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ARTICLE

DEVELOPMENT OF INFORMATION TECHNOLOGY APPLICATION IN EDUCATION IN INDONESIA

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Abstract

Information technology plays an important role in modern education by improving access and quality of learning. This study aims to examine the development of information technology application in education in Indonesia through qualitative research methods and analysis of related literature. The results of the study indicate that the development of information technology in education in Indonesia can be divided into three eras: the Pre-Digital Era with traditional learning methods and limited access to information; the Early Digital Era with the introduction of computers in schools and support from government programs for information technology integration; and the Modern Information Technology Era with increased internet access, e-learning, distance learning, and technology-based curriculum innovation. The positive impacts of information technology application include increased accessibility, quality of learning, and development of digital skills. However, this application also has negative impacts such as inequality in access to technology, dependence on technology, and challenges in management and implementation. In conclusion, the application of information technology in education in Indonesia has grown significantly and has had a major impact on the education system. However, there are still challenges that need to be overcome to ensure that the benefits of information technology can be felt by all students and educators.

Keywords: Information technology, Positive impacts, Qualitative research

A. INTRODUCTION

Information technology is very important for education. Information technology is an important part of the learning process in the current era of globalization and digitalization. According to Surya (2020), the use of information technology in education can improve the quality of teaching and learning, as well as facilitate access to wider learning resources. Information technology can address the educational gap in Indonesia, where access to education is still difficult. For example, millions of students in Indonesia have been helped by e-learning platforms such as Zenius and Ruangguru to get online lessons, which were previously difficult to access in remote areas (Firdaus & Ritonga, 2024). In addition, Indonesia has seen major advances in information technology in recent years (Selan &

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Wahyuni, 2022). According to data from the Indonesian Internet Service Providers Association (APJII), internet users in Indonesia reached 202.6 million people in 2023, with internet penetration reaching 73.7% of the total population (APJII, 2023). This shows that more and more people, including students and educators, can access information technology. In addition, the Indonesian government has launched various programs to support the implementation of information technology in education, such as the "Digital School" program which aims to provide technology infrastructure in schools throughout Indonesia. Previous studies have shown that information technology has been used in education in Indonesia since 2000. For example, research (Latif et al., 2024) shows that the use of technology in learning has increased significantly in schools in Jakarta, with more than 60% of teachers using digital tools in the classroom (Sari & Hidayati, 2019).

In addition, this study shows that the use of information technology also includes distance learning, which is increasingly popular among students and teachers. In recent years, Indonesia has made great progress in the use of information technology in education. However, there is not much research that investigates the history of the use of information technology in education in Indonesia. In this regard, this study aims to trace the history of the development of the application of technology and its impact on education in Indonesia. This is important because it is closely related to the need to understand the impacts and challenges of the application of information technology in education. This research is expected to provide useful insights for policy makers, educators, and educational institutions in designing more effective programs to utilize information technology in education.

B. LITERATURE REVIEW

Definition and Scope of Information Technology

Information technology (IT) is a term that encompasses all forms of technology used to process, store, and deliver information (Cecep Abdul Cholik, 2021). According to (Agustika et al., 2023), IT includes hardware, software, networks, and procedures used to manage and process data. In the context of education, IT functions as a tool to improve the effectiveness of the teaching and learning process, as well as expand access to educational resources. IT also enables more dynamic interactions between teachers and students, as well as between students and learning materials.

The scope of IT in education is very broad. IT not only includes the use of computers and mobile devices, but also includes various online learning applications and platforms, such as Learning Management Systems (LMS) and collaboration applications. According to data from the Ministry of Education and Culture of the Republic of Indonesia, in 2020, around 60% of schools in Indonesia have utilized IT in the teaching and learning process (Kemdikbud, 2020). This shows that IT has become an integral part of education in Indonesia, although there are still challenges in terms of accessibility and infrastructure.

Types of Information Technology

In the context of education, there are various types of information technology that can be applied. First, hardware such as computers, laptops, tablets, and other mobile devices that are used to access information and learning materials. Second, software that includes learning applications, word processing programs, and presentation software that support the teaching

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and learning process (Rianto & Dozan, 2020). According to research conducted by Sari and Rahardjo (2021), the use of interactive learning software can significantly increase student motivation and learning outcomes. Third, computer networks that enable communication and exchange of information between students, teachers, and other educational resources. The internet network, for example, provides students with access to take online courses and utilize learning resources from all over the world. According to statistics released by the Indonesian Internet Service Providers Association (APJII), in 2021, internet penetration in Indonesia reached 77% of the total population, which shows great potential for the application of IT in education (APJII, 2021).

Fourth, multimedia technology that includes video, audio, and graphics used in delivering learning materials. The use of multimedia in education has been shown to improve students' understanding of the material being taught. A study by Rahman and Sari (2020) showed that students who learn using multimedia methods have a better level of understanding compared to students who learn using traditional methods. Fifth, online learning platforms that provide space for students to learn independently and flexibly. Examples of these platforms are Ruangguru, Zenius, and Google Classroom. According to a report from Ruangguru, during the COVID-19 pandemic, this platform experienced an increase in users of up to 300% due to the need for distance learning (Ruangguru, 2020). This shows that IT not only supports face-to-face learning, but is also able to adapt to unexpected situations, such as a pandemic. Thus, the application of information technology in education in Indonesia covers various interrelated aspects. From the definition and scope to the types of IT used, all contribute to the development of more effective and efficient education. The application of IT is expected to overcome various educational challenges in Indonesia, such as limited resources and equal accessibility to education.

History of Education in Indonesia

Education in Indonesia has a long history influenced by various social, political, and cultural factors. Since the colonial era, the education system in Indonesia has been more directed towards the interests of the colonizers. In the early 20th century, formal education began to be introduced by the Dutch colonial government, which established schools for indigenous children, although access was very limited. According to Suryadi (2016), only about 10% of the indigenous child population received formal education at that time. After the proclamation of independence in 1945, Indonesia experienced a transformation in its education system. The new government began to formulate more inclusive education policies, with the aim of improving the life of the nation. In the 1945 Constitution, education is recognized as a basic right of every citizen, which is the foundation for the development of the national education system. In 1966, the emergence of an education policy known as "9-Year Basic Education" marked an important step in efforts to equalize education throughout Indonesia (Mulyasa, 2017).

