AIED (Artificial Intelligence in Education): Opportunities and Challenges in Improving Learning Efficiency in the Era of Society 5.0

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Article Info	Abstract
  	Education in the era of digital transformation faces great challenges. These challenges result from the lack of information about the transformation of digital education using AIED (Artificial Intelligence in Education) in the Society 5.0 era. The world of education in Indonesia is undergoing a transformation and is ready to welcome the Society 5.0 era. Thus, it provides opportunities and challenges for educators in every educational unit. Through a qualitative analysis, this study shows that AIED (Artificial Intelligence in Education) can positively contribute to support digital transformation in learning in schools, so there are factors that need to be considered for schools to achieve efficient changes in improving learning. When teachers have understood the opportunities and challenges in improving learning efficiency with AIED in the era of Society 5.0. Thus, the use of AIED (Artificial Intelligence In Education) in learning can achieve the goals of learning, so that education will continue to advance and can produce superior future generations.

Introduction

Today, the world has entered an era that cannot be separated from the use of technology. Every aspect of human life, including education, has been transformed by advances in information and communication technology. The world of education in Indonesia is undergoing a transformation and is ready to welcome the era of society 5.0. School digitization will be the top priority of the Ministry of Education and Culture (Wira Rahman, 2023). The problem facing digital-based learning is the lack of information about the transformation of digital education in the era of Society 5.0. The importance of knowing digital education transformation data can help educators be more flexible and innovative to improve learning efficiency in the Society 5.0 era. The challenges faced by teachers in the past will be different from the challenges faced by teachers today, so data on digital learning transformation is needed to become a glass of comparison in the future. To improve learning efficiency, teachers must have the ability to use artificial intelligence technology. However, before implementing these skills, teachers must understand the opportunities and challenges that will be faced in using AIED learning media in the era of society 5.0.

The benefits of AI technology are felt by all walks of life, including in the field of education. Previously, more people looked at the negative effects of using AI technology, such as making them addicted to gaming and spending more time with their technological devices than spending time studying. As a result, they are less successful in learning. AI technology devices if used correctly can help us, especially in the field of education which is commonly called AIED (Artifical Intelligence In Education) (Danny, 2022).

Research Method

The method used in this research is a qualitative research method with library research data collection techniques. Studi pustaka menggunakan cara pengumpulan data melalui bahan penelitian dari perpustakaan yang didasari oleh penelitian literatur berdasarkan buku, jurnal ilmiah, dan laporan penelitian. Qualitative research is research that seeks to obtain a more in-depth description of a problem so that the knowledge obtained is relevant. Even so, the results of qualitative research are often speculative (Fadli, 2021). This research was conducted in a qualitative analysis by examining the concept of AIED (Artificial Intelligence In Education): Opportunities and Challenges in Improving Learning Efficiency in the Era of Society 5.0 which is the result of research from journals in the last five years and related books. So as to find new relevant concepts.

To clarify the analysis in this study, the researchers refer to a scientific journal entitled "Impacts of digital technologies on education and factors influencing schools' digital capacity and transformation: A literature review." In the journal, Stella Timotheou and Yiannis Dimitriadis (Timotheou et al., 2023) explain that digital technology is causing changes in the nature and scope of education and is leading education systems around the world to apply artificial intelligence in education to improve learning efficiency in the era of Society 5.0. The author also discusses the quality issues of teaching and learning artificial intelligence, which is to understand, adapt and design appropriate learning systems in the era of digital transformation. However, AIED (Artificial Intelligence In

Education) can also make a positive contribution to supporting the digital transformation of learning in schools, so there are factors that need to be considered for schools to achieve efficient changes in improving learning in the era of Society 5.0.

Result and Discussion

AIED Learning Media	Internet of Things (IoT) in education
	Virtual Reality (VR) / Augumented Reality (AR) in Education
	Use of Artificial Intelligence (AI) in Education
Opportunities for AIED in Improving Learning Efficiency in the Era of Society 5.0	Technological advances can provide more interactive and innovative teaching opportunities.
AIED's Challenge in Improving Learning Efficiency in the Era of Society 5.0	The challenges that must be overcome during the development of digital technology are free access to the internet, dependence on technology, lack of thinking power of students.

The Concept of AIED Learning Media in the Era of Society 5.0

The learning process will successfully achieve its goals if the teacher has a strategy in choosing learning media in teaching and has a good relationship with students, so that teachers and students can interact actively (Rahayu, t.t.). Educators must know the purpose of education, understand the character of students, know the principles and uses of educational tools (Rachayu & Bachri, 2023). There are three kinds of knowledge that teachers must have: motor, psychomotor, and pedagogy (Lestari dkk., 2023). When students receive quality teaching, it can increase their interest and motivation to learn (Tumurang & Chandra, 2023).

