

Implementation of Digital Transformation of Education in Indonesia

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ABSTRACT

Digital transformation of education is a process of using digital technology that aims to increase effectiveness, efficiency, and innovation in education. Changes in learning models due to the Covid-19 pandemic and also the shift of Industry 4.0 to Society 5.0 provide learning models that tend to vary with the concentration of learning and teaching activities based on the use of digital technology and problem solving in real daily life. This can include providing technology juxtaposed with lessons that utilize online learning, classroom management applications or platforms, and using technology to assess student learning outcomes. Digital transformation can also be interpreted as the use of technology to improve teacher and student collaboration, provide learning support facilities that adapt to the needs of each student, and facilitate access to learning materials. Improving the quality of education requires various elements in education to be able to implement and also overcome the obstacles that can occur in the implementation of digital transformation in education. The purpose of this study is to identify and deepen studies related to the digital transformation of education in Indonesia. This research uses meta-analysis methods and literature review. The results of this study present digital transformation in the aspect of education that occurs in Indonesia.

Keywords: Transformation, Digital, Education, Meta, Analytics

1. INTRODUCTION

Digital transformation aims to drive and initiate significant change through the collaboration of information, computing, communication and connectivity that encourages the use of digital technologies. Digitalization is a key driver of innovation in education through methods, pedagogy, and policy. Technology becomes the basis of educational innovation that produces new technologies that accelerate changes in the educational process of society. Digital transformation in education supports more inclusive education, expands the availability of information and expertise, diversifies the educational process, and improves the learning outcomes offered to students [1]. Digital transformation is a process that aims to drive and trigger significant change through the collaboration of information, computing, communication, and connectivity that encourages the use of digital technologies. Digitalization is a key driver of innovation in education through methods, pedagogy, and policy. Technology becomes the basis of educational innovation that produces new technologies that accelerate changes in the educational process of society. Digital transformation in education supports more inclusive education, expands the availability of information and expertise, diversifies the educational process, and improves the learning outcomes offered to students..

Community development 5.0 is a form of social order that aims to bring comfort and sustainable change and is based on human- and technology-oriented concepts. The development of Society 5.0 offers new values where social, age, gender, and language gaps are eliminated and adapted to the various needs of many people. These changes occur in various areas of life, especially in the education aspect [2] Digital transformation moves gradually in education has changed old learning practices and habits into new, more efficient and effective ways, marking the beginning of digital transformation. Learning activities in education become easier and more flexible with the help of digital technology as an adaptive step to improve the quality of education. The main focus is to adapt the use of digital technology devices in the learning process [3].

Digital technology is used in many subjects such as arts, crafts and physical education. The pandemic has brought valuable experience with various learning methods that can be used in the future, such as the use of digital platforms in administering exams. Digital technology increasingly encourages students to more easily find learning resources from various existing sources. Successful online learning has a positive impact on students and enables distance learning that facilitates learning. However, teachers have also complained that distance learning is difficult to complete because it takes more time to plan lessons than regular [4]

The global pandemic Covid-19 is expected to bring many technological changes and rethink the educational process in the next 5 to 10 years. The principle of new normal is to adjust life and lifestyle to post-Covid-19 changes, by adapting so that life can run as before [5]. Three things led to changes in education. The first is the rapid adoption of digital technologies, the development of the implementation of new education systems in accordance with innovation and the change of educational perspectives for the new generation, which grows with all developments. Students' educational expectations arise when they come into contact with new technologies such as Virtual Reality or Artificial Reality. Artificial Intelligence will refer to the purpose of education in the future. The challenge we must face is a willingness to be open to change and develop an education system that offers innovation. Digital technologies offer better opportunities for collaboration and integration of educational programs around the world [6]. Rapid changes in the digital transformation of education present challenges and opportunities as technological developments create a gap between students who have access to competent technology and those who do not have access to competent technology. Therefore, it is expected that there will be changes in people's behavior and also the use of existing technology.