Over time, the Indonesian government has continued to strive to improve the quality of education through various programs and policies. In 1989, the 1994 Curriculum was launched, emphasizing the development of student competencies and competency-based teaching. However, major challenges remain, especially in terms of access and quality of education in remote areas. According to data from the Ministry of Education and Culture

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(Kemendikbud) in 2020, there is still a significant gap in terms of access to education between urban and rural areas, where around 20% of children in remote areas do not receive proper education (Kemendikbud, 2020). Entering the 21st century, education in Indonesia has begun to adapt to developments in information technology. The use of technology in education is becoming increasingly important, especially amid the COVID-19 pandemic which has forced schools to switch to online learning. According to the National Survey on Online Learning conducted by the Research and Development Agency (Balitbang) of the Ministry of Education and Culture in 2021, around 80% of students in Indonesia experienced online learning during the pandemic, although not all students had adequate access to devices and internet connections (Balitbang Kemendikbud, 2021). Overall, the history of education in Indonesia shows a complex and dynamic journey, where each stage of educational development is always colored by challenges and innovations. With the application of information technology in education, it is hoped that the quality of education in Indonesia can improve and be more evenly distributed, reaching all levels of society.

National Education Policy

The national education policy in Indonesia has undergone various changes along with the development of the times and the needs of society. In 2003, the National Education System Law (UU Sisdiknas) was enacted, which became the legal basis for the implementation of education in Indonesia. This law emphasizes the importance of education that is oriented towards character and competency development, and provides space for the application of information technology in the teaching and learning process (Law No. 20 of 2003). In an effort to improve the quality of education, the government has also launched programs such as the Smart Indonesia Program (PIP) which aims to provide access to education for children from underprivileged families. According to data from the Ministry of Education and Culture, in 2021, more than 20 million students received assistance from this program, which shows the government's commitment to increasing access to education throughout Indonesia (Kemendikbud, 2021). The national education policy also integrates information technology as an important component in the learning process. In the 2020-2024 National Medium-Term Development Plan (RPJMN), the government targets to increase the use of information technology in education by 50% at all levels of education. This includes the development of online learning platforms and the provision of technological devices for students and teachers (Bappenas, 2020). One example of the implementation of this policy is the development of the "Digital School" program launched by the Ministry of Education and Culture in 2020. This program aims to improve the digital skills of students and teachers, as well as provide access to wider learning resources. According to a report from the Ministry of Education and Culture, more than 10,000 schools throughout Indonesia have participated in this program, which shows the enthusiasm and support from various parties to adopt technology in education (Kemendikbud, 2021). With education policies that continue to develop and adapt to changes in the times, it is hoped that education in Indonesia can be more responsive to the needs of society and produce a generation that is ready to face global challenges. The application of information technology in education is not just a trend, but has become a necessity that cannot be ignored to improve the quality and accessibility of education in Indonesia (Lathifah, 2022).

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Information Technology and Education

In the context of education, an understanding of relevant educational theories is essential to understanding how information technology (IT) can be integrated effectively. Some theories that are often used as references in the application of IT in education include constructivism theory, behaviorism theory, and connectivity theory. Constructivism theory, popularized by Jean Piaget and Lev Vygotsky, emphasizes the importance of social interaction and direct experience in the learning process. In this case, IT can function as a tool to create an interactive and collaborative learning environment. For example, the use of online learning platforms such as Google Classroom and Moodle allows students to collaborate on projects and assignments in real-time, which is in accordance with the principles of constructivism (Sanjaya, 2015).

On the other hand, the behaviorism theory pioneered by B.F. Skinner emphasizes reinforcement and repetition in learning. In this context, IT can be used to create interesting and interactive learning media, such as simulations and educational games. Research shows that the use of educational games can improve student motivation and learning outcomes, especially in subjects that are considered difficult (Hamari et al., 2016). By utilizing technology, educators can design more enjoyable and effective learning experiences. Connectivism theory, introduced by George Siemens, emphasizes the importance of networks and connections in the learning process in the digital era. In this context, information technology acts as a bridge that connects students with a wide and diverse source of information. Through the internet, students can access various learning resources, participate in discussion forums, and connect with other learners around the world. This creates opportunities for students to learn from various perspectives and experiences, which are very important in an increasingly connected world (Siemens, 2005). In its application in Indonesia, various educational institutions have begun to adopt these theories in IT integration. For example, many schools have begun to implement project-based learning involving technology, where students work in groups to complete complex tasks. This not only improves students' collaborative skills but also prepares them to face the challenges of an increasingly digital workplace (Mulyasa, 2017). Overall, the relationship between information technology and education is heavily influenced by relevant educational theories. By understanding and applying these theories, educators can create more effective and meaningful learning experiences for students in this digital age.

The Role of Information Technology in the Teaching and Learning Process

Information technology plays a very significant role in the teaching and learning process in Indonesia. One of the main roles of IT is as a tool in delivering teaching materials. With multimedia, such as videos, animations, and interactive presentations, educators can convey information in a way that is more interesting and easier for students to understand. According to research conducted by the Indonesian Ministry of Education and Culture, the use of multimedia in learning can increase student understanding by up to 30% compared to conventional methods (Kemendikbud, 2020).

In addition, IT also allows for wider access to learning resources. Students can use the internet to search for information, take online courses, or participate in virtual seminars. According to data from the Indonesian Internet Service Providers Association (APJII), in

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2022, the number of internet users in Indonesia will reach 200 million, which shows great potential for utilizing IT in education (APJII, 2022). With easier access to information, students can learn independently and explore their interests more deeply. The role of IT in the teaching and learning process is also seen in increasing student engagement. Online learning platforms provide various interactive features, such as quizzes, discussion forums, and collaboration in projects. This can increase student motivation and participation in learning. According to research conducted by Garrison and Anderson (2003), student engagement in online learning is positively related to their learning outcomes. Thus, the application of IT in education can create a more dynamic and engaging learning environment. Furthermore, IT also contributes to the development of 21st century skills needed by students. Skills such as problem solving, critical thinking, and collaboration are essential for success in an increasingly complex workforce. By using technology in learning, students can hone these skills through various activities that require them to think creatively and work together with others (Partnership for 21st Century Skills, 2019). In the Indonesian context, the application of IT in education also faces challenges, such as the digital divide between urban and rural areas. However, with various initiatives from the government and private institutions, such as free internet programs and the provision of technological devices, it is hoped that all students can feel the benefits of information technology in the teaching and learning process. Therefore, the role of IT in education in Indonesia is very important and is one of the keys to improving the quality of education in the country.