The reflective learning process can occur when students experience confusion, obstacles or doubts when solving the problems they face. So, the ability to think reflectively is a student's ability to select the knowledge possessed and stored in memory to solve any problems faced to achieve its goals (Suntiah, 2021). The education serves as a medium of propagation of enlightenment to emancipate, advance, and educate people. Kyai Dahlan developed the ethos of learning and tabligh with the slogan "be a teacher and student at once" (Khoirudin dkk., 2020).

Media is everything that is commonly used in conveying messages from the sender to the recipient of the message. learning media is divided into two, namely online learning media and offline learning media (Lalu Gede Muhammad Zainuddin Atsani, 2020). The existence of a new program that is run, of course, experiences some obstacles in the implementation process.(Naim dkk., 2022) The development of technology

has influenced progress in the field of education, one of which is Artifical Intelligence in Education. Currently, AIED technology is a solution and alternative in the learning process. With the rapid development of technology today requires teachers, teachers or lecturers to be able to innovate and adapt in the use of various digital-based learning methods (Thoyib dkk., 2021).

In the end, the goal of AIED is not to promote AI, but to support education. In essence, there is only one way to evaluate the impact of AI in Education: through learning outcomes. AIEd for reducing teachers' workload is a lot more impactful if the reduced workload enables teachers to focus on students' learning, leading to better learning outcomes (Chaudhry & Kazim, 2022). The education system that is widely used in the Era of Society 5.0 is Online Learning which is internet-based learning that can connect teachers and students. There are two basic perceptions of online learning, namely learning methods that use information technology (Electronic Based) and learning processes that use the internet as the main tool (Internet Based). Society 5.0 era is a digital era that is identical with the rapid development of information and technology. Online learning media is divided into five, namely: whatsapp group, google suite for education, ruang guru, zenius, and zoom.

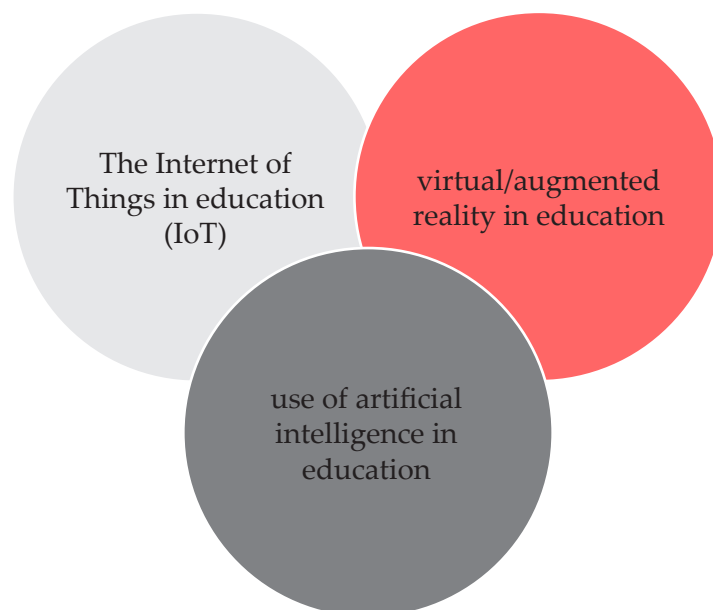**There are three AIED-based learning media, among others:**

Figure 1. AIED Learning Media

Online learning media is divided into five, namely: whatsapp group, google suite for education, ruang guru, zenius, and zoom.

Opportunities for AIED in improving Learning Efficiency

The world of Indonesian education has a positive impact on the development of technology and information, but the negative impact is also unavoidable from the world of education. (Baharizqi dkk., 2023). Learning media is needed in the learning process, so the learning media used must keep up with the times (Sobarningsih & Muhtar, 2022). Educators have an important role in producing a superior generation of Indonesians who have creative thinking skills and critical thinking skills (Mertayasa & Indraningsih, 2020). The younger generation is responsible for providing quality education as a pillar of the nation's struggle for success. A country needs to pay attention to education to build a country in future towards a developed country (Rochmat, Yoranita, dkk., 2022). Higher order thinking skills (HOTS) include problem solving, critical thinking, creative thinking, argumentation, and decision-making skills (Rochmat, Sholihah, dkk., 2022).

The increasing use of technology and information provides opportunities for teachers in every education unit (Abidah dkk., 2022). Technological advances offer more interactive and innovative teaching opportunities. For example, the use of online learning platforms such as teacher rooms, digital technology, and interactive tools can enhance students' creativity so that students can understand learning concepts well.

As long as it does not conflict with existing rules, the presence of technology is not a problem. Teachers can provide students with an understanding of technology by utilizing technology in learning, such as E-Learning and Kahoot. If utilized properly, students will get a good education.

AIED's challenge in improving Learning Efficiency

Technological innovations such as the Internet of Things (IoT) in education, Virtual Reality (VR) / Augmented Reality (AR) in education, the use of Artificial Intelligence (AI) in education offer great opportunities to improve learning efficiency in the era of Society 5.0. Therefore, education systems around the world continue to increase their investment in improving information and communication technology to adapt to the times. (Ford Lumban Gaol & Ekaterina Prasolova-Førland, 2022).

AIED (Artificial Intelligence In Education) requires teachers to move forward and be creative, teachers are emphasized to have digital skills and creative thinking. If teachers cannot keep up with the times, then the role of teachers will be replaced by robots or AI. The challenges faced by teachers today are more severe when compared to teachers in the past. To be a professional teacher, teachers are required to master general knowledge and technological knowledge. Examples of technological knowledge are computers, the internet, and digital videos (Asrial dkk., 2019).

The development of technology and information in education has challenges that must be overcome. Excessive use of technology can cause students to become addicted to technology, so teachers must remind students to use technology appropriately. In using AI, online privacy and security must also be considered. (Sugiarto & Farid, 2023) Millennials cannot be forced to do something, for example, teachers cannot force students not to bring cellphones to school.

The main challenge caused by AIED (Artificial Intelligence in Education) in the era of digital transformation is the reduction of human resources, or in other words, the reduction of teacher resources. Teachers are needed to educate students and guide students in every class, but the existence of AIED (Artificial Intelligence in Education) can reduce the work of a teacher, so teachers must continue to follow the digital transformation so that education around the world will continue to progress and develop. The interaction between teachers and students can also be reduced by AIED (Artificial Intelligence in Education), so students must be really wise in using AIED (Artificial Intelligence in Education) in learning so that they can achieve the expected learning goals.

Educators in this digital era must be more open to the latest thoughts. Teachers must approach students and not make coercive policies (Diplan, 2019). Another challenge for education in this era is that information can spread more quickly. Therefore, the approach of teachers and students in interacting will be more important. The last challenge for a teacher is to instill the four skills that students must have from an early age, namely skills in thinking, skills in communicating, skills in collaborating, and skills in finding and creating something.

Conclusion

The development of technology has influenced progress in the field of education, one of which is Artifical Intelligence in Education. Currently, AIED technology is a solution and alternative in the learning process. The younger generation is responsible for providing quality education as a pillar of the nation's struggle for success. A country needs to pay attention to education to build a country in future towards a developed country. The rapid development of technology today requires teachers or lecturers to be able to innovate and adapt to the use of various digital-based learning methods.

In the end, the goal of AIED is not to promote AI, but to support education. In essence, there is only one way to evaluate the impact of AI in Education: through learning outcomes. AIED for reducing teachers' workload is a lot more impactful if the reduced workload enables teachers to focus on students' learning, leading to better learning outcomes. Era Society 5.0 merupakan era digital yang identik dengan perkembangan informasi dan teknologi yang sangat pesat. Media pembelajaran online terbagi menjadi lima, yaitu : whatsapp group, google suite for education, ruang guru, zenius, dan zoom.

AIED Learning Media is divided into three, namely the Internet of Things (IoT) in education, Virtual Reality (VR) / Augumented Reality (AR) in Education, and the Use of Artificial Intelligence (AI) in Education. The world of Indonesian education gets a positive impact from the development of technology and information, but the negative impact is also inevitable from the world of education. AIED learning media in Improving Learning Efficiency in the Era of Society 5.0 provides more Interactive and Innovative teaching opportunities. Examples are the use of online learning platforms such as teacher rooms, digital technology, and interactive tools that can increase student creativity so that students can understand learning concepts well.

As long as it does not conflict with existing rules, the presence of technology is not a problem. Teachers can provide students with an understanding of technology

by utilizing technology in learning, such as E-Learning and Kahoot. If teachers cannot keep up with the times, then the role of teachers will be replaced by robots or AI. The challenges faced by teachers today are more severe when compared to teachers in the past. To be a professional teacher, teachers are required to master general knowledge and technological knowledge. Examples of technological knowledge are computers, the internet, and digital videos.

The development of technology and information in the world of education has challenges that must be overcome. Excessive use of technology can cause students to become addicted to technology, so teachers must remind students to use technology appropriately. In using AI, online privacy and security must also be considered. Another challenge of education in this era is that information can spread faster. Therefore, the way teachers and students interact will be more important. The last challenge for a teacher is to instill the four skills that students must have from an early age, namely skills in thinking, skills in communicating, skills in collaborating, and skills in finding and creating something.

The challenge caused by AIED (Artificial Intelligence In Education) is the reduction of teachers and labor resources and the values of social interaction will begin to decrease, so educators are required to be wiser in facing the era of digital transformation and participate in the development and improvement of the use of AIED (Artificial Intelligence In Education) in learning to achieve the goals of learning.

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