may utilize student data and individual preferences to deliver customized learning experiences that cater to the specific needs of each

student. This can enhance student involvement in the learning process and facilitate their attainment of their maximum capabilities (Spiro et al., 2017).

Despite the potential advantages that AI technology offers to educators in addressing the complexities of teaching in the digital age, there remain a number of obstacles that must be surmounted (Holmes et al., 2023). One example is the apprehension regarding the confidentiality and protection of student data. Safeguarding students' personal data has paramount significance when employing AI technology in educational settings. This phenomenon has the potential to hinder the achievement of educational goals. Disparities in educational quality and competitive advantage among students from diverse origins, alongside ethical considerations encompassing openness, fairness, security, and data privacy, necessitate careful examination within the realm of education. Moreover, the current difficulty lies in the fact that students in higher education consistently depend on technology when assigned tasks, resulting in uniform responses and occasional laziness among some students. Driven by the aforementioned introduction, academics are intrigued by the research topic "Integration of Artificial Intelligence (AI) into Teaching and Learning in Higher Education".

This literature review article examines the utilization of artificial intelligence (AI) technology in addressing the difficulties encountered by educators in the digital age, with a particular focus on optimizing the integration of AI in classroom instruction. The utilization of artificial intelligence (AI) has been delineated by researchers as a means to enhance the efficacy of teaching, individualize the learning experience, and deliver more comprehensive feedback to students. In addition, researchers also address the obstacles and factors that must be considered when implementing AI technology in higher education.

The utilization of Artificial Intelligence (AI) Technology in addressing the difficulties encountered by educators has significant importance due to the subsequent rationales:

1. The management of student data has become progressively intricate for lecturers in the digital era, characterized by an abundance of information. AI can enhance the efficiency of lecturers by enabling them to select, group, and evaluate student data. AI algorithms have the capability to gather data from various sources, enabling them to gain profound understanding of particular students' advancement and requirements. This, in turn, assists lecturers in making more knowledgeable judgments (Yusriadi et al., 2023).
2. Customize Learning: Each learner possesses distinct requirements and preferred methods of learning. Lecturers face challenges in providing personalized attention to each student in overcrowded classrooms. The utilization of artificial intelligence (AI) enables lecturers to employ machine learning algorithms in order to ascertain the learning preferences of students and deliver customized information that caters to their unique needs. The implementation of

personalized learning approaches has the potential to enhance student motivation and engagement, hence facilitating improved learning outcomes (Supriyanto et al., 2021).

3. The provision of effective feedback plays a crucial role in enhancing students' comprehension. Nevertheless, delivering prompt and comprehensive feedback to every student within a bustling classroom setting might present difficulties. Artificial intelligence (AI) enables educators to employ automated tools for the purpose of analyzing student performance and delivering prompt feedback. According to Machmud et al. (2020), this facilitates the expeditious enhancement of students' areas of weakness, while also enabling lecturers to offer more efficacious coaching.
4. Enhanced Teaching Efficiency: AI technology can assist educators in enhancing their teaching efficacy. By employing advanced data analysis techniques, educators are able to effectively uncover patterns in learning, determine the unique needs of individual students, and make necessary adjustments to their instructional approaches. According to Syifa et al. (2019), artificial intelligence (AI) has the capability to offer suggestions and recommendations to assist educators in enhancing their teaching methodologies and attaining improved educational results.
5. Equipping Students for the Digital Era: The integration of artificial intelligence (AI) in educational settings facilitates the cultivation of abilities that are pertinent to the digital age. In an era characterized by technological dominance, the comprehension of artificial intelligence (AI) and the capacity to engage with technology are progressively gaining significance. Utilizing AI technology in education can assist lecturers in facilitating students' adaptation and preparedness to confront the complexities and possibilities of the digital age (Hastungkara & Triastuti, 2019).

The utilization of artificial intelligence (AI) technology enables instructors to effectively address the difficulties that emerge in the digital world. AI utilization enhances efficiency, customizes learning experiences, provides appropriate feedback, improves teaching efficacy, and equips students to navigate a technology-driven environment. Hence, the incorporation of artificial intelligence (AI) technology in the instruction of lecturers holds significant importance in enhancing the quality of education and the academic achievements of students.

Lecturers are increasingly recognizing that the integration of information technology, particularly AI, into their teaching has led to the optimization and enhancement of classroom organization and environment (Priyahita, 2020). However, they also face clear challenges in this regard. Indeed, drawing from the aforementioned literature, numerous studies have examined the challenges that students may encounter within a flipped teaching setting, as well as the strategies employed by teachers to implement flipped teaching plans and facilitate the enhancement of

students' language proficiency. Nevertheless, the majority of the completed study primarily concentrates on English classes in a broad sense, encompassing both non-English majors and English majors. Within the domain of English for Specific Purposes, such as English for Civil Engineering, the aforementioned findings demonstrate a broad and somewhat abstract acknowledgment of the advantages associated with the flipped classroom approach. This is particularly evident in the identification of both opportunities and obstacles pertaining to the integration of artificial intelligence in the learning process.

Hence, the primary objective of this study was to investigate the potential advantages and obstacles associated with the incorporation of artificial intelligence in the context of higher education instruction. In addition to this, the focus of this study pertains to the examination of the potential hazards associated with artificial intelligence for students, as well as the obstacles and prudent utilization of this technology by educators within the Department of Civil Engineering at Ambon State Polytechnic. The objective of this study is to investigate the potential hazards associated with artificial intelligence (AI) for university students, as well as to examine the strategies employed by instructors in the Department of Civil Engineering at Ambon State Polytechnic to address these issues and effectively utilize AI technology.

METHODOLOGY

The study employed a qualitative research methodology, including literature review methodologies, in order to obtain a deeper understanding of the observed events (Harris, 2019). The selected study methodology is qualitative descriptive research, which seeks to provide a comprehensive description and explanation of the phenomenon under investigation. The study employs a unique research design. Data collection will be conducted at the Department of Civil Engineering, Ambon State Polytechnic, utilizing interviews with professors and direct observations within the campus environment.

A range of bibliographic materials, including books, journals, articles, and bibliographies, are employed as research instruments. The assurance of data validity is achieved by carefully choosing literature sources that are pertinent to the study topic. Additionally, rigorous data selection and verification procedures have been implemented to verify the accuracy and validity of the data. The research's legitimacy is bolstered by dependable references and referrals sourced from educational and intellectual organizations.

The study was conducted in the Civil Engineering Department of Ambon State Polytechnic from January to February 2024. The initial method employed for data collecting is observation. In the Civil Engineering Department, the utilization of observation encompasses the direct observation of many facets pertaining to lecturers. Furthermore, interviews were carried out utilizing pre-prepared research instruments that specifically addressed inquiries pertaining to the

teacher position within the Civil Engineering Department. Furthermore, documentary material serves as a supplementary source of information to augment data acquired from observations and interviews. This manuscript comprises photographs, videos, and audio recordings. Within the framework of this study, documents serve as a means of documenting the acquired data.

The research employs data analysis techniques, namely data reduction, which involves examining all obtained data in the form of interviews, observations, and documentation pertaining to the risks, problems, and prudent utilization of artificial intelligence in education. Secondly, Data Presentation involves the concise depiction of data, specifically focusing on the risks, obstacles, and prudent utilization of artificial intelligence in the field of education. Furthermore, this study aims to uncover novel insights into the potential risks, difficulties, and prudent application of artificial intelligence in the field of education.

FINDINGS

Advancement of Artificial Intelligence (AI)

A machine's capacity to replicate human intelligence in terms of learning, reasoning, and decision-making is referred to as Artificial Intelligence (AI). Data processing, pattern recognition, and intelligent prediction or action generation are facilitated through the utilization of algorithms and advanced computer techniques. John McCarthy (1927-2011) is closely associated with the concept of "Artificial Intelligence's Father". According to Kaharuddin (2021), the individual in question is a computer scientist who has instructed mathematics at MIT and Stanford University.