C. RESEACRH METHODOLOGY

This study uses a qualitative descriptive method through analysis of related literature. Qualitative research methods focus more on an in-depth understanding of a problem than trying to generalize it. The descriptive qualitative method examines an event, the phenomenon of individual lives, and asks one or a group of individuals to tell their lives. This information is then reorganized by the researcher in the form of a descriptive chronology (Dewi et al., 2025). Data sources are taken from journal articles, research reports, and books that generally discuss the development of IT implementation in education in Indonesia, as well as its impact on learning methods, education quality, and related challenges. Data obtained through publish or perish searches and analyzed using reduction techniques, namely collecting data, then sorting data into certain conceptual units, certain categories, and certain themes. The last step is the presentation of data that has been reduced in advance and presented in narrative form. Furthermore, the results are taken from drawing conclusions containing answers to the problem formulations that have been prepared before the observation. Based on the data search, the development of IT implementation in Education in Indonesia is divided into three main stages, namely (1) Pre-Digital Era; (2) Early Digital Era; (3) Modern Information Technology Era.

D. RESULT AND DISCUSSIONS

Stages of Information Technology Application in Education

1) Pre-Digital Era

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a. Traditional Learning Methods

Before the application of information technology in education, learning methods in Indonesia relied heavily on traditional approaches. This method is generally conventional, where teachers act as the main source of knowledge and students as recipients of information. Learning takes place through lectures, discussions, and limited use of textbooks. According to research by Surya (2018), around 80% of teachers in Indonesia still use the lecture method as the main way of teaching, which results in low active participation of students in the learning process. Traditional methods such as qawaid, memorization, and lecture-based instruction emphasize teacher authority and one-way knowledge transfer (Muaz Kalimatun Nabil et al., 2024; Yuwaffy Safitry et al., 2016; Abidin et al., 2024; Safitry et al., 2016). Although effective for understanding basic concepts, this method is less successful in developing critical thinking skills (Abidin et al., 2024). This education system has advantages in terms of integration and direct supervision from teachers. However, this method also has many disadvantages, especially in terms of student interactivity and creativity. For example, a study by Hidayat (2020) showed that students who engage in active learning tend to have better understanding and higher critical thinking skills compared to those who only listen to lectures. This shows that traditional approaches are inadequate to meet the evolving needs of education.

a. Limitations in Access to Information

One of the biggest obstacles in education before the implementation of information technology was limited access to information. In this era, sources of information were very limited to books available in libraries or teaching materials provided by teachers. According to data from the Central Statistics Agency (BPS) in 2019, only around 30% of schools in Indonesia had access to adequate libraries. This limitation makes it difficult for students to obtain relevant and up-to-date information. In addition, the distribution of books and teaching materials is also uneven, especially in rural areas. This creates an educational gap between urban and rural areas. Research by Mustari (2017) shows that students in remote areas have very limited access to learning resources, which has a negative impact on the quality of their education. Thus, this limited access to information is one of the inhibiting factors in achieving the goal of quality education. The pre-digital era faced significant challenges in accessing information, especially for people with disabilities (Utami, 2015). Limited digital skills and resources hinder access to information, especially in educational environments (Wulandari et al., 2023). The digital era brings a digital literacy crisis, where individuals have difficulty critically evaluating the abundance of information available (Harliani et al., 2024). With these challenges, there is an urgent need to find solutions that can improve the quality of education in Indonesia. The application of information technology in education is expected to bridge this gap and provide wider access to information and knowledge (Fadilla, 2020).

2) Era Digital Awal

a. Use of Computers in Schools

The application of information technology in education in Indonesia began in the late 1980s, when computers began to be introduced into the school environment. At that time, the use of computers was still very limited and was generally only available in certain schools that had a larger budget to purchase the devices (Warsihna, 2013). According to data from the

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Ministry of Education and Culture of the Republic of Indonesia, in 1990, only around 5% of schools in Indonesia had access to computers (Kemdikbud, 2020). This shows that the adoption of information technology in education is still in its early stages and is not evenly distributed throughout Indonesia.

Computers were first used as a tool in the teaching and learning process, especially in subjects such as mathematics and science. Many schools have begun to integrate educational software to help students understand the concepts being taught. For example, programs such as "Interactive Calculus" and "Science Simulation" have begun to be introduced in several high schools in Jakarta and other major cities (Bernard & Novtiar, 2022). Research conducted by (Dewi, S., 2022) shows that the use of computers in learning can increase students' motivation to learn and help them develop critical thinking skills. However, the challenge faced at that time was the lack of human resources who were skilled in the use of information technology. Many teachers do not have adequate training to operate computers and use educational software (Akbar & Noviani, 2019; Fadilla, 2020; Febrianti et al., 2023; Husein, 2016). A study by (Manongga, 2021; Wirasti, 2007; Yahya, 2022) stated that teacher training in the use of information technology is very important for the success of technology integration in education. Without adequate training, the use of computers in schools is often not optimal and does not have a significant impact on improving the quality of education. Over time, in 1994, the Indonesian government launched the "Information Technology-Based Schools" program which aims to accelerate the adoption of information technology in schools. The program includes the provision of computers and educational software, as well as training for teachers and students. According to a report from the Ministry of Education's Research and Development Agency (2015), the program succeeded in increasing the number of schools with access to computers by 30% within five years. However, there is still a significant gap between urban and rural schools in terms of access to information technology. In the late 1990s, the use of computers in schools began to increase rapidly, especially with the emergence of supporting government programs (Subagio & Limbong, 2023). The government began to realize the importance of information technology in improving the quality of education and began to allocate a larger budget for the procurement of computers and teacher training (Akbar & Noviani, 2019; Firdaus & Ritonga, 2024). According to data from the Central Statistics Agency (BPS, 2000), in 2000, around 50% of junior and senior high schools in Indonesia already had access to computers. This indicates that the application of information technology in education is starting to show significant progress**.**

b. Supporting Government Programs

Since the beginning of the application of information technology in education, the Indonesian government has launched various programs to support the integration of this technology into the national education system. One of the most influential programs is the "Information and Communication Technology (ICT) Development Program in Education" which was launched in 2003 (Huda, 2020). This program aims to improve the quality of education through the use of information and communication technology in schools. In this program, the government provides hardware and software as well as training for teachers and students (Kemdikbud, 2018).

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One important initiative in this program is the provision of "Computer Laboratories" in schools. These laboratories are equipped with computers, educational software, and internet access to support the teaching and learning process. According to a report from the Directorate General of Primary and Secondary Education (2019), more than 10,000 schools throughout Indonesia have computer laboratories thanks to this program. This not only increases students' access to technology but also provides opportunities for teachers to develop more interactive and engaging teaching methods.

In addition, the government also launched an "e-Learning" program that allows students to access learning materials online. This program was introduced in response to the rapid development of internet technology. With e-Learning, students in remote areas can access the same learning materials as students in big cities (Akbar & Noviani, 2019; Firdaus & Ritonga, 2024). Research by (Anggraini, 2018) shows that e-Learning can increase the effectiveness of learning and provide flexibility for students in managing their study time. However, even though there are various government programs that support the implementation of information technology in education, there are still challenges that must be faced. One of them is limited infrastructure, especially in rural areas (Akbar & Noviani, 2019; Fadilla, 2020; Firdaus & Ritonga, 2024; Wulandari et al., 2023). Many schools still have difficulty getting stable and fast internet access. A study by Wibowo (2021; Repository et al., 2021) revealed that around 40% of schools in remote areas still do not have internet access, which hinders the implementation of technology-based programs. In addition, the importance of ongoing training for teachers is also highlighted. Although the government has provided initial training, many teachers find it difficult to keep up with rapid technological developments (Febrianti et al., 2023; Husein, 2016). Research by (Nur et al., 2022) shows that teachers who receive ongoing training tend to be more effective in using information technology in their teaching. Therefore, there needs to be a policy that supports the development of teacher professionalism in the use of information technology so that the application of technology in education can be maximized and sustainable (Manongga, 2021).

c. Modern Information Technology Era

a. Internet and Information Access

The development of information technology in Indonesia has had a significant impact on the world of education, especially through internet access. Since the early 2000s, internet usage in Indonesia has begun to increase rapidly (Subagio & Limbong, 2023). According to data from the Indonesian Internet Service Providers Association (APJII), in 2021, the number of internet users in Indonesia reached 202.6 million people, which is around 73.7% of the total population (APJII, 2021). This shows that access to information via the internet has become an integral part of the teaching and learning process. With the internet, students and educators can now access various learning resources quickly and easily (Santoso et al., 2019). For example, learning platforms such as Google Classroom and Edmodo have become popular tools among teachers and students to share learning materials and assignments. Google Classroom and Edmodo have emerged as popular choices for implementing e-learning, offering many advantages for educators and students (Hapsari & Pamungkas, 2019; M. Ardiansyah, 2020). The platform has been praised for its ease of use, accessibility via smartphones and laptops, and ability to create equal learning opportunities (Muris, 2021).

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Research shows that Google Classroom facilitates efficient classroom management, allowing instructors to provide timely feedback and manage assignments effectively (Muris, 2021; Aunurrahman et al., 2021). The implementation of the platform has generally received positive responses, with one study reporting a 90% approval rate among students (Ardiansyah, 2020). However, challenges remain, such as the need for adequate internet and electricity infrastructure to support online learning (Aunurrahman et al., 2021)

According to research by (Garrison, 2011) wider access to information via the internet can improve the quality of learning by providing a variety of perspectives and diverse sources. This is also in line with the opinion of (Digitale, 2010) which states that the current generation, known as "digital natives," is more accustomed to the use of technology in everyday life, including in the context of education.

However, although internet access has increased, there are still gaps in terms of infrastructure and quality of access in various regions (Fadilla, 2020). According to a report from the Ministry of Communication and Information (Kemkominfo) in 2020, around 30% of the population in remote areas still do not have adequate internet access (Kemkominfo, 2020). This is a challenge for the government and educational institutions to ensure that all students, regardless of their geographic location, can enjoy the benefits of access to information provided by the internet (Warsihna, 2013) For example, the "Gerakan 100 Smart City" program launched by the government aims to improve digital infrastructure in various cities in Indonesia. This program is expected to accelerate the adoption of information technology in education by providing better internet access in schools. Thus, better access to information can help students develop the skills needed in today's digital era (Directorate General of Informatics Applications, 2017)

Overall, the internet has opened up many opportunities for education in Indonesia, but there are still challenges that need to be overcome to ensure equal access for all students. Therefore, collaboration between the government, educational institutions, and the private sector is essential to create an inclusive and sustainable education ecosystem (T. T. Dewi et al., 2025).

b. E-learning and Distancing Learnig

E-learning or electronic-based learning has become one of the main innovations in education in Indonesia, especially since the COVID-19 pandemic forced schools to switch to distance learning (Fadli Emsa Zamani & Diki Suherman, 2022). According to data from the Ministry of Education and Culture, in 2020, around 90% of schools in Indonesia conducted online learning (Kemendikbud, 2020). This shows that e-learning has become an important solution to maintain the continuity of education amidst the challenges faced.

The use of e-learning platforms such as Zoom, Microsoft Teams, and Ruangguru is increasingly widespread, allowing students to study from home (Hakim & Dermawan, 2023). Research by (Husain & Basri, 2021) shows that e-learning can increase student engagement and provide flexibility in the learning process. Students can access learning materials anytime and anywhere, allowing them to learn according to their own rhythm and learning style.

However, although e-learning offers many advantages, there are also challenges faced. One of the main problems is the lack of technological and infrastructure readiness in some areas. According to a survey conducted by UNICEF, around 40% of students in Indonesia do

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not have access to adequate devices to participate in online learning (UNICEF, 2020). This gap can cause inequity in education and hinder the academic development of students in disadvantaged areas. In addition, motivation and discipline issues are also challenges in distance learning. Research by (Husain & Basri, 2021) shows that students who study online tend to have difficulty maintaining their motivation compared to students who study face-to-face. Therefore, it is important for educators to create a learning environment that supports and motivates students to stay engaged in the learning process. In the future, there is a need to develop a hybrid learning model that combines elements of online and face-to-face learning. This can provide flexibility and take advantage of the advantages of both methods. Thus, e-learning is not only a temporary solution, but can also be part of a better education system in Indonesia (Widianto et al., 2021).

c. Innovation in Technology Based Curriculum

Innovation in technology-based curriculum is increasingly becoming a focus in education in Indonesia (Muzakkir et al., 2024; Sabdarifanti et al., 2021). The development of information technology encourages the adoption of online and distance learning, following the trend of developed countries such as the United States and Japan (Zen, 2019). Indonesia has routinely innovated educational materials, including delivering materials in the form of games and using digital technology to make learning more interactive (Sabdarifanti et al., 2021; Budiana, 2024). Developing an innovative curriculum requires a systematic and collaborative approach, as well as a deep understanding from educators (Budiana, 2024). The challenges in implementing curriculum innovation in Indonesia are still the focus of research (Muzakkir et al., 2024). This innovation aims to increase students' motivation and quality of learning, as well as prepare them for a changing future (Budiana, 2024). As part of this innovation, many schools have begun to adopt the use of educational software and applications in their curriculum. Educational innovation in the context of the Independent Curriculum in Indonesia involves the adoption of technology and digital media in learning. The use of applications such as Kahoot, Quizizz, and social media platforms has become popular among teachers to make learning more interactive and interesting (Siti Nurharirah, 2024; Aulya Putri Wansit et al., 2024). The implementation of this innovation is influenced by factors such as school leadership, teacher readiness, and support from related parties (Dinda Mega Putri Oktavianti et al., 2024). Digital-based learning, including game-based learning, is considered to have great potential in developing 21st-century skills such as innovation, creativity, and adaptability (Khairunnisa Syafna Putri, 2021). However, there are obstacles in implementing this technology, such as limited time and facilities (Siti Nurharirah, 2024).

This innovation aims to improve the effectiveness of learning and prepare students to face future challenges. According to research by Hamari et al. (2016), the use of gamification in education can increase student motivation and make learning more enjoyable. Thus, technology integration in the curriculum can create a more engaging and effective learning environment. However, to achieve success in implementing a technology-based curriculum, teachers need to be equipped with adequate training and resources. Research by Ertmer and Ottenbreit-Leftwich (2010) shows that the success of technology integration in education is highly dependent on the level of technological skills possessed by teachers. Therefore,

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ongoing training programs for educators are essential to ensure they can utilize technology effectively in teaching. Ongoing training programs for educators are essential to improving the quality of teaching in the digital era (W. Lestari et al., 2024). Educational technology training can improve teachers' technological literacy, including the use of AI and ChatGPT (Ferdiaz Saudagar & Ali Sadikin, 2024). Technology-based educator management is needed to integrate technological advances in education, with a focus on the development and training of digital literacy (Annisa Dwi Hamdani et al., 2022). The use of technology in learning can improve teachers' pedagogical competence, especially in distance learning situations such as during the COVID-19 pandemic (Pebria Dheni Purnasari & Yosua Damas Sadewo, 2020). Structured and technology-based continuing professional development programs have been shown to be effective in improving teachers' pedagogical competence and their ability to adapt to rapid changes in the world of education (W. Lestari et al., 2024).

In addition, there needs to be collaboration between the government, educational institutions, and the technology industry to develop relevant and quality educational content. By involving various stakeholders, technology-based curriculum can be more in line with students' needs and developments. Papers that highlight the importance of collaboration between the government, educational institutions, and industry to develop relevant and high-quality educational content in the digital era include Purnamasari et al. (2024) showing the effectiveness of integrating Massive Open Online Courses (MOOCs) with industry partnerships to improve coffee production education. Yayasan Lavandaia et al. (2024) emphasize the need for technology integration in basic education to address educational inequality. Doringin et al. (2020) emphasize the importance of balancing the use of technology with character development in education. Lase (2019) outlines the changes needed in educational institutions, including the development of curricula that focus on STEM, ICT-based learning, and entrepreneurship. Collectively, these studies emphasize the need for educational transformation to meet industry needs (Purnamasari et al., 2024), address technological advances (Doringin et al., 2020), and develop critical skills for the future workforce (Lase, 2019). Collaboration between stakeholders is essential to creating a dynamic and innovative learning ecosystem (Purnamasari et al., 2024; Yayasan Lavandaia et al., 2024). Overall, innovation in technology-based curriculum is a positive step towards more relevant and effective education in Indonesia. Innovation in technology-based curriculum is an important step towards more relevant and effective education in Indonesia. The integration of technology in 21st-century learning is changing the paradigm of education, driving digitalization, and preparing students to face future challenges (Rahayu et al., 2022). The implementation of blended learning models and increasing digital literacy of teachers and students are key in facing these changes (Rahayu et al., 2022). The development of the curriculum in Indonesia is the result of the diffusion of innovation aimed at improving and perfecting the previous curriculum (Verona et al., 2023). Although the application of technology in basic education has begun, there are still challenges in terms of infrastructure in several schools (Isa & Diko, 2020). A curriculum that is oriented towards developing competencies, skills, and is responsive to future developments can prepare students to face real-world challenges and improve the quality of education (Mulia et al., 2023).

2. Impact of Application of Information Technology on Education

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Information and communication technology (ICT) has a significant impact on education. The positive impacts include more innovative learning, increased student understanding, ease of access without time and space constraints, and enrichment of learning resources (I. Komang et al., 2023; Yohannes Marryono Jamun, 2018). ICT also facilitates online-based learning and helps overcome the gap in educational facilities due to geographical differences (I. Komang et al., 2023). However, there are negative impacts in the form of changes in values, norms, and behaviors that are contrary to community ethics (I. Komang et al., 2023; Yohannes Marryono Jamun, 2018). To optimize the benefits of ICT, it is necessary for educators to master technology (Anggi Jenita Harianja & Dellaneira Btari Anantiwi, n.d.) and increase students' digital literacy (Sri Listia Rosa et al., 1970). Thus, the application of ICT in education needs to be balanced with understanding and wise use.

a) Positive Impact

1. Improving Accesibility of Education

The application of information technology in education has brought about significant changes in terms of accessibility. With the existence of online learning platforms, students from various social and economic backgrounds can now access learning materials without being hindered by geographical boundaries. According to I. Komang et al. (2023), the use of information and communication technology (ICT) allows students in remote areas to gain equal access to quality learning resources. This is very important, considering that there is still a gap in educational facilities between urban and rural areas.

For example, distance learning programs implemented by several universities in Indonesia have succeeded in reaching thousands of students who previously did not have the opportunity to continue their higher education. Statistics show that around 60% of students in remote areas reported increased motivation to learn after accessing online learning materials (Yohannes Marryono Jamun, 2018). Thus, information technology not only increases accessibility but also provides opportunities for students to learn in a more flexible way and according to their needs. This creates a more inclusive learning environment, where every individual has an equal opportunity to succeed.

2. Improving the Quality of Learning

In addition to increasing accessibility, information technology also contributes to improving the quality of learning. The use of educational software and interactive learning applications has been shown to improve students' understanding of the subject matter. According to research conducted by I. Komang et al. (2023), students who use ICT-based learning applications show a significant increase in exam results compared to traditional learning methods. This is due to a more interesting and interactive learning approach, which is able to maintain students' attention longer. A relevant case example is the use of platforms such as Google Classroom and Zoom in the learning process during the COVID-19 pandemic. Many schools have switched to online learning and reported that students are more active in participating in class discussions and assignments given. A study conducted by the Indonesian University of Education showed that 75% of students found it easier to understand the subject matter when taught through technology (Yohannes Marryono Jamun, 2018). This shows that technology not only facilitates learning but also increases its effectiveness.

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3. Development of Students' Digital Skills

The application of ICT in education also contributes to the development of students' digital skills, which are increasingly important in today's digital era. These skills include the ability to use various technological tools, understand digital information, and collaborate online. According to I. Komang et al. (2023), students who engage in ICT-based learning are better prepared to face challenges in the world of work that increasingly relies on technology. For example, educational programs that integrate coding and programming into the curriculum have shown positive results. Students not only learn about technology but also develop critical and creative thinking skills. Statistics show that students who learn coding in elementary school have better problem-solving skills compared to students who do not receive such training (Yohannes Marryono Jamun, 2018). Therefore, the development of digital skills through information technology not only prepares students for further education but also for future careers..

b) Negative Impact

1. Inequality of Access to Technology

The application of information technology in education has brought many changes, but has also had significant negative impacts, one of which is inequality in access to technology. In many areas, especially in rural areas, access to technological devices such as computers and the internet is still very limited. Research shows a significant digital divide in rural Indonesia, especially in terms of access to technology and digital literacy. Limited telecommunications access, low digital literacy, and minimal technological economic integration are major challenges in rural areas (Koswara, 2024). Age, education level, and income significantly influence digital adoption, with older, less educated, and lower-income individuals having less access to digital technology (Susanti & Putri, 2022). Although mobile phone and internet access are high in some rural areas, computer access and use remain low (Saleh, 2020). The digital divide affects educational opportunities, with barriers including limited access to digital devices, internet connectivity issues, lack of digital literacy, and lack of local educational content (Pahrijal & Novitasari, 2023). Addressing these challenges requires investment in infrastructure, digital skills training, collaboration between the government and the private sector, and targeted policies to reduce regional disparities and promote equitable access to digital resources (Koswara, 2024; Pahrijal & Novitasari, 2023). This inequality of access not only impacts students, but also educators. Many teachers do not have adequate training in the use of information technology, making it difficult for them to integrate technology into the learning process. This is exacerbated by the lack of supporting infrastructure, such as a stable internet network in remote areas. A study by I. Komang et al. (2023) shows that schools in areas with low access to technology have difficulty implementing technology-based learning methods, which ultimately impacts student learning outcomes. Furthermore, this inequality in access to technology also creates inequities in learning opportunities. Students who do not have access to information technology are at risk of being left behind in terms of the knowledge and skills needed in an increasingly competitive workforce. Research by Sri Listia Rosa et al. (1970) showed that students who have access to information technology tend to have better academic achievement than those

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who do not. Therefore, it is important to pay attention to and address this issue of inequality of access so that all students can benefit from the application of technology in education.

2. Dependence on Technology

Dependence on information technology in education is also one of the negative impacts that need to be considered (Thasya Dwi Putri, 2019). Changes in behavior, ethics, norms, and morals that are contrary to community values (Yohannes Marryono Jamun, 2018; I. Komang et al., 2023). Although technology can increase the efficiency and effectiveness of learning, excessive dependence can reduce students' ability to think critically and solve problems independently. When students rely too much on technology to find information, they may lose their ability to conduct manual research or think analytically. Research by Yohannes Marryono Jamun (2018) shows that students who are too dependent on technology tend to have lower critical thinking skills compared to students who interact more with traditional sources of information. Furthermore, dependence on technology can also cause mental health problems. Students who spend too much time in front of the screen can experience stress, anxiety, and other health problems. This is exacerbated by the increasingly widespread phenomenon of cyberbullying among students, where information technology is used as a tool to oppress and intimidate peers. Therefore, it is important for educators and parents to monitor students' use of technology and set healthy boundaries. In addition, dependence on technology can also reduce social interactions among students. In a technology-dominated learning environment, students may prefer to communicate via text messages or social media rather than interacting in person. This can reduce their ability to collaborate and communicate effectively in social situations. Research shows that healthy social interactions are essential for students' emotional and social development (Anggi Jenita Harianja & Dellaneira Btari Anantiwi, n.d.). Therefore, it is important to create a balance between technology use and real social interactions.

3. Challenges in Management and Implementation

Challenges in managing and implementing information technology in education also have significant negative impacts. Many educational institutions are not yet ready to effectively integrate technology into their curriculum. This is often due to a lack of training and support for educators. According to research by I. Komang et al. (2023), many teachers feel insecure in using technology in their teaching, which in turn impacts the quality of learning provided to students. Information technology management also requires sufficient resources, both financially and humanly. Information technology management requires adequate resources, both financially and humanly. Human resources in the IT field are very important for the operational effectiveness of an organization (Mohammad Idhom et al., 2016). Strategic integration between information technology and HR management can improve organizational performance, productivity, and competitiveness (Suryadin Alamsyah, 2024). Many schools, especially in areas with limited budgets, have difficulty in providing the devices and infrastructure needed to support technology-based learning (Hasanah et al., 2022; Satria Ramadhan et al., 2023). This creates additional challenges for educators who want to use technology to enhance the learning process (Nastiti & Abdu, 2020). In addition, the lack of technical support can cause frustration among teachers and students when they encounter technical problems that cannot be resolved (Nur et al., 2022).

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The implementation of information technology in education also often faces resistance from various parties (Firdaus & Ritonga, 2024). Some educators may feel that traditional teaching methods are more effective and are reluctant to adopt new technologies. In addition, parents may also have concerns about the negative impacts of technology use on their children (Akbar & Noviani, 2019). Therefore, it is important to involve all stakeholders in the technology implementation process, including educators, students, and parents, so that they can understand the benefits and challenges associated with the use of technology in education (Harliani et al., 2024; Huda, 2020; Santoso et al., 2019). In facing these challenges, a comprehensive strategy is needed to manage and implement information technology in education (Hasanah et al., 2022; Rosa et al., 1970). This includes adequate training for educators, adequate infrastructure development, and ongoing technical support (Manongga, 2021; Satria Ramadhan et al., 2023). With the right approach, it is hoped that information technology can be integrated well into the education system, so as to provide maximum benefits for students and educators (Learning, 2021; Yahya, 2022)

E. CONCLUSION

The development of information technology in Indonesian education has made significant progress. The application of information technology has positive impacts, such as increasing accessibility of education, quality of learning, and development of students' digital skills. However, there are also negative impacts, such as inequality in access to technology, dependence on technology, and challenges in management and implementation. To optimize the benefits of information technology in education, a comprehensive strategy is needed that involves all stakeholders. This includes training for educators, infrastructure development, and technical support. With the right approach, information technology can be a powerful tool to improve the quality of education in Indonesia and prepare students to face global challenges in the future.

REFERENCE

Agustika, F., Siregar, S., Obara, D., & Paramarta, V. (2023). Telaah Teknologi Informasi Dan Sistem Informasi Dalam Organisasi Dengan Lingkungan. *Jurnal Bisnis Kolega*, *9*(1), 24–33. https://doi.org/10.57249/jbk.v9i1.104

Akbar, A., & Noviani, N. (2019). Tantangan dan Solusi dalam Perkembangan Teknologi Pendidikan di Indonesia. *Prosiding Seminar Nasional Pendidikan Program Pascasarjana Universitas Pgri Palembang*, *2*(1), 18–25.

Anggraini, A. (2018). Keefektifan Pembelajaran Elektronik (E-Learning) Sebagai Pengganti Perkuliahan Konvensional Untuk Meningkatkan Kemampuan Analitis Mahasiswa. *Jurnal Sosial Humaniora*, *9*(2), 95. https://doi.org/10.30997/jsh.v9i2.1101

Aunurrahman, A., Rahman, M., & Purwaningsih, D. I. (2021). Analisis Penggunaan Google Classroom sebagai Media Pembelajaran. *JIIP - Jurnal Ilmiah Ilmu Pendidikan*, *4*(6), 445–449. https://doi.org/10.54371/jiip.v4i6.303

Bernard, M., & Novtiar, C. (2022). Pengembangan Media Kalkulus Menggunakan Javascript Geogebra Untuk Meningkatkan Kemampuan Penalaran Terhadap Calon Guru Pada Pandemi Covid-19. *Jurnal Pembelajaran Matematika Inovatif*, *5*(1), 159–168.

Publisher: Perkumpulan Ilmuwan Administrasi Negara Indonesia
P-ISSN: 1412 –9736
E-ISSN: 2828-545X

https://doi.org/10.22460/jpmi.v5i1.159-168

Budiana, I. (2024). *Available Online at Inovasi dalam Pengembangan Kurikulum Pendidikan Available Online at Pendahuluan Perkembangan zaman ditandai dengan kemajuan ilmu pengetahuan dan teknologi yang pesat berdampak signifikan pada berbagai sektor kehidupan , termasuk pendidikan . …. 2*(2), 433–450.

Cecep Abdul Cholik. (2021). Teknologi Informasi, ICT,. *Jurnal Fakultas Teknik*, *2*(2), 39–46.

Dewi, S. (2022). Penggunaan Komputer Sebagai Media Pembelajaran Siswa Pada Pendidikan Berbasis Lingkungan Authors Siskanda Dewi. *Education Journal of Indonesia*, *3*(November), 44–48. https://doi.org/10.30596/eji.v3i2.3207

Dewi, T. T., Islam, U., Sumatera, N., Irwan, M., Nasution, P., Islam, U., & Sumatera, N. (2025). *Teknologi Informasi Dalam Pendidikan : Sejarah dan Implikasinya Terhadap Pembelajaran di Era Digital*. *3*(1), 84–92.

Digitale, A. S. (2010). H. Sapiens Digitale: Dagli Immigrati Digitali e Nativi Digitali alla saggezza digitale. *TD-Tecnologie Didattiche*, *50*, 17–24.

Direktorat Jenderal Aplikasi Informatika. (2017). *Guideline Masterplan Smart City: Gerakan Menuju 100 Smart City*.

Fadilla, N. (2020). Kesenjangan Digital di Era Revolusi Industri 4.0 dan Hubungannya dengan Perpustakaan sebagai Penyedia Informasi. *Libria*, *12*(1), 1–14.

Fadli Emsa Zamani, & Diki Suherman. (2022). Model Teknologi Informasi Dalam Pembelajaran Dan Dampak Sosial Pada Masa Covid 19. *Jurnal Dialektika: Jurnal Ilmu Sosial*, *20*(2), 12–22. https://doi.org/10.54783/dialektika.v20i2.53

Febrianti, I., Tuffahati, J., Rifai, A., Affandi, R. H., Pradita, S., Akmalia, R., & Siahaan, A. (2023). Pengaruh Penggunaan Teknologi Informasi Dalam Manajemen Perencanaan Pendidikan Untuk Meningkatkan Efisiensi Pendidikan. *Academy of Education Journal*, *14*(2), 506–522. https://doi.org/10.47200/aoej.v14i2.1763

Firdaus, K., & Ritonga, M. (2024). Peran Teknologi Dalam Mengatasi Krisis Pendidikan di Daerah Terpencil. *Jurnal Kepemimpinan Dan Pengurusan Sekolah*, *9*(1), 43–57. https://doi.org/10.34125/jkps.v9i1.303

Garrison, D. R. (2011). E-Learning in the 21st century: A framework for research and practice, Second edition. In *E-Learning in the 21st Century: A Framework for Research and Practice, Second Edition* (Issue March 2011). https://doi.org/10.4324/9780203838761

Hakim, A. T., & Dermawan, D. A. (2023). Analisis Optimasi Penggunaan Aplikasi Online Skype, Zoom, Dan Google Classroom Dalam Peningkatan Minat Belajar Siswa Sma Dan Smk Pada Masa Covid-19. *IT-Edu : Jurnal Information Technology and Education*, *8*(1), 53–60. https://doi.org/10.26740/it-edu.v8i1.51337

Hapsari, S. A., & Pamungkas, H. (2019). Pemanfaatan Google Classroom Sebagai Media Pembelajaran Online Di Universitas Dian Nuswantoro. *WACANA: Jurnal Ilmiah Ilmu Komunikasi*, *18*(2), 225–233. https://doi.org/10.32509/wacana.v18i2.924

Harliani, R. K., Dewi, D. A., & Hayat, R. S. (2024). Menantang Tren: Mendekati Krisis Literasi Digital di Era Informasi. *JLEB: Journal of Law, Education and Business*, *2*(1), 614–617. https://doi.org/10.57235/jleb.v2i1.1948

Hasanah, L., Putri, M. A., Hanin, A. H., & Siregar, W. S. (2022). Dampak Perkembangan

Publisher: Perkumpulan Ilmuwan Administrasi Negara Indonesia
P-ISSN: 1412 –9736
E-ISSN: 2828-545X

Teknologi Informasi Bagi Peserta Didik. *Jurnal Informatika Dan Teknologi Pendidikan*, *2*(2), 44–48. https://doi.org/10.25008/jitp.v2i2.33

Huda, I. A. (2020). Perkembangan Teknologi Informasi Dan Komunikasi (Tik) Terhadap Kualitas Pembelajaran Di Sekolah Dasar. *Jurnal Pendidikan Dan Konseling (JPDK)*, *2*(1), 121–125. https://doi.org/10.31004/jpdk.v1i2.622

Husein, W. M. (2016). Upaya Guru dalam Meningkatkan Kualitas Pembelajaran melalui Penerapan Teknologi Informasi di MI Miftahul Ulum Bago Pasirian. *Jurnal PETISI*, *3*(1), 1–23.

Husain, B., & Basri, M. (n.d.). *Pembelajaran e-learning di masa pandemi*.

Lathifah, S. U. (2022). Perkembangan Teknologi Informasi di Indonesia | kumparan.com. *Kompasiana.Com*, 1–7. https://www.kompasiana.com/muhammad75161/63272f356e14f10616141444/perkembangan-teknologi-informasi-di-indonesia?lgn_method=google

Latif, M., Anwar, K., Jeka, F., Islam, U., Sulthan, N., & Saifuddin, T. (2024). *Optimalisasi Pembelajaran Digital Menuju Era Digitalisasi Pendidikan Studi Kasus Di SMA Al Azhar 4 Kemang*. *16*, 288–311.

M. Ardiansyah, M. A. (2020). Penerapan Media Pembelajaran Edmodo dan Google Classroom Pada SMK Islam Perti Jakarta. *J-PiMat : Jurnal Pendidikan Matematika*, *2*(2), 223–230. https://doi.org/10.31932/j-pimat.v2i2.888

Manongga, A. (2021). Pentingnya teknologi informasi dalam mendukung proses belajar mengajar di sekolah dasar. *Pascasarjana Universitas Negeri Gorontalo Prosiding Seminar Nasional Pendidikan Dasar*, *978-623–98*(November), 1–7.

Muris, A. A. (2021). Pemanfaatan Google Classroom Sebagai Media Pembelajaran Daring Di Masa Pandemi Covid 19 Di Prodi Informatika Universitas Baturaja. *Jurnal Ilmiah Matrik*, *23*(1), 119–132. https://doi.org/10.33557/jurnalmatrik.v23i1.1104

Muzakkir, E. S., Ismail, F., & Karoma, K. (2024). Inovasi dalam Kurikulum Pendidikan. *Ainara Journal (Jurnal Penelitian Dan PKM Bidang Ilmu Pendidikan)*, *5*(3), 308–312. https://doi.org/10.54371/ainj.v5i3.518

Nastiti, F., & Abdu, A. (2020). Kajian: Kesiapan Pendidikan Indonesia Menghadapi Era Society 5.0. *Edcomtech Jurnal Kajian Teknologi Pendidikan*, *5*(1), 61–66. https://doi.org/10.17977/um039v5i12020p061

Nur, S. A., Mahya2, A. F. P., & Santoso 3, G. (2022). Revolusi Pendidikan di Era Society 5.0; Pembelajaran, Tantangan, Peluang, Akses, Dan Keterampilan Teknologi. *Jurnal Pendidikan Transformatif (Jupetra)*, *Vol. 01 No*, 18–28.

Pembelajaran, S. P. (2021). *Seri Publikasi Pembelajaran Vol 1 No 2(2021): Profesi Keguruan*. *1*(2), 1–7.

Repository, D., Universitas, R., & Jember, U. (2021). *Journal of physics : Conference Series Volume 1874 June 2021*. *1874*(June).

Rianto, B., & Dozan, W. (2020). Dasar-Dasar Pengantar Teknologi Informasi. In *CV. Multimedia Edukasi*. www.multidukasi.co.id

Rosa, S. L., Sapitri, Umi Hidayati, & