The Effectiveness of Using Artificial Intelligence/Robots in Virtual Learning during the COVID 19 Pandemic

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Abstrak

Penelitian ini mengkaji dampak dari implementasi Kecerdasan Buatan (Artificial Intelligence/AI) da-lam dunia pendidikan selama pandemi Covid-19, dengan meninjau peran ganda AI sebagai kekuatan transformatif dan potensi ancaman. Berfokus pada perubahan paradigma profesi pengajar akibat teknologi, khususnya AI, penelitian ini bertujuan untuk mengevaluasi kontribusi AI dalam pembela-ja-ran virtual, menganalisis keuntungan dan ancamannya, serta mengusulkan solusi implementasi yang optimal. Dengan menggunakan pendekatan fenomenologi hermeneutik kualitatif, informasi diperoleh dari 20 mahasiswa UIN Walisongo Semarang di Indonesia. Hasil penelitian menekankan aplikasi AI yang serba-guna, menyoroti dampak positif pada kualitas pembelajaran, personalisasi, dan peluang praktis. Namun, perhatian diperlukan untuk mengatasi dampak negat-ifnya, termasuk kecanduan teknologi, masalah sosial, masalah kesehatan mental, berkurangnya kreativitas, dan biaya implementasi yang tinggi. Studi ini meng-garisbawahi peran penting guru dan membayangkan masa depan kolaboratif di mana AI dan pendidik manusia bersinergi untuk meningkatkan pemikiran kritis dan interaksi sosial, mengadvokasi pendekatan yang seimbang untuk integrasi AI dalam pen-didikan.

Abstract

This research investigates the impact of integrating Artificial Intelligence (AI) into education during the Covid-19 pandemic, examining AI's dual role as a transformative force and a potential threat. Focused on the changing landscape of the teaching profession due to technology, particularly AI, the study aims to evaluate AI's contributions to virtual learning, analyze its advantages and threats, and propose optimal implementation solutions. Utilizing a qualitative hermeneutic phenomenological approach, insights were gathered from 20 UIN Walisongo Semarang students in Indonesia. Results emphasize AI's versatile applications, highlighting positive impacts on learning quality, personalization, and practical opportunities. However, attention is needed for addressing negative consequences, including technology addiction, social issues, mental health concerns, reduced creativity, and high implementation costs. The study underscores the crucial role of teachers and envisions a collaborative future where AI and human educators synergize to enhance critical thinking and social interaction, advocating for a balanced approach to AI integration in education.

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INTRODUCTION

AI has been a prominent research topic in various fields and a rapidly growing area in education. The technology of artificial intelligence, or AI, undergoes substantial development each year, contributing to unprecedented advancements in the fourth industrial transformation, known as Industry 4.0. The rapid pace of AI development is creating novel possibilities, marking a significant shift in the industrial landscape. Concurrently, the advent of Industry 4.0, focusing on production, aligns with the concept of Society 5.0 proposed by Japan. Society 5.0 emphasizes placing humans at the forefront of innovation, leveraging the outcomes and impacts of Industry 4.0 technology (Khan et al., 2023). Consequently, the introduction of this concept necessitates that all institutions, including education at all levels, adeptly adapt and apply these technologies.

The presence of AI, with its new features, functions, and appearances, is significantly influencing various facets of human life, including education (Khan et al., 2023). Artificial intelligence (AI) is increasingly becoming involved in learning activities within schools and universities. This duality characterizes AI as a double-edged sword, offering numerous positive impacts while posing inherent threats. The concern arises from the potential for AI to transition into an automated pilot, where it assumes the complete role of educators who are meant to use AI as a tool to assist and alleviate their teaching responsibilities.

During the period from 2020 to 2022, the Covid-19 disease emerged as a serious global pandemic, resulting in gradual changes across various aspects of human life. Its significant impact extended to numerous areas, including the economy, education, politics, and health. The education sector, in particular, experienced substantial transformations due to the Covid-19 disease. The pandemic prompted a shift in the education system in Indonesia, moving from the initial model of face-to-face or offline learning to the adoption of distance or online learning. This transition aimed to mitigate the spread of the Covid-19 virus by enabling online learning from home. The decision to discontinue face-to-face or offline learning was taken to prevent gatherings in learning environments, thereby reducing the risk of spreading the Covid-19 virus.