According to Haryanto & Ali (2019), the inception of artificial intelligence took place between 1943 and 1955, during which endeavors were undertaken to fabricate robots with the capacity to replicate human capabilities. During this particular era, a significant accomplishment was the creation of artificial neural network models by McCulloch and Pitts in 1943. Additionally, McCarthy, Minsky, Rochester, and Shannon proposed the Dartmouth Summer Research Project on Artificial Intelligence in 1955. From 1986 until the present, the prevailing methodology has been the distributed approach, which involves the integration of statistical tools. Artificial intelligence systems are enhanced by employing advanced techniques such as artificial neural networks, machine learning, and genetic algorithms. The development of artificial intelligence has been expedited by advancements in computing technology.

Luckin et al. (2022) categorized the evolution of artificial intelligence into distinct and significant phases as follows:

a. During the early development phase spanning from the 20th century to the 1950s, there were initial endeavors aimed at the creation of intelligent machines. Mathematicians like Alan Turing and John von Neumann established the concept of formal logic machines, which served as the foundation for the advancement of artificial intelligence.

b. The era spanning from the 1950s to the 1960s was primarily characterized by the advancement of rules-based systems. During this time, the primary emphasis was placed on the creation of logical rules that represented human knowledge and were then executed by machines. One such can be found in the Logic Theorist software, which was created by Allen Newell and Herbert A. Simon.
c. The emergence of the connectionist method, which centered on artificial neural networks, occurred between the 1960s to 1970s. John McCarthy, Marvin Minsky, and Oliver Selfridge emerged as significant figures in the advancement of this era.
d. The period from the 1970s to the 1980s, known as the Era of Knowledge and Expert Systems, witnessed a notable shift in focus towards the representation of knowledge and the advancement of expert systems. The process of capturing and integrating human knowledge into systems enables the generation of intelligent judgments. A similar methodology is employed in other domains, including medicine and natural language processing.
e. The period spanning from the 1980s to the 1990s witnessed the introduction of Machine Learning techniques and data-driven methodologies. Machine Learning algorithms are employed for the purpose of instructing computers to acquire knowledge from data and detect intricate patterns.
f. Recent achievements in the field of artificial intelligence, spanning from the 1990s to the present, encompass notable advancements in computer power, progress in deep learning methodologies, and the adoption of approaches such as reinforcement learning. Recent advancements have facilitated notable accomplishments in various domains, including but not limited to facial recognition, speech recognition, and autonomous vehicles.

According to Sadiku et al. (2022), there exist three distinct classifications of artificial intelligence, which are outlined as follows:

a. Narrow Artificial Intelligence: This refers to a form of AI that is designed to perform highly specific and restricted tasks. Examples include language translation systems, self-driving autonomous vehicles, and facial detection systems.
b. General Artificial Intelligence: This encompasses the capacity to execute a wide range of tasks akin to those performed by humans, potentially surpassing human capabilities in certain domains. General artificial intelligence is an ongoing and enduring objective that is currently in the developmental phase.

Super Artificial Intelligence: This type of artificial intelligence significantly exceeds human intellectual capacities across various domains. Super intelligence denotes artificial

intelligence that possesses the ability to solve significantly more intricate issues and exhibits a more profound comprehension than humans.

Consequences of Implementing AI into Higher Education Level

Prior to implementing artificial intelligence (AI) in the tertiary education sector, there are significant dangers to consider. The following are the hazards associated with its usage:

a. Potential for Errors and Inaccuracies in Knowledge Acquisition by Students

Data is utilized by artificial intelligence (AI) in order to generate recommendations or execute decisions. Nevertheless, the data recognition and processing procedure has the potential to generate errors. Furthermore, the decisions generated by artificial intelligence systems might lack accuracy or pertinence. Because the utilized data is unrepresentative, insufficient, or derived from biased sources. Undoubtedly, this element is impacted by various factors, including the manner in which the AI algorithm is trained using data and the inclinations of the human developers (Rakuasa et al., 2024).

When scientific writing or assignment creation by students incorporates artificial intelligence, a number of errors may occur, including grammatical and punctuation errors, in addition to the provision of inaccurate information. Nevertheless, artificial intelligence also offers support in activities like literature reviews, summarization, paraphrasing, and provision of summaries; thus, its implementation necessitates human or user evaluation. In this situation, a comprehensive examination of potential errors or biases that may result from the use of artificial intelligence-based tools requires the involvement of the instructor. Furthermore, as stated by Reza et al. (2020), it is incumbent upon students to not only verify the accuracy of the information they obtain but to develop a critical understanding of it when engaging in information literacy activities; it is possible that the data they obtain will be flawed.