2. METHOD

The study used meta-analysis method. The meta-analysis method is a research method that uses identification, evaluation and interpretation of relevant previous studies. A conclusion was then drawn from this information, which became the subject of wider discussion. The source of the data was obtained from previous literature focusing on the digital transformation of education in Indonesia. The material is analyzed by identifying the focus of research digital transformation of education in Indonesia, then search for data that is in accordance with the research focus. The material is then assembled into a unit, the subjects are analyzed and conclusions are made for a unified study in accordance with the research topic. Then the conclusions of such data are presented. A literature review is a research technique that begins with gathering literature, evaluating it, and summarizing information gathered from various written sources to obtain new information. The purpose of literature research is to deepen and deepen understanding and strengthen knowledge research by combining past and current literature.

3. RESULT AND DISCUSSION

Education is the greatest investment tool to efficiently and effectively build qualified and educated human resources. Education must be able to adapt and survive to changes and also the times, especially in the flow of digital transformation. Education as the core of the nation's life must adapt to global dynamics and meet the demands of society. The state must be able to prepare education as well as possible so that the next generation can survive before the changing times. Management of digital technology is needed in education, which facilitates learning and can improve the quality of education [7]. Digital technology that exists today has become a necessity in society so that the mastery of digital technology in education needs to be expanded and also developments in the learning process that can trigger educational innovation by combining technology in it.

In addition, science and technology is an important aspect of development, so that the country is not left behind in the current development of information and communication technology. This technology is used to manage, collect, organize and store information to produce relevant and accurate information that can be used as strategic information for decision making. Current developments demand appropriate adjustments, especially in the field of education, so that the teaching and learning process is adjusted to the needs of students and educational goals are adjusted to the use of technology [1]. It offers education new opportunities to develop learning models that adapt to the demands of changing times, introducing a learning process that no longer relies on classical or traditional techniques with stationery such as books, pens or whiteboards, but switches to digital technology. The data transfer process can be more flexible and no longer restricted by access restrictions. Students and teachers can use existing digital technologies to more easily access the information and materials they need and to explore new issues more comprehensively and in depth.

Current digital technology is undeniable and cannot be separated from the role of technology in everyday life. The sophistication of digital technology has an impact on the ease of access to information that is so great with the easier use of various kinds of technological innovations that exist [5]. The driver of digital transformation in education is the Covid-19 pandemic, where teachers have had to use technology to implement distance learning [8]. The massive and ongoing pandemic has led to the development of different digital technologies in various areas of life. The education sector is using this as a breath of fresh air to improve the quality of education and embark on a digital transformation

that offers many opportunities. The ongoing pandemic and changes in digital technology have brought the world to a new way of life, which is Society 5.0.

The development of Society 5.0 is a form of order in society that is expected to provide comfort and also sustainable change which is centered on a human- and technology-based concept. The development of Society 5.0 provides new value where there is a elimination of social gaps, age, gender, language, and adapted to the various needs of many people. This change occurs in various areas of life, especially in aspect of education [2]. Education in Society 5.0 began to adopt technology in education more deeply. This gives rise to various processes and also entirely new learning models that are applied in education in Indonesia.

The pandemic has brought valuable experiences where there are different learning styles that can be used in the future, such as the use of digital platforms in administering exams. Digital technology increasingly encourages students to more easily find learning resources from various existing sources. Successful online learning has a positive impact on students and enables distance learning that facilitates learning. However, teachers have also complained that distance learning is difficult to complete because it takes more time to plan lessons than regular learning [4]. This must have happened in the early stages of digital technology change, but it is undeniable, adjustments and solutions are offered to overcome existing obstacles. Generation Alpha, which is currently a challenge for the world of education, must always present an important and interesting learning process that combines daily teaching with digital technology. Teachers must be able to encourage their students to make meaningful use of digital technology in the classroom so that the educational process does not change goals..