The online learning system in question is a technology-driven system encompassing various aspects such as attendance tracking, assignment submission, virtual meetings, and assignment collection. Respondents from different school backgrounds provide varying responses in completing questionnaires, reflecting their adaptation to changes in the learning system. These background differences present both advantages and disadvantages in the transition to the learning system in Indonesia.

However, it is crucial not to overlook the fact that technology and artificial intelligence (AI) signi-

ficantly contribute to education. Considering the impact of AI, there is potential for enhancing the quality of various fields, including education. Artificial intelligence has the capacity to optimize learning and teaching methods, fostering positive developments in the educational landscape for both students and teachers.

Therefore, the above statement raises a pertinent question: How is technology shaping the teaching profession, and what can be expected in the future? Rainie & Anderson (2017) emphasize that adaptability is the most crucial skill for future workers. Examining how teachers are currently adapting to new technology and anticipating future adaptations becomes imperative, especially in the face of technological advancements that may be challenging to conceive.

Many experts hold different views on the impact of using Artificial Intelligence (AI) in education. According to Ahmad et al. (2022) AIA has a significant impact on the education sector, benefiting both academic and administrative activities. Learning within the framework of artificial intelligence is anticipated to have a profound effect on science, technology, and education (Schank & Slade, 1991). The introduction of artificial intelligence and robots providing personalized instruction may lead to a shift in teachers' roles, with a focus on overseeing the design and selection of machine-led instruction, monitoring student progress, and offering support (Edwards et al., 2018).

Edwards et al. (2018) suggest that independent robot teachers are a possibility in the near future, potentially causing a disruption in the educational landscape and the loss of many jobs related to teacher roles. However, it is anticipated that new types of roles or jobs will emerge to replace these positions (Noy & Zhang, 2023). The fear that AI will render human teachers obsolete seems, for now at least, unfounded. The potential future impact depends on how people approach the evolving technology. Teachers play a critical role in the implementation of AI in education, and AI should not, indeed cannot, completely replace the teacher (Felix, 2020). The impact of AI on the education sector, with its dual benefits for academic and administrative activities, remains significant (Ahmad et al., 2022).

Nalbant (2021) argues that with intelligent systems, there is an increase in student-teacher interaction, facilitated access to information, easier identification of disinterested students, and the development of feedback between students and teachers. Additionally, AI provides students with practical or experiential learning experiences, especially when used in conjunction with other technologies like virtual reality, 3-D, gaming, and simulation, thereby enhancing students' learning experiences (Chen et al., 2020). During pandemics, such as COVID-19, the utilization and effectiveness of AI and ML in addressing human problems, particularly in learning, have been emphasized (Ara Shaikh et al., 2022).

Research Gap: Previous research conducted by Ara Shaikh et al. (2022) indicates that the use of AI technology in online learning can offer effective support for students and teachers, including personalized learning for students, automation of routine teacher tasks, and provision of adaptive assessments. However, while the opportunities presented by AI technology are promising, the impact of AI systems on culture, norms, and expectations regarding interactions between students and educators remains unclear.

In online learning, student-teacher interactions significantly impact satisfaction and outcomes. Understanding how AI influences these interactions is crucial to identify gaps and challenges. Future research should investigate AI's impact on higher education students during COVID-19. This article aims to: (a) assess AI's contribution to virtual learning during the pandemic based on student perceptions; (b) highlight AI's advantages, opportunities, and threats in education; (c) propose solutions for effective AI implementation to enhance learning outcomes.

METHOD

This research adopts a qualitative phenomenological approach, aiming to understand and interpret specific phenomena. Qualitative research is a global social research method that seeks to align research results with reality (Cohen et al., 2018; Creswell, 1998). The choice of a qualitative method is aligned with the research focus. The study utilizes a hermeneutic phenomenological approach, which involves interpreting and articulating the meaning of human experiences (Alase, 2017). This approach goes beyond mere description, emphasizing the interpretation of participants' life experiences.