Mr. Nusi, an Engineering English lecturer in the Department of Civil Engineering, encountered the aforementioned situation: "…*When I assigned them to translate English into Indonesian, I gave them ten minutes to consult a dictionary. However, instead, they used Chat-GPT on their cellphones to translate the text, which resulted in the students' translations being inaccurate...*" (***Results of the interview, January 2024***).

b. Student Moral Risks

Recently, there has been an increase in the use of chatbots presented as interactive text, which can assist humans in obtaining the necessary information. Chatbots enable users to pose inquiries and receive responses expeditiously. Undoubtedly, in this scenario, pupils may employ artificial intelligence as a visual mentor to facilitate their comprehension of concepts and promote self-directed learning (Rokhmawati et al., 2018). However, a predicament arises when scientific

work is generated through the utilization of artificial intelligence; failing to paraphrase the generated scientific work can undoubtedly result in instances of plagiarism.

Plagiarism occurs when an individual presents an essay, opinion, or similar work as one's own while falsifying the source material (Fitria, 2021). According to Anutariya et al. (2020), expediency in completing tasks, haste in perusing literature, and a propensity for immediate gratification are factors that contribute to plagiarism. This is made possible by the presence of artificial intelligence, which provides instantaneous solutions to students' inquiries. Sumakul (2023) provided a synopsis of the adverse consequences associated with silent plagiarism, which encompasses the development of the notion that plagiarism is ordinary, thereby desiring students to feel culpable despite having violated the rule. Additionally, plagiarism can undermine one's confidence in their ability to produce unique and authentic work.

Mrs. Wuarlela, an Indonesian language lecturer in the Department of Civil Engineering, encountered the aforementioned situation: "*...When I attempted to rectify a student's test results, I found no discernible discrepancy among the answers they had submitted; they had been apprehended cheating on their assignments or exchanging answers electronically to evade detection by the instructor*..." (***Results of the interview, January 2024***)

c. Potential Psychological Risks for Students

The proliferation of chatbots and other artificial intelligence-based tools has introduced numerous conveniences to the realm of education. You must, nevertheless, be cognizant of the fact that this convenience may induce dependence. According to Pendy (2021), dependency arises when an individual is reliant on specific resources, artificial intelligence in this instance, to fulfill necessities or accomplish objectives. This observation illustrates notable patterns of usage, including the exponential growth of artificial intelligence, which amassed one hundred million active users in the wake of its January 2023 introduction (Hasibuan et al., 2023). This demonstrates the growing acceptance and necessity of artificial intelligence, even within the realm of education.

The findings of a study conducted by Astutik et al. (2023) indicate that a high level of comfort with artificial intelligence significantly reduces reliance. Moreover, an overemphasis on technology-related sources of stress, such as smartphones and analogous devices, can contribute to the development of the "*technostress*" phenomenon. *Technostress* may result from students' ease of use of artificial intelligence for academic tasks such as answering exams, completing assignments, and composing essays (Pratama et al., 2023). Students will experience tension if this is not effectively managed and they are unable to utilize artificial intelligence to complete assignments.

Mr. Abdin, a lecturer of Pancasila and Citizenship Education in the Department of Civil Engineering, described: "*...when supervising students doing exam questions, I attempt to ensure that electronic devices are gathered on the instructor's desk. However, this backsliding results in students failing to adequately answer the questions, and in some cases, they fail the exam altogether; this suggests that students are dependent on artificial intelligence to simplify the quest process*." (***Results of the interview, January 2024***).

The Challenges Faced by Higher Education's Educators in Addressing Students' Reliance on Artificial Intelligence

The increasing prevalence and frequency of students utilizing artificial intelligence to complete homework assigned by educators will lead to a greater reliance on artificial intelligence. Furthermore, it will adversely affect pupils, such as exacerbating instances of plagiarism and diminishing students' self-assurance in their capacity to successfully do projects. The issue of artificial intelligence addiction is a significant difficulty for educators. The following responses aim to address the challenges associated with this phenomenon;

a. Challenges Encountered in Conquering Plagiarism Among Students

As students increase their usage of artificial intelligence, they will experience a corresponding decrease in motivation to read literature and an increase in the demand for immediate gratification. This will potentially influence the rise in instances of plagiarism among students. Various measures have been proposed by Dalle et al. (2022) to mitigate or pre-empt plagiarism: priority number one for educational institutions, in this case colleges, should be a plagiarism detection system. Furthermore, ascertain and enforce academic sanctions against individuals or entities that have been substantiated to have engaged in plagiarism. Thirdly, facilitate socialization and instruction concerning the protocols governing the composition of scientific articles. Fourth, demonstrate knowledge of proper writing conventions, with particular emphasis on citation material.

Mrs. Sari, an English lecturer in the Department of Civil Engineering, has implemented this policy. She stated, "...*If students provide identical responses, I consistently review their exam results and maintain disciplinary measures against those caught cheating or utilizing AI to translate." Furthermore, offer resources and instruction to students on the proper and proficient execution of translations...*" (***Results of the interview, January 2024***).

b. Challenges Associated with Enhancing Students' Self-Efficacy

It is necessary to increase students' self-efficacy, or confidence in their own capabilities to complete tasks independently of artificial intelligence. Several determinants of self-efficacy have been identified by Reza et al. (2020). To begin with, the experience of success—in this instance, the instructor should assign relatively simple tasks so that students feel confident in their ability

to complete them on their own—is one such determinant. Furthermore, through social modelling, instructors have the ability to acknowledge students who demonstrate proficiency in autonomous work, thereby setting an exemplary example for their peers. Thirdly, social persuasion occurs when other individuals provide encouragement; in this instance, the instructor guides students through group assignments and permits them to collaborate and assist one another in order to complete the work collectively. Fourth, emotional conditions—in this case, the classroom environment—must be meticulously organized to foster students' comfort; additionally, innovative and engaging learning strategies must be implemented to bolster students' self-assurance.

Mr. Huwae, a lecturer in Concrete Engineering, has implemented this. He stated, "...*when I assign tasks to students, if they complete them independently without utilizing artificial intelligence, I award them with prizes and set them up as exemplary figures worthy of imitation*..." (***Results of the interview, February 2024***).

Opportunities of The Integration of Artificial Intelligence into the Academic Engagements of Educators and Students in Higher Education

Experts assert that despite the aforementioned obstacles, artificial intelligence has unquestionably assisted students and instructors in the learning process individually and collectively in academic institutions. The opportunities presented by artificial intelligence for educators and pupils during the learning process in higher education are outlined below (Sadiku et al., 2022);

a. Adaptive Education

Adaptive learning systems possess the capability to generate individualized learning plans that correspond to students' specific requirements and comprehension levels. Automatic modifications to learning materials and difficulty levels are possible in response to the progress made by students in their studies. Illustratively, interactive web-based language learning platforms like Duolingo employ artificial intelligence technology to personalize instructional materials and tasks in accordance with the unique language proficiencies of individual users.

Mrs. Rimesye, a Geology lecturer at the Ambon State Polytechnic, described how she occasionally employs artificial intelligence (AI) learning platforms, such as Duolingo, to assist her students. "... *occasionally I use AI in learning such as Duolingo, which is good for student learning, because there are levels in working on the questions*..." (***Results of the interview, February 2024***).

b. Game-Based Education

Using artificial intelligence (AI), game-based learning experiences that are both engaging and interactive can be developed. Through the analysis of student development and behavior

during learning game sessions, artificial intelligence can adapt the degree of difficulty and challenge to correspond with the students' aptitudes. Kahoot, an interactive learning platform based on games, provides users with queries and answer options that are customized to their individual capabilities.

Mrs. Siahay, a Technical Drawing lecturer in the Department of Civil Engineering, stated, "*...I always implement this strategy when learning becomes tedious, or if the material can be made into a game, I do so. The intention is to prevent students from becoming bored while studying and to enable them to comprehend the material being taught...*" (***Results of the interview, February 2024***).

Assessment By employing machine learning algorithms, artificial intelligence (AI) has the capability to autonomously evaluate students' work outcomes and offer constructive feedback. This feature offers substantial benefits in terms of time efficiency for educators, enabling students to promptly ascertain the outcomes of their assessments. To illustrate, an automated evaluation system powered by artificial intelligence is employed by *Coursera*, an online learning platform, to assess student work across multiple programming courses.

Mr. Payunglangi, an Applied Physics lecturer in the Department of Civil Engineering, described how this was implemented: "*...during the corona period, when all teaching and learning activities were conducted online, we were overburdened with evaluating students' work. Fortunately, artificial intelligence (AI) can assess students' work automatically; last year, we utilized Coursera...*" (***Results of the interview, February 2024***).

Leveraging Artificial Intelligence in Higher Education for Strategic Purposes

The prudent utilization of artificial intelligence (AI) is of utmost importance in mitigating potential hazards and optimizing advantages. There exist a number of measures that can be implemented to guarantee the prudent utilization of artificial intelligence. These measures encompass guaranteeing the precision and impartiality of text produced by artificial intelligence, refraining from employing artificial intelligence for unethical intentions, and contemplating the societal and ethical ramifications associated with the utilization of artificial intelligence.

Artificial intelligence's application in education can yield numerous advantages for both students and educators. Artificial intelligence has the potential to facilitate the learning process by offering explanations that are more comprehensible to pupils. In addition, artificial intelligence has the capability to offer personalized learning recommendations that are specifically designed to cater to the individual needs of students. Therefore, the utilization of artificial intelligence (AI) has the potential to enhance the efficiency and expedite the process of acquiring knowledge.

Nevertheless, it is imperative for users to use caution and prudence when employing artificial intelligence. To ensure proper utilization, it is crucial to comprehend the boundaries of

artificial intelligence's capabilities. While artificial intelligence possesses exceptional text generation capabilities, it is incapable of substituting human interaction in intricate decision-making processes. Hence, it is advisable for users to employ artificial intelligence solely as a supplementary tool, while continuing to depend on human judgment for critical decision-making.

The Civil Engineering Department at Ambon State Polytechnic has implemented a lesson on the prudent use of AI. Mr. Betaubun, the Head of the Civil Engineering Department described, "… *This lesson was learned from because it can be seen that from its use after the previous pandemic, students and lecturers were greatly helped and facilitated, although it cannot be denied that there are challenges and negative impacts from the use of AI. Initially, there was reluctance to use AI, but due to compelling circumstances, we eventually adopted it. Currently, we continue to employ artificial intelligence (AI) in several aspects of our educational process. For instance, we utilize Google Forms to administer examinations, allowing students to complete them using their mobile devices. This system allows us to identify those who have engaged in cheating and provides them with a single opportunity to access the exam questions. Other institutions should adopt this practice of utilizing AI, with the aim of teaching pupils that employing AI can enhance their abilities*…". (***Results of the interview, February 2024***).

CONCLUSIONS AND SUGGESTIONS

The conclusions of this current study, which investigates the existing challenges and opportunities on the integration of artificial intelligence in the realm of education, hold significant promise for the development of personalized and adaptive learning approaches tailored to the unique requirements of individual students in Higher Education. In the forthcoming era, the realization of pertinent and adaptable education is anticipated. The integration of artificial intelligence and instructors is anticipated to foster a more dynamic and efficacious learning experience. Furthermore, it is imperative to prioritize the accessibility of artificial intelligence technologies in order to mitigate the potential hindrance of technological differences on equitable educational opportunities. By employing artificial intelligence technology judiciously, the field of education has the potential to undergo a substantial metamorphosis, resulting in heightened student engagement, diminished disparities in learning outcomes, and the development of learning experiences that align with future demands. Hence, it is imperative for educators to adequately prepare for and conscientiously embrace new changes in order to attain an enhanced educational trajectory.

The utilization of Artificial Intelligence (AI) technology in addressing the difficulties faced by educators in the digital age has significant promise in enhancing the efficacy of teaching and learning. Artificial intelligence (AI) has the potential to enhance the efficiency of managing student data for lecturers and college students, facilitate tailored learning experiences, offer

appropriate feedback, and enhance overall teaching efficacy. Artificial intelligence (AI) possesses sophisticated data analysis skills that enable lecturers to effectively identify learning patterns, acknowledge the unique needs of individual students, and optimize teaching methodologies. AI recommendations also assist educators in formulating more effective pedagogical approaches. Nevertheless, it is crucial to bear in mind that lecturers continue to play a significant part in directing pupils, and AI technology should be employed as a potent instrument to enhance the quality of education. By possessing a comprehensive comprehension of the capabilities and constraints of artificial intelligence (AI) technology, educators may effectively harness its potential to equip students with the necessary skills to navigate the complexities and prospects of the digital age.

REFERENCES

Alam, A. (2021, November). Possibilities and apprehensions in the landscape of artificial intelligence in education. In *2021 International Conference on Computational Intelligence and Computing Applications (ICCICA)* (pp. 1-8). IEEE. https://doi.org/0.1109/ICCICA52458.2021.9697272

Anutariya, C., Bonsangue, M., Abidin, T. F., Dailey, M., Fraidaki, K., Gomes, T. M. R., ... & Wickramarachchi, C. (2020). Building a needs-based curriculum in data science and artificial intelligence: Case studies in Indonesia, Sri Lanka, and Thailand.

Astutik, E. P., Ayuni, N. A., & Putri, A. M. (2023). Artificial Intelligence: Dampak Pergeseran Pemanfaatan Kecerdasan Manusia Dengan Kecerdasan Buatan Bagi Dunia Pendidikan Di Indonesia. *Sindoro: Cendikia Pendidikan*, *1*(10), 31-40. https://doi.org/10.9644/sindoro.v1i10.1219

Buabeng-Andoh, C. (2012). Factors influencing teachersâ adoption and integration of information and communication technology into teaching: A review of the literature. *International Journal of Education and Development using ICT*, *8*(1).

Dalle, J., Ampera, D., Jamalie, Z., Akrim, A., Rudiansyah, F., Subandowo, M., & Normelani, E. (2022). ARTIFICIAL INTELLIGENCE, LEARNING STRATEGIES, AND DEVELOPMENT OF VOCATIONAL SKILL LESSONS WITH MULTIMEDIA SOFTWARE IN INDONESIA. *International Journal of eBusiness and eGovernment Studies*, *14*(3), 640-665.

Fitria, T. N. (2021, December). Artificial intelligence (AI) in education: Using AI tools for teaching and learning process. In *Prosiding Seminar Nasional & Call for Paper STIE AAS* (Vol. 4, No. 1, pp. 134-147).

Hastungkara, D. P., & Triastuti, E. (2019). Application of e-learning and artificial intelligence in education systems in Indonesia. *Anglo-Saxon: Journal of the English Language Education Study Program*, *10*(2), 117-133.

Harris, D. (2019). *Literature review and research design: A guide to effective research practice*. Routledge.

Haryanto, E., & Ali, R. M. (2019, January). Students' attitudes towards the use of Artificial Intelligence SIRI in EFL learning at one public university. In *International Seminar and Annual Meeting BKS-PTN Wilayah Barat* (Vol. 1, No. 1).

Hasibuan, R., Parta, I. B. M. W., Sholihah, H. I. A., Damayanto, A., & Farihatun, F. (2023). Transformation of Indonesian language learning with artificial intelligence applications: the era of the independent curriculum for learning in universities in Indonesia. *Indonesian Journal of Education (INJOE)*, *3*(2), 341-363. https://doi.org/10.54443/injoe.v3i2.71

Holmes, W., Bialik, M., & Fadel, C. (2023). Artificial intelligence in education. Globethics Publications. https://doi.org/10.58863/20.500.12424/4276068

Kaharuddin, K. (2021). Assessing the effect of using artificial intelligence on the writing skill of Indonesian learners of English. *Linguistics and Culture Review*, *5*(1), 288-304. https://dx.doi.org/10.21744/lingcure.v5n1.1555

Knox, J. (2020). Artificial intelligence and education in China. *Learning, Media and Technology*, *45*(3), 298-311. https://doi.org/10.1080/17439884.2020.1754236

Laurillard, D. (2013). *Rethinking university teaching: A conversational framework for the effective use of learning technologies*. Routledge. https://doi.org/10.4324/9781315012940

Luckin, R., George, K., & Cukurova, M. (2022). *AI for school teachers*. CRC Press.

Machmud, M., Masmuh, A., & Nasirin, C. (2020). Artificial intelligence in the public health sector: The use of telemedicine in Indonesia during Covid-19. *PalArch's Journal of Archaeology of Egypt/Egyptology*, *17*(7), 10106-10118.

Mumtaz, S. (2000). Factors affecting teachers' use of information and communications technology: a review of the literature. *Journal of information technology for teacher education*, *9*(3), 319-342. https://doi.org/10.1080/14759390000200096

Pedro, F., Subosa, M., Rivas, A., & Valverde, P. (2019). Artificial intelligence in education: Challenges and opportunities for sustainable development.

Pendy, B. (2021). Artificial intelligence: The future of education. *Jurnal Indonesia Sosial Sains*, *2*(11). https://doi.org/10.59141/jiss.v2i11.801

Pratama, M. P., Sampelolo, R., & Lura, H. (2023). Revolutionizing education: harnessing the power of artificial intelligence for personalized learning. *Klasikal: Journal of Education, Language Teaching and Science*, *5*(2), 350-357. https://doi.org/10.52208/klasikal.v5i2.877

Priyahita, R. (2020, August). The utilization of e-learning and artificial intelligence in the development of education system in Indonesia. In *2nd Jogjakarta Communication Conference (JCC 2020)* (pp. 263-268). Atlantis Press. https://doi.org/10.2991/assehr.k.200818.061

Rakuasa, H., Faris, D. A., & Hidayatullah, M. (2024). Transforming Education in the Age of Artificial Intelligence: Challenges and Opportunities in Indonesia, A Literature Review. *Journal Education Innovation (JEI)*, *2*(1), 180-186.

Reza, M. A. N., Hamidi, E. A. Z., Herawati, R., & Mulyana, E. (2020, September). Research Development and Landscape Artificial Intelligence in Indonesia. In *2020 6th International Conference on Wireless and Telematics (ICWT)* (pp. 1-5). IEEE. https://doi.org/10.1109/ICWT50448.2020.9243659

Rokhmawati, A., Kusumo, G. R., Wahyoho, I. D., & Irawati, R. (2018, September). Ultranus: A novel Indonesian cultural game using artificial intelligence. In *2018 International seminar on application for technology of information and communication* (pp. 361-366). IEEE. https://doi.org/10.1109/ISEMANTIC.2018.8549744

Sadiku, M. N., Musa, S. M., & Chukwu, U. C. (2022). *Artificial intelligence in education*. iUniverse.

Spiro, R. J., Bruce, B. C., & Brewer, W. F. (Eds.). (2017). *Theoretical issues in reading comprehension: Perspectives from cognitive psychology, linguistics, artificial intelligence and education* (Vol. 11). Routledge.

Sumakul, D. T. Y. (2023). *EFL LEARNERS'MOTIVATION IN AI-ASSISTED ONLINE LEARNING AT A UNIVERSITY IN INDONESIA* (Doctoral dissertation, Universitas Pendidikan Indonesia).

Supriyanto, E. E., Warsono, H., & Herawati, A. R. (2021). Literature Study on the Use of Big Data and Artificial Intelligence in Policy Making in Indonesia. *Adm. J. Ilm. Adm. Publik dan Pembang*, *12*(2), 139-153.

Syifa, M., Kadavi, P. R., & Lee, C. W. (2019). An artificial intelligence application for post-earthquake damage mapping in Palu, central Sulawesi, Indonesia. *Sensors*, *19*(3), 542. https://doi.org/10.3390/s19030542

Yusriadi, Y., Rusnaedi, R., Siregar, N., Megawati, S., & Sakkir, G. (2023). Implementation of artificial intelligence in Indonesia. *International Journal of Data and Network Science*, *7*(1), 283-294. http://dx.doi.org/10.5267/j.ijdns.2022.10.005