Digital transformation of education, therefore, is a process of progress that needs to be familiarized with using digital technology in the learning process. The existing transformation makes it easier to provide knowledge which can be done anywhere and anytime as well as the implementation of webinars that can be done through the zoom application, gmeet, and so on. [3]. The gradual digital transformation in education is changing old practices and learning habits into new, more efficient and effective ways, marking the beginning of digital transformation. Learning activities in education become easier and more flexible with the help of digital technology as an adaptive step to improve the quality of education. The main focus is to adapt the use of digital technology devices in the learning process.

Digital transformation of education, which aims to increase the effectiveness, efficiency and innovation of education. This may include the delivery of technology using e-learning, classroom management apps or platforms, and the use of technology to assess student learning outcomes. Digital transformation can also be interpreted as the use of technology to improve collaboration between teachers and students, provide learning support services that adapt to the needs of individual students, and facilitate access to subjects [1]. So that learning is not only technology-based, but uses digital technology as a more innovative learning tool. The development of models in the classroom and the interaction between students and teachers are expected to increase with the ease of use of technology that can shorten learning time and improve the quality of student understanding of subjects. Students and teachers are given the freedom to learn in an era of digital technology transformation that leverages online learning and web applications as well as platforms that drive paperless adoption. These things make it easier to share information and also collect assignments in a more structured and organized way, minimizing errors and also information loss that often occurs when learning still continues without technology.

The transformation of education requires support rather than appropriate digital technology. Digital transformation can also be interpreted as the process of utilizing digital technology such as mobile computing, cloud, and chatbots. This digital transformation triggers a significant change through a combination of technology, information, and computing aspects [9]. Digital transformation has a positive impact on changes in student behavior when browsing, studying, documenting, and rereading the information obtained Digital transformation began to extend not only to the use of technology such as computers, laptops, mobile phones, etc., but also to optimal data management and the use of simpler backup functions. The use of AI-based chatbots or chat rooms makes it easy for students to explore new information instantly. With the help of artificial intelligence, various questions and information are presented that know how to answer everything and help solve problems for students. This digital technology also makes it easier for students to manage the information they receive. With information from various sources and languages easily and freely available, students can easily find out what information they want to know. Students know how to compare the information received with other online information and draw conclusions. The information obtained can be reused anytime and anywhere as long as the electronic device is connected to the network. Students no longer need to keep dozens of pages to retrieve and store information because it can be used many times and key points can be stored on personal electronic devices. Digital transformation offers teachers and students a lot of flexibility in the learning process using various existing digital technologies.

Digital transformation is a process that aims to improve and trigger significant change through collaboration in terms of information, computing technology, communication, and connectivity that encourages the use of digital technology.

Digitalization is a major driver of innovation in education through methods, pedagogy, and policy. Technology as the basis of educational innovation that gives birth to new technologies that accelerate changes in the educational process in society. Digital transformation in education supports more inclusive education, expands access to information and knowledge, provides diversity in the educational process, and improves outcomes rather than learning that has been provided to students [1]. Thus, it is hoped that digital transformation in education can provide flexibility for teachers and students in designing learning processes that do not have to require students to always come to class, listen to the material that the teacher delivers, record material, and do theoretical problems. The development of digital technology used during the teaching and learning process must also be accompanied by changes in learning patterns that no longer prioritize questions what, mention, explain, how, and so on, but tend to use reasoning on real problems that exist in society.

Education in the Era of Society 5.0 uses problem-based learning or project-based learning where this learning is a process that combines existing digital technology with various real problems in everyday life encountered by students. This project-based learning provides motivation to students to directly solve problems with the concepts and principles of knowledge as an experience, the teacher acts as a facilitator in learning with students as the main focus in it [10]. Problem-based learning or project-based learning as one of the educational collaborations that combines student reasoning and digital technology which is expected to answer the latest problems that exist in society more deeply and flexibly. Project-based learning also emphasizes students to be able to adapt to the times and be able to solve problems in society using technology, so in this case education aims to prepare students to be better prepared to plunge into society armed with critical problem analysis and the use of digital technology.