This research is a qualitative study using a hermeneutic phenomenological approach, conducted in four stages. The planning stage involves focusing on argumentation, conducting literature studies, and formulating the research problem. The preparatory stage includes selecting participants and compiling relevant instruments. In the implementation stage, direct interviews or questionnaires are conducted. The analysis and interpretation stage involves analyzing all gathered data and drawing conclusions based on the research results.

The questionnaire focused on AI/robot contributions, benefits, efficacy, and challenges during Virtual Learning in the COVID-19 Pandemic. Twenty UIN Walisongo students from various Indonesian cities responded, providing insights into the equitable use of AI in Indonesia. Respondents represented diverse regions, including East Java, Central Java, West Java, Kalimantan, North Sumatra, and Nusa Tenggara. The respondents attended different schools, such as SMA, SMK, MA, MAN, and Islamic Boarding School, and their school locations influenced their perspectives on AI/robot contributions during Covid-19 virtual learning.

RESULT AND DISCUSSION

This research aimed to assess the impact of technology on learning, especially during the Covid-19 pandemic, focusing on students from various regions in Indonesia such as East Java, Central Java, West Java, Kalimantan, North Sumatra, and Nusa Tenggara. Analysis of the questionnaires revealed that respondents attended different types of schools, including SMA, SMK, MA, MAN, and Islamic Boarding Schools. The school's location influenced their perspectives on AI/robot contributions during Covid-19 virtual learning.

Data indicated that students attending high schools (SMA)/vocational schools (SMK) in urban areas did not face challenges transitioning from face-to-face to virtual learning. Many considered virtual learning more effective, as they were accustomed to using technology in daily life, and schools permitted the use of cellphones or laptops as learning tools. However, this perspective did not apply to respondents from MA/MAN and Islamic Boarding Houses. Most of them opposed transitioning to a system that required cellphone or laptop usage for learning, as several Islamic schools prohibit such technology. This, coupled with a lack of socialization about learning technology, led to culture shock, presenting a challenge as they needed to adapt quickly to technology during the Covid-19 pandemic.

However, these background differences do not deter students from engaging in teaching and learning activities at school. In fact, they exhibit increased enthusiasm due to the introduction of new learning experiences during virtual learning amid the Covid-19 pandemic. In this chapter, the author will present the research results based on a questionnaire, which is segmented into several chapters.

A. Types Of AI/Robots Used During Virtual Learning During Covid 19

The Indonesian government has attempted to control the spread of corona virus infection by implementing a lockdown policy. This policy certainly has a big impact on all aspects, especially education in Indonesia. The government has prohibited all schools in Indonesia from holding face-to-face meetings between teachers and students and then requires them to meet virtually. During the lockdown, AI/robots really helped make the work of teachers and students easier in carrying out teaching and learning activities, this AI was able to develop potentially during the pandemic and in the future in helping to develop the digitalization of education.

AI provides a new approach between students and teachers by utilizing several applications to support learning activities. So based on this statement, the author formulated questions on the questionnaire that had been distributed: "What types of AI/Robots do you use in virtual learning during the Covid 19 pandemic?" The author received answers from participants, namely in the form of applications divided into several aspects based on their use as follows.

1. Virtual Meeting

Since the spread of the corona virus reached its peak, the Indonesian government decided to limit human activities to break the chain of spread of Covid 19 by means of lockdown and PPKM so that all learning activities must be carried out at home and converted into online meetings and classes that can be accessed online. This makes many online meeting or video conferencing applications important because almost the entire world population uses them. This requires teachers and students to adapt quickly to master online meeting applications/platforms to facilitate access to teaching and learning such as zoom, google meet, teams, and WA group video call.

Based on the explanation above, it can be concluded that all online meeting applications used by participants provide and bring positive benefits because video conferencing has proven to be more efficient, practical and safe. Communication exchange and a sense of togetherness are also maintained even though it is only visible in visual and audio form. Online meeting applications can overcome the distance factor so that anyone in any part of the world can share information, especially in learning activities.

This interactive technology has proven to be effective in all layers and aspects of life, in fact each user is no longer limited to visual or audio displays. It can also send files and interact like conventional meetings such as writing meeting contents on a digital whiteboard. This certainly changes the paradigm in the world of education that learning processes or activities do not always have to be carried out in the classroom. Therefore, the use of applications is not only carried out when a disaster occurs, but also as a new learning style in achieving learning goals in the future.

2. Gamification

The Covid 19 pandemic requires teachers to be more creative in making the classroom atmosphere enjoyable. In this situation, gamification activities are considered effective, educational and interesting, as well as fun. Gamified teaching strategies are seen as a promising option for imparting knowledge and increasing student collaboration during social distancing. Each respondent has experience using different gamification platforms in their school, including Quiziz, Kahoot, Duolingo, Educandy, and Wordwall.

In this research it can be concluded that the gamification strategy used has proven to be efficient in creating a fun but serious learning situation and increasing students' learning motivation. Participants explained that gamification is not just technology-based games, but the use of gamification such as quiziz is used as daily assignments, final evaluations and daily exams, so it can be concluded that gamification is not only fun but students still think critically when doing quiziz.

3. Assignment

Based on the data obtained by the author, it is known that online learning is carried out by implementing several applications, namely Google Form, Quiziz, and Google Classroom with the help of WhatsApp groups as a means of giving announcements and exchanging information. Based on the data obtained, respondents felt that the use of Google Form and Quiziz was effective as a medium for daily exams, while Google Classroom with its features was effective in collecting routine assignments from students according to predetermined deadlines. These three applications really help students and teachers in achieving learning goals, the platform is effective in building student learning motivation and makes student assessment easier for teachers.

It is recommended that the application may be utilized to enhance the quality of the teaching and learning process at all levels of academic activities, not only during the pandemic but also in the future.

B. The Presence of AI/Robots Affects the Quality of Learning During the Covid 19 Pandemic

Based on the data that has been obtained, it was found that the presence of AI/robots has a big influence in influencing the quality of learning. This has been proven that the presence of AI/robots during the Covid pandemic changed the learning system from traditional learning to modern learning. I will describe how AI/robots have a big influence in changing traditional learning systems into modern learning.

First, the presence of AI/robots in modern classes provides many benefits for students, modern classes can provide different styles of teaching, so students can choose to suit their own style according to their favorite choice, while in the traditional classroom model, only one teacher is speaking.

Second, modern classes provide virtual classes that can provide each student with a different teaching strategy based on each student's different interests. While traditional classrooms can only provide a strategy and method for the majority of students.

Third, the presence of AI/robots in education really supports students in looking for learning resource references. Before the existence of AI/robots, students were limited in looking for learning resource references. Learning resources were limited to textbooks, printed materials and physical teaching materials, but after the presence of AI/robots in learning, especially during virtual learning during the pandemic, students can access learning information anywhere and at any time from various sources around the world.

Fourth, the presence of AI can help teachers with administrative matters and provide recommendations. This makes it easier for teachers to search for learning resources with certain indicators, helps teachers choose the most suitable method for the students being taught.

Fifth, before the presence of AI/robot learning

systems in Indonesia, face-to-face (offline) meetings meant that all learning activities had to be carried out face-to-face in class, such as delivering material by teachers, presentations, collecting assignments, evaluating final exams, etc. However, after the presence of AI/robots it has been proven to make it easier for students and teachers to carry out learning activities because meetings do not have to be held in the classroom. Through online learning, students can access learning materials, do daily assignments, take attendance, take exams, etc. through online platforms, online courses and various digital resources without having to come to class.

Based on the statement above, it can be concluded that AI/robots have a big influence on education, the presence of AI/robots influences the quality of student learning to be better than traditional learning without using AI in learning. The use of AI in education cannot be stopped because of several negative side effects. If the use of AI in education is limited or stopped, it will of course cause losses and reduce the quality of learning.

C. Contribution and Benefits of Using AI/Robots in Virtual Learning During the Covid 19 Pandemic

Based on conducted research, a definitive inference can be drawn that Artificial Intelligence (AI) has significantly influenced and made a substantial impression of education as a whole, and specifically, in its application within educational institutions. Educators or facilitators who employ or utilize AI are capable of attaining enhanced productivity and efficacy in various responsibilities, which encompass administrative duties like assessment, evaluation, and furnishing constructive input to students regarding their submitted assignments. Moreover, by collaborating with artificial intelligence (AI) or its various manifestations, including web-based and online intelligent systems, collaborative robots (cobots), and chatbots, educators can enhance the quality of instruction.

Conversely, students benefit from AI's utilization of machine learning, as evidenced by multiple research studies, which enables them to partake in an enhanced and more comprehensive learning journey. This is achieved through AI's ability to assess students' capabilities and needs, and subsequently utilize the insights gained from such analysis to create and distribute personalized or customized educational content. As a result, students are more likely to engage with and retain the material, ultimately leading to improved learning outcomes.

Furthermore, artificial intelligence (AI) affords students with hands-on or practical learning opportunities, particularly when it is combined with other cutting-edge technologies such as virtual reality, three-dimensional visualizations, gaming, and simulation. This integration enhances the overall learning experiences of the students. A specific research study delved into the detrimental consequences of AI, na-

mely the erosion of academic integrity and the prevalence of cheating facilitated by AI-powered services like paper churning and paper mill platforms. The majority of the analyzed studies convincingly illustrated and expounded upon the myriad ways in which AI, including its integration, confers benefits and impacts various aspects of education such as administration, instruction, and student learning. The advantages, or pros, of AI clearly outweigh the disadvantages, or cons.

AI learning is presently acknowledged as an educational aide during its preliminary phase, while AI-enabled education will assume a more significant function as the demands of learning evolve. Currently, it offers courses of varying complexity through rudimentary rule-based evaluation and has yet to attain the optimal level of intelligence in the realm of intelligent education. Research on AI systems in the field of education encompasses knowledge mapping and probability modeling. As the educational process witnesses progressively frequent interaction, AI systems will generate an ever-increasing amount of information.

D. Negative Impacts of Using AI In Education In The Present And Future

Based on the explanation above, AI/ROBOT has a positive impact on learning activities, especially during virtual learning during the Covid-19 pandemic, but AI also has negative impacts which are important to discuss. Based on the research that has been carried out, the following results were found.

1. Technology Addiction

The phenomenon of technology addiction is observed in the context of students' preference for engaging with others on social platforms as opposed to participating in face-to-face social interactions. This excessive preoccupation with technology hinders students' ability to dedicate sufficient time to their academic pursuits and impairs their motivation. Given that a significant proportion of a student's leisure time is spent in virtual environments and playing games, the requisite emphasis on education tends to be lacking. This issue ranks highly among the grievances voiced by parents.

2. Social Life Issues

Students from SMA/SMK frequently use technology in their daily lives. They felt the impact of the use of technology which intensely affects social life before the emergence of artificial intelligence, they were engaged in a greater amount of collaborative and communal activities. However, as technology has advanced, there has been a shift towards more solitary endeavors. The advent of tablets and computers, which have become cherished companions of individuals, has replaced the traditional practice of visiting libraries for research and study purposes. Consequently, the ability of a single person to easily access information through a few keystrokes has resulted in

the isolation of individuals and the development of a solitary disposition.

3. Mental Health Issues

All participants (SMA, SMK, MA, MAN and Islamic Boarding School) who frequently engage with AI/ROBOT technology in their daily routines assert that it adversely affects their well-being by intensifying competition among students, leading to heightened stress levels. Consequently, this can have a detrimental impact on the mental health and psychology of students. Furthermore, technological devices emit radiation that can result in a range of health issues. Prolonged exposure to technology may lead to eye disorders, nerve compression, as well as pain in the neck, waist, and wrists.

4. Lack of Creativity

This study revealed that the integration of AI/Robot technology promptly impacted students' creative abilities negatively. Ridwan from SMK noted that using AI simplified the process of designing, allowing for easy access to design templates and minimizing the need for extensive modifications to complete assignments. The researcher then explored students' approaches to design tasks before the advent of AI/Robots. Annisa from SMA shared that, for PowerPoint assignments, students would typically search for templates on CANVA. However, in the pre-AI era, the manual creation of presentations using the PowerPoint application was laborious and time-consuming. Based on the data above, it can be concluded that artificial intelligence lacks the qualities of imagination and creativity. While machines are capable of generating designs, they are unable to match the innovative capabilities of the human mind. Human intelligence and emotions are boundless, encompassing emotional intelligence as well. Individuals have the ability to mold their thoughts through their emotions, a feat that machines cannot even begin to imitate.

5. High Cost

All participants agreed that the disadvantage of using AI/robots was the high cost. During the Covid-19 pandemic, the government enforced virtual learning with technology-based methods, but the issue arises as not all students share the same economic background. This research was conducted in villages and cities with varying economic statuses, yielding different responses. Students with affluent financial backgrounds don't find this problematic, as their parents are willing to invest significantly in supporting the quality of their children's learning. However, this differs for students facing economic instability; they struggle to purchase cellphones and laptops as learning tools and find it challenging to cover data and maintenance costs for electronic products. Thus, the high cost emerges as one of the drawbacks that must

be considered when implementing AI in education.

E. The Potential of AI In Education in The Future

Teachers play a crucial role in adopting AI in education. History is replete with examples of technological change altering roles and introducing unforeseen positions. In the realm of educational AI, teachers stand at the forefront. The question isn't about adapting to the vanishing role of the teacher; to paraphrase Mark Twain, the rumors of her demise were greatly exaggerated. Instead, the question is how to maximize the potential of the new tools AI offers while preserving the aspects in which teachers excel, all of which center around their essential humanity. Their physical presence holds an irreplaceable role in students' ability to empower themselves, foster well-being, and engage in society.

Humans are inherently social beings who thrive on shared activities and experiences. For success, young people must learn to balance self-care with contributing to the society they belong to, as society must reciprocate by caring for them. They need to develop autonomy and interdependence simultaneously. A range of social skills is essential to counteract loneliness, ensure personal development, and attain existential peace. A strong teacher-student and student-student bond serves as a solid foundation. Critical thinking skills are crucial for combating bigotry, populism, fake news, fact resistance, and various related issues.

Palmer & Neuenschwander (2000) assert that a teacher's ability to connect with students "depends less on the methods I use than on the degree to which I use my self—know it, trust it, and am willing to do it." A good teacher allows students to perceive her as both an instructor and a person—an expert in her field who is still prone to making mistakes. The lesson she imparts is not about making mistakes but about acknowledging and learning from them, a skill that no AI can yet replicate.

Educational AI excels at its designated tasks. AI-powered educational software has undeniably impacted teaching, and the emergence of adaptive agents (Chase et al., 2009) carries its own implications: students are essentially teaching computers to learn independently.

AI operates on algorithms. While humans may also be governed by algorithms, theirs are of a vastly different level of complexity. Current AI lacks its own will, consciousness for reflection, a mind, or a sense of self beyond a data construct. It lacks deep behavioral flexibility. The prevailing myth suggests that computers not only perform what they are programmed to do but also that their "learning" capacity is severely limited. Any mistakes they make are often attributed to environmental conditions rather than anything resembling creativity—especially the creativity a teach-

er brings to her classroom daily.

CONCLUSION

In conclusion, AI integration in education during the Covid-19 pandemic has transformed the learning landscape, presenting both positive and negative impacts. While AI enhances learning experiences, concerns like technology addiction, social issues, mental health, and implementation costs require attention. Teachers play a crucial role in guiding students through personalized learning, emphasizing critical thinking and social interaction. Proactive exploration of AI in education is essential, focusing on student-teacher interactions and cultural considerations for a balanced approach.

The Indonesian government is urged to promote widespread technology access in schools, allocating funds for digital infrastructure, providing devices, internet connectivity, and integrating technology literacy into the national curriculum. Public awareness campaigns and technology hubs in rural areas can empower students and contribute to community development. Prioritizing technology in education, especially in underserved regions, is vital for a more inclusive and promising future for Indonesian education.

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