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The Effectiveness of Artificial Intelligence on Education: Learning During the Pandemic and in the Future

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Abstract---This paper reviewed ten international publication about the effectiveness of Artificial Intelligence in Education: During the Pandemic and Learning in the future. Since the pandemic has disrupted world education, distance learning has become an alternative by relying on machine learning. To understand the extent of the power of artificial intelligence in education both during the COVID-19 period and the future learning period, we try to understand it through the example of ten international scientific publications that speak out about artificial intelligence in education today and the future of learning. Besides reviewing ten papers, we also conducted an online search engine for related literature. We performed searches with keywords such as "artificially intelligent," "learning during a pandemic," and "future learning." Then, we analyzed a phenomenological approach to ensure our findings answered the study questions under a qualitative method design. By considering the evidence of research and literature, we can summarize our findings, among others, that the critical understanding of artificial intelligence in education, the use of AI in education, typical Learning in the pandemic era, and the role of AI in pandemic learning as long as residents and future Learning still depend on data patterns and automation based on learning tasks that are smarter than usual. It helps students be more focused on learning experiences and identify if they do not understand the topic. Most importantly, the teachers are helpful in the process of assessing student learning outcomes.

Keywords---artificial intelligence, education during the pandemic, future learning, international publications.

Introduction

The importance of artificial intelligence (AI) is currently being developed on a large scale and has received attention from educational circles. Today's AI will imitate and even take over the tasks that are usually done by humans. [Lu et al. \(2018\)](#), said that several tech companies had implemented AI, including Amazon, Facebook, Microsoft, and Google. However, few know that this AI has also entered the world of education and teaching. Along with the development of schools followed by technology. For example, the accounting field in college uses online textbooks through practical software. Even the founder of Microsoft, Bill Gates, is one of the supporters of AI in education. Gates even believes that AI will be able to improve human Learning in various ways. Based on these beliefs, we want to understand the effectiveness of artificial intelligence in education during pandemics and future Learning ([Güzer & Caner, 2014](#); [Engeström & Sannino, 2010](#)).

[Li et al. \(2020\)](#), examined that artificial intelligence has succeeded in distinguishing the COVID-19 from pneumonia that attacks the chest's community. Talking education means learning speaking smarter than the usual way before AI was invented. This AI system's learning program is a personalized learning system that enhances the student learning experience more profoundly and enjoyably. Understanding how AI in individual systems shows that it can improve student focus. The reason is that AI can teach students individually and identify areas needed to find effective ways of teaching students through artificial intelligence. For example, if a student's AI technology is interested in a hobby, the AI machine will be used as an analogy or example to understand the subject matter. In other words, this machine will identify if students do not understand. Furthermore, AI intelligence can determine what kinds of concepts are not to be understood by students. So later, AI can make adjustments to find new ways to help student learning that is the advantage of this AI engine for improving today's generation learning services.

AI is designed to expand the readiness of artificial intelligence programs in modern-generation education investments. With AI, this program is also held to help students apply artificial intelligence to develop technological literacy, in line with implementing the Industry 4.0 program in each country that is already eyeing advanced technology-based educational projects in the 21st century. In many countries that have started to glance at AI, schools have developed solutions to overcome the various challenges faced by the world of teaching, especially the world of education (Boden, 1998; Alava et al., 2017). The community must continue to learn and work through the world of education. Especially in the era of the COVID-19 pandemic using artificial intelligence, students will significantly learn and save themselves from the plague's spread.

When discussing advancing education in the Industrial Revolution Era 4.0, learning experts often mention that teaching in the revolutionary era is designed to describe various methods of integrating digital technology both physically and non-physically in the younger generation's Learning (Aslan, 2020; Putra et al., 2020). This teaching in the Industrial Revolution Era 4.0 opens a phenomenon that responds to changes with the industrial revolution by adjusting new agendas according to the current situation. This 4.0 revolution curriculum program will open a window of education through digital with the help of utilizing the internet of everything. On the other hand, education also gets more choices and teaching methods that are very popular in young countries.

However, some things are not free from challenges for teachers to implement. According to Lase (2019), educators must have several competencies in the Industrial Revolution Era 4.0. First, critical thinking and problem-solving skills. These skills are the ability to understand a problem, get as much information as possible to be elaborated on, and bring various perspectives to solve the problem. Teachers are expected to be able to concoct learning and export these competencies to students. Next are communication and collaboration skills. These skills are not free from information technology-based abilities to apply collaboration in the teaching process.

Furthermore, creative and innovative thinking skills are essential. With these skills, teachers hoped that teachers in the learning process could apply new ideas to spur students to think creatively and innovatively, especially in doing tasks using technology and information. The last one is technology and information literacy. Teachers are expected to obtain many references in using technology and knowledge to support the teaching and learning process for strengthening the technological literacy skills of the nation's generation living in the modern age.

Artificial Intelligence in learning in the pandemic Era of COVID-19 is supported by revolution 4.0. Even learning in the COVID-19 era is full of panic due to widespread coronavirus that attacks the respiratory system; Indonesia is currently facing days against COVID-19, and the government has even issued a new policy that essentially states an extension of the working period from home and an adjustment of the work system, which helps with technological sophistication. It does not mean that public services such as education services are eliminated. Learning services in the COVID-19 era can be done online with technology or artificial intelligence. Studying at home through specific applications, online lectures, online guidance, and seminars are examples of educational services that accelerate education implementation in the Revolution 4.0 era. How can not both teachers and students be encouraged to understand at least the use of digital technology? On the other hand, students are also encouraged to explore technology and information and channel their creativity through innovations in school assignments.

On the other hand, education in the COVID-19 era is also an opportunity to collaborate with fellow citizens learning online. Learning and adjustments are needed in implementing Revolution-era 4.0 education. However, it cannot be denied that the COVID-19 outbreak is one of the driving forces for applying this learning system using artificial intelligence technology. On the other hand, apart from being required to understand technology and information and implement it. Even so, of course, there are problems that arise, namely related to adequate infrastructure. Besides, learning in the COVID-19 era must also ensure that the internet is available in the education area. Behind this, students are required to adapt and take advantage of the 4.0 Revolution-era education by implementing the internet. Examples of collaboration, for example, have been carried out by students in various places.

With this artificial intelligence, students will efficiently complete individual assignments by making posters/videos about supporting learning content. For example, individual projects develop the ability to create specific applications to help online public service systems without requiring service users to go to service locations. All of these are the conveniences possessed by artistic intelligence. It may be possible, for example, for a single online submission being implemented. It is not impossible for students can create online applications that facilitate the process of providing public services. During the outbreak of COVID-19, education in the Industrial Revolution 4.0 can be implemented with certain adjustments without overriding things that need more technical attention, for example, the impact and weaknesses. On the other hand, the demands of students' roles are expected to bring positive changes in the middle of a situation through the teacher's understanding. It is time for us to collaborate in realizing opportunities to work and learn amid the COVID-19 pandemic.

Much literature proves the effectiveness of artificial intelligence on education projects, especially learning during the pandemic and in the future. The current application of artificial intelligence in Indonesia is not yet, as stated in the reading context. The role and superiority of artificial intelligence in education, supported by technological sophistication, is the progress of learning civilization in the modern age. Currently, the learning period of the COVID-19 period has indeed proven to be very disturbing. With the advent of technology, the prospects for students' future through artificial intelligence projects for education are more real. Learning that uses artificial intelligence to project technological applications with artificial intelligence in the future - and revolutionary technology 4.0 has been tested in educational practice. To see the effectiveness of this artificial intelligence in future education, we have highlighted ten international publications with various contemporary issues and lessons tested in every literature covered in this study.

Method

The aim of this model is that we wanted to understand the effectiveness of artificial intelligence in learning education during the pandemic and in the future. To make it easier to understand artificial intelligence's practical and application, we have conducted a series of data collection from ten international published papers that examine the above issues. After the data collected, we analyzed qualitative application through the coding system, in-depth interpretation, and concluding. Analysis to be a valid and reliable finding, the conclusions we draw must answer the research questions. The way to search is we use keyword searching, for example, "effectiveness of artificial intelligence," "study of the pandemic period," "study of the future," the international publication, "and "qualitative study. "

Findings

As said earlier, this study's primary purpose was to understand the effectiveness of artificial intelligence (AI) in education. In particular, this study will see how typical Learning during pandemic and future supported AI solution from ten international publications reviewed and presented here: Scientific studies in artificial intelligence education have developed rapidly over the past few decades. As educators and researchers look back and reach the younger students' future, they naturally want to understand the advantages of artificial intelligence in future education? Also, what opportunities has this artificial intelligence machine provided for the learning future of generations next?

To understand it, we have analyzed ten papers published in international journals over the past ten years. We learn a typical scenario that advances the field of technology-assisted education, especially human-made intelligence. With the hope that the results of the ten papers will be discussed and suggested by a series of instructional studies conducted to help to learn in the pandemic period and the future; for example, the accelerated learning process, focusing on learning solutions during the pandemic, how students can collaborate in Learning while saving a life, and the adoption of technology to achieve the learning outcomes. In the revolutionary process, 4.0 educators and researchers work together investing in educational technology for students' future practice, relevant to the era, culture, goals, and the millennial generation learning community.

Artificial intelligence understanding

Valle-Cruz & Sandoval-Almazan (2018), conceptualized the understanding of artificial intelligence applied nationally through meta-analysis to identify understanding, systems, and applications for education nationally. They found that AI is very useful in decision making, efficiency, ecosystem changes, biomedicine, disaster prevention and response, teaching, and public services, among the government's applications nationally. To go deeper into the understanding of AI, a study from Samek et al. (2017), has summarized the latest developments in artificial intelligence and make a plea for deeper interpretability of that artificial intelligence. Their study also presented a new approach to the prediction of meaningful ideas and ways of Learning. This way of understanding the predictive sensitivity of AI concerning input development through a method to whole describes results in terms of learning input variables through several ways evaluated on three classification models.

Meanwhile, Frank et al. (2019), finding also has confirmed that the technological advances in AI and technological advances in automation have the opportunity to rob people of human labor opportunities significantly. Because AI, with its automation, can increase productivity manifold compared to workers. The advancement of AI

can replace humans. It is likely to change all human jobs even though it is still to some degree. Advances in automation occurred when the economy was at a disadvantage during the global disruption of COVID-19. It raises concerns about human unemployment due to the sophistication of AI, especially human-made results.

How useful artificial intelligence in education

Understanding effective AI, [Du Boulay \(2016\)](#) gave a deeper understanding of how artificial intelligence brings significant partner in Learning. This AI program appears to marginalize social roles and cognitive excellence. AI for streamlining various learning models and creating systems to encourage students to acquire new skills. Understanding new fields that provide new insights into meta-analyses that creates energetic ways of Learning in which educators can transfer much of ordinary human work to artificial intelligence systems in education for adequate reasons towards learning productivity.

[Beck & Mostow \(2008\)](#), examined the effectiveness of several practical strategies for manipulating, organizing, and exploring data from intelligent Artificial Intelligence. This study tries to mine the information recorded by the AI machine system to understand data and knowledge that is useful for data users (students, researchers, writers, teachers, and other professionals. According to AI, it is beneficial for those who need information that can deliver accelerated education in an accelerated manner. More efficient, productive, and always responsive to the needs of each individual. Through these studies, they factored this discovery process into methods for modifying teachers, mapping heterogeneous AI workings into a collection of information, and investigating. Their analysis identified marking roadmaps for existing areas of information repeller data storage. It can respond to user data and frameworks to keep past, present, and future work in this field of AI studies. They explain this framework model through experiments that test interventions by reading machines auto to help students solve problems and understand problems.

Typical learning during pandemic COVID-19

[Barton \(2020\)](#), examined the impact of artificial intelligence in education and teaching alternatives remotely during the pandemic. The result is that instructors in ecology and evolution often conduct field education to teach new lessons. According to Barton, distance learning, which was taught traditionally before the pandemic, has presented unique challenges for students, instructors, and schools and colleges. A survey of 117 faculties during the spring of 2020 resulted in a substantial reduction in learning outcomes typically taught in the field and frequently substituted less active and more instructor-centered distance activities for field activities. The survey generally revealed negative instructor views on many teaching substitutions in the classroom. Still, this study shows some approaches that AI considered to be more effective instructors, even though there are potential challenges on a fair basis. Barton suggests several small substitution models for traditional field teaching on identifying overall teaching with the impact of COVID-19 on-field instruction and remote teaching from the point of view of teachers and instructors.

The role of artificial intelligence in dealing with the learning crisis during the pandemic has become a global issue. Artificial intelligence, such as machine learning, has become part of the field of artificial intelligence, where its role is quite large in helping human Learning in heavy tasks in automation. One of the ways that are continuously being pursued in fighting against this pandemic situation is the use of technology to meet the needs of the school community. Likewise, when the learning crisis impacted by COVID-19 has led to many setbacks in human Learning, various studies have responded with various studies that were tried with innovations in overcoming current learning disabilities ([Chao et al., 2020](#); [Lee et al., 2020](#); [Hilburg et al., 2020](#)). Many articles have been published about programs being implemented so that learners do not get distracted by the pandemic. For example, how to analyze information and predict how a pandemic will disrupt human activities, especially learning.

For example, [Allam et al. \(2020\)](#), succeeded in creating an application called BlueDot which is an AI-based program created to detect and discover the concept of how viruses spread disease and provide services to provide early warnings of the dangers and threats of an outbreak a few days before the control center by the world health organization issues a public warning globally. They founded this application website because previous pandemic cases inspired them. The point of their study is how this AI can fight to detect and prevent the virus from starting from the start. This application is super useful for learning during COVID-19.

Artificial intelligence and future learning

[Luckin \(2018\)](#), research, which studied machine learning and human-made intelligence has been able to answer how Learning is in the future for the millennial century. According to Luckin, intelligence is a gift from what makes

human beings. But the methods humans use in identifying, discussing it, and evaluating human artificial intelligence also raise another problem. This study invests in artificial intelligence with qualities that humans do not have. Thus, artificial intelligence risks losing the educational capacity to pass on the emotional, cooperative, motoric, and self-effective variables of human-made intelligence that define humans. To make IA useful, Luckin tries to apply AI in future education utilizing a framework that is not difficult for human artificial intelligence to describe. He addresses the comparative limitations of AI when analyzed with the same framework, then recommends a concise method of how future educators can utilize what AI has in mind to sustain and expand the learning capabilities of future generations.

The role of artificial intelligence during the COVID-19

Nguyen (2020), found that artificial intelligence in the battle against coronavirus (COVID-19) through his survey and future research directions. Besides, he also said that Yitu Tech's Corona Virus Pneumonia Chest CT Smart Evaluation System, other Chinese Internet giants such as Alibaba, Baidu, Tencent, SenseTime, and other AI companies have also launched their new diagnostic applications. They are thereby accelerating the control of the pandemic spreading in China in less than two months. Before the outbreak, artificial intelligence had become the hottest topic in clinical applications in China. US data shows that 84% of radiology clinics in the United States have also developed or are preparing to use artificial intelligence algorithms to examine medical images in 2018. Vinod Khosla, a well-known technology investor in Silicon Valley, predicts that AI algorithms will replace 80% of Human doctors. It is a severe project, and it hopes that it will bring a better future for human working and Learning.

According to Lalmuanawma et al. (2020), Applications of machine learning and artificial intelligence for a pandemic are an essential job as AI is very good at making diagnoses and is likely to bring about disruptive changes in the entire medical industry in the world. However, AI still has two severe problems to solve so far. The problem of the black box effect and the problem of medical responsibility. In the medical field, artificial intelligence's main application is to analyze a patient's medical pictures and check whether the patient is sick or not. Now more science may ask again, Couldn't a human doctor do that as Ai does? If the human cannot, it means people need AI. Therefore, the medical pictures via AI have very high algorithm accuracy. In some of the most challenging cases, AI also can make even more accurate assessments than human doctors do.

Discussion

Artificial intelligence initiation

Artificial intelligence is an essential field in computerization in the present and future era of education. This intelligence is designed to bring about intelligent machine systems beyond the capabilities of human work. This AI field has developed rapidly in the last 20 years in line with industrial technology 4.0 revolution tools' needs. Because this project can answer various problems of modern human needs, the results of recent studies that need to be mastered by academics, students, and technology and education researchers complete with implementations that benefit human race development are how artificial intelligence is beneficial in today's learning pandemic and tomorrow the future of education. Astini (2020), challenges and opportunities for applying technology in distance learning during the pandemic and future generations is engaging. Look at history; artificial intelligence comes from Latin, which means a machine with many skills and understanding. So it can be understood that the basis of artificial intelligence is the ability to understand and take action while solving human problems. The term artificial intelligence (AI) originates from the presence of the computer in the 19th position. However, the history of its development can be traced back to ancient times. However, today, scientists and business people's attention remains focused on the ability of computers to do something that humans can do specifically for the business and education of future generations. In this case, computers can imitate human intelligence and the ability to behave beyond humans. Di Vaio et al. (2020), examined the benefits of artificial intelligence in the agricultural, industrial system. His studies have raised the attention of many experts on rethinking sustainable business models in the COVID-19 scenario to achieve sustainable economic and educational development.

Meanwhile, Ratten (2020) suggested that COVID-19 and the entrepreneurship education community should be a solution with the development of AI. He also reminded that literacy and numeracy models must impact Learning. He also shows how Learning becomes active like machines, and AI can learn and act differently at times than given input. The most significant contribution to the AI field began in the 1950s, which tried to answer, Can computers

think? By creating machine learning, expert computing machinery, and intelligence, which discusses a machine's requirements to be considered intelligent. Experts assume that if a machine manages to behave like a human, we can consider it intelligent. To be able to initiate education for the future generation of information.

Understanding AI for human purpose

The understanding of AI that can act like humans has been proven by the Turing Test approach, where [Turing \(1950\)](#), proved that AI is designed to answer the satisfying meaning of human tasks from Artificial Intelligence. A computer is said to pass the Turing Test if a human tester can ask several questions and then answer them by contrasting it with someone or a computer's response. Computers must have the minimum ability to pass tests, for example, communication skills, be able to represent skills and knowledge to store what is known or respond, pass reasoning independently to use the stored information to answer questions and at the same time draw conclusions. Lastly, artificial machine learning can adapt to circumstances, detecting and extrapolating new patterns in specific fields.

AI and future generation learning

Regarding the effectiveness of future Learning, [Arel et al. \(2010\)](#), managed to convince many experts that deep artificial machine learning without limits in many artificial intelligence studies. His studies provide a general understanding of future learning styles with a significant focus on recent studies initiated. In this case, it is essential to make sure that each learning framework has strengths and weaknesses. It depends on the application, and the content applied. Hence, their findings provide a glimpse into the current status of AI from the deep-rocky field of future Learning and multiple perspectives on how that field of AI can be useful and innovative in future Learning with a significant commitment to future work.

Conclusion

The findings on how the effectiveness of artificial intelligence in future education has summarized the findings? It is including the understanding of artificial intelligence in the world of teaching and education. Then the use and effectiveness of AI in solving human problems, especially learning, unique learning solutions in the era of COVID - 19 pandemics, and the critical role of AI in pandemic era education as long as future citizens and machine-based teaching still depend on artificial intelligence machines both in the pandemic state and in the future learning era as well as data patterns and automation based on more practical knowledge tasks. It helps many people to focus more on trial and error experiences if AI is not adequately understood in terms of understanding and role. The most important thing is that teachers are much helped by evaluating the learning outcomes of students and academics in the modern era.

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