There is a way to develop an educational model through digital technology transformation that can be applied, namely by using digital technology such as computers, tablets, and smartphones to access learning resources that adjust to assignments and as a communication tool between teachers and students. The use of digital media such as videos, animations, interactive online platforms, and games can help students understand lessons and improve student competence [1]. In the learning process, learning environment development strategies play an important role in adjusting the learning model to the development of teaching materials, online media, and others, which encourage the transfer of learning from teacher to student. Providing a more interactive learning model can increase morale and encourage students to use technological advances to expand their knowledge with new knowledge. In addition, models adapted to the digitization of education should be used when presenting learning materials, such as video materials on digital platforms such as YouTube, Instagram, Facebook, Twitter, etc. In addition, teachers can also use the game as a quiz and reinforcement. understanding of the material provided. Games that can be used include brain teasers such as puzzles, English mystery games to improve English skills, how to use kahoot etc. Therefore, in this case, teachers have the opportunity to use a learning environment that not only focuses on writing or textbooks, but also extracts audio-visual materials that are more suitable for use in today's era of technological change. In addition, variations in learning models also provide learning models that are more suitable for students who use different learning models. Like voiced students, learning models can focus more on learning acquisition when learning material is delivered to them via voice. So are students with visual learning tendencies who can learn with video or animation. Thus, learning technology can adjust to student learning needs.

Changes in learning models due to the pandemic and also the shift of Industry 4.0 to Society 5.0 provide learning models that tend to vary. One of the developments that occur in the learning process is the implementation of a hybrid learning learning system that makes it easy for students to choose learning methods that focus more on learning and interaction that requires a lot of motivation and creativity. Hybrid learning does require a lot of implementation costs for the needs of digital technology-based facilities and infrastructure such as devices, laptops, internet, and other supporting equipment [11]. Hybrid learning can be carried out with face-to-face learning, namely outside the network or the implementation of learning in the network. The pandemic that forced students to carry out the learning process remotely provided flexibility in the new normal period with the holding of hybrid learning-based learning. This provides ease of learning process that no longer has space and time limitations. Learning can be done anywhere and anytime in real time using digital applications through electronic devices.

In addition, there is also a blended learning model that combines offline and online learning processes. Blended learning uses digital technologies in the learning process both face-to-face and offline, so that in this case students can use technology more proficiently in the learning process. The blended learning models are station rotation, flex blended learning, remote blended, project based, inside-out blended, flipped classroom, and supplemental blended learning. Remote blended learning is a learning model that combines offline and online or just one of them. Flex blended learning is carried out with learning carried out online and continued offline learning activities. Flipped classroom blended learning is a learning model that carries out the online learning process and strengthens material when offline. While project-based is a learning process that combines offline and online with project-based task output. There is also an inside-out learning model, which is offline-based learning with online as an option if needed. The blended supplemental

learning model is implemented by conducting online learning to complement learning carried out offline and vice versa [11]. The implementation of a combination of online and offline learning by utilizing existing technology and digital technology devices needs attention from various parties in education so that the learning process can run well and effectively and improve the quality of education. Digital transformation must be accompanied by the role of government, schools, educational human resources, and also the community.

Governments in the digital transformation of education are responsible for developing and enforcing educational policies and regulations governing the use of digital technologies and ensuring that students have adequate opportunities to use such digital technologies. The government is responsible for technology management and availability of resources that improve the quality of education through digital transformation. In addition, the role of the government is to provide educational resources and train them to use technology in learning and developing curriculum [1]. Thus, the government as a central role holder must be able to ensure the implementation of digital transformation runs well and can support the need for affordable access to technology for all elements of education, namely schools, teachers, and students. The government not only provides assistance for electronic devices, but also must be able to provide network access and also electricity that is available to remote areas. The lack of school access to digital technology must be addressed by the government wisely and fairly for the advancement of the quality of education in Indonesia. Not only in providing electronic devices, but also assistance in the use of existing technology and ensuring educational human resources, which in this case are teachers and students, can use electronic devices and digital technology in it and have sufficient competence. The government must provide massive mentoring and training to students and teachers who do not understand how to use technology well. It is hoped that the assistance that has been given to educational institutions is not given for free, but is really used as a support for more innovative learning and can reach all elements of education.

Schools play an important role in supporting the development of digital transformation in education. Schools as providers of the necessary technology infrastructure are tailored to learning needs and willingness to use digital technology in learning. Schools must have access to technology such as computers, laptops, tablets and adequate internet connections. Schools also train teachers to use technology effectively in the classroom and can help students who have difficulty using existing technology. Schools should also be able to encourage teachers to use technology in the learning process by providing learning materials online, using applications and assessing student learning outcomes digitally. Schools should be able to offer the same services and programs to all students, provide access to rich technology and digital media, and ensure that students with special needs and support can keep up with the same learning process [1]. Schools are required to be pro-active in familiarizing school elements to use digital technology and provide assistance, direction, and motivation in its implementation. In addition, schools must also provide special handling related to students who cannot use digital technology both due to internal and external factors by providing periodic training. Therefore, the insertion of digital technology in the learning process carried out by teachers needs to be done so that students and teachers are accustomed and easy to face digital transformation.

Educational institutions play a role not only in paying attention to the job prospects of students, but remembering and understanding the new normal order of the learning process before students enter higher education. The world is changing very quickly and must be accompanied by following the urgency and changes in the digitization process that has been commonly used in the world of education during the learning and teaching process. Consideration is needed for the empowerment of teachers and schools that play a leading role in the digital transformation of education. In the educational process, a prospective teacher must be given the ability and competence to master, plan, and lead the process of producing strategies in responding to changes in digital technology [4]. In this case, schools must be able to encourage teachers and students to use digital technology in every learning process to prepare students to be ready to take roles in society. The school's role is to minimize as little as possible the possibility of students being left behind with the real situation that exists in society. So schools must really implement digital technology in education as an effort to improve education and also human resources. Students need to be given assistance related to what competencies are needed in the community and also when entering higher education, namely universities. Students need to be equipped with various basic knowledge about the learning process in universities which generally have used digital devices and also digitally integrated education systems. So it is hoped that students will not experience lagging behind when entering the learning phase in higher education which demands rationality and also digital technology-based problem solving.

Rapid changes in digital transformation in education provide challenges and opportunities where technological developments result in gaps between students who have access and also the availability of qualified technology and those who do not. Therefore, it is expected that there will be a change in behavior in society and also the use of existing technology. Culture and also student behavior are very important in education, especially in how students acquire knowledge and information. This leads to challenges and also opportunities for educational institutions to innovate effective teaching methods by utilizing existing digital technology [6]. Technological changes in education must still be interpreted wisely by prioritizing the goals of education and also implementing the values and noble character of the nation. The values and character possessed by the nation must not fade with the development of technology in education.

With the ease of technology, it is not uncommon for fraud to occur and also changes in the way of thinking. The government and schools must always control the use of digital technology wisely and provide guidelines on strengthening the character of each student. It is hoped that digital transformation can be a positive change in aspects of science and technology which is also balanced with the practice of the nation's noble values.

In addition, there are challenges to digital transformation faced today are resistance to change, learning motivation, technological skills possessed by students, evaluating the effectiveness of the use of digital technology, and also the ability to adapt to technology. However, transformation also opens up opportunities for education, such as the absence of physical boundaries, cost-effectiveness, involvement in high learning, and products in learning that have many innovations and are also of higher quality [12]. Not all elements of education are ready to accept educational changes because the facilities and competencies possessed are still relatively low and cannot adapt to the development of existing digital technology. Changes in learning motivation in students are also one of the obstacles that must be corrected and given special attention. This can be caused by the ease of access to information and knowledge digitally which makes students reluctant to independently explore new knowledge and think critically about solving real problems that exist in society, but by relying on digital platforms that can cause laziness in students. In addition, easy digital access that cannot be interpreted positively by students can cause misappropriation such as cheating, plagiarism, playing social media, and reluctant to learn and behave honestly. Schools and teachers with the help of parents must provide good examples and guidance regularly so that students do not abuse the ease of digital technology.

Digital transformation in the world of education certainly cannot be separated from existing challenges and obstacles such as lack of facilities, geographical location, economic problems, and differences in the mindset of students who live in urban and rural areas or remote areas [3]. Therefore, technology in the world of education needs to get limitations from aspects of character education strategies obtained from knowledge about morals, feelings, and behavior. Knowing the morals or values in the use of educational technology needs to be done so that students can use existing progress wisely [5]. Lack of facilities, geographical difficulties, economic inequality that makes access to technology impossible to enjoy are structural problems that must be given more attention because they are the root of late students obtaining digital services. The government must be able to provide subsidies for equitable facilities and also the development of services to areas that have difficult mobility access. This is what causes a difference in mindset between students who have easy access and also students who have never used digital technology at all.

Other obstacles experienced in digital transformation are devices, student skills, and also low affordability. The digital divide felt during the pandemic is a reality that exists in the world of education when the use of digital technology is starting to be widely used, so it is necessary to increase the competence of students and teachers on an ongoing basis in order to have digital knowledge and skills that are in accordance with existing demands [13]. Although the current generation is very familiar with technology, students may not be able to operate digital devices in education effectively and efficiently. Student skills need to be developed first in line with the use of digital technology so that students do not experience difficulties when digital technology is used in the learning and teaching process. The reach of access to digital technology must also be able to access educational elements at every level, type, and also educational path.

Teachers thought that technology is not a problem or a barrier for students. Schools can facilitate electronic equipment for students who do not have it at home. However, the abilities possessed by students are things that become obstacles at the beginning. In this case, it takes a lot of time to adjust learners to get used to using electronic devices in the learning process [4]. Thus, competence is the main thing that must be mastered before digital transformation in education is implemented. The development of student competencies needs to be developed so that the learning process does not experience obstacles and runs smoothly. The development of this competency is then the responsibility of human resources in schools.

Human resource development is important in the process of national development that dynamically and continuously has good quality and has competitive advantages. Quality human resources in today's era are people who are able to master and expertly use digital technology devices. The transformation that is taking place in society is the result of the development of appropriate digital technology. This can lead to serious challenges in the development of digital transformation if not managed properly [14]. Therefore, teachers as the main resource must have qualified skills and competencies in order to provide the best teaching, not only in the use and implementation of digital technology in the teaching and learning process, but also provide assistance and understanding of the use of digital technology. Teachers as central role holders and also the most important human resources who are directly in contact with students must be able to provide good examples in facing the development of learning technology. On the contrary, students must be able to provide boundaries independently regarding the use of digital technology while still prioritizing the goal of achieving learning as well as noble values and good character. Students as determinants in the success of digital transformation must be able to work together in achieving educational goals.

4. CONCLUSION

Transformasi digital di dalam pendidikan sebagai dampak dari adanya pandemic Covid-19 dan juga pergeseran The order of society towards Society 5.0 provides many changes in the implementation of education. Digital transformation that provides breadth and freedom in choosing learning methods and the use of digital technology facilitates the learning and teaching process more effectively and efficiently. Digital transformation in education guarantees the advancement of better learning quality with easy access to information and knowledge. Digital transformation allows learning to be carried out flexibly with the ease of learning implementation that is not limited to space and time. Digital transformation in education requires the participation of all elements of education starting from the government, educational institutions, teachers, and students. The development of the use of digital technology in education will not be created if human resources in educational institutions do not have the competence and ability to use technology. Therefore, all elements of education must be able to make a real contribution in facing obstacles and obstacles that can occur such as lack of competence, difficult network access, limited affordability, and so on. In addition, digital technology must also be utilized and addressed wisely while still applying the noble values of the nation so that the goals of education can be achieved.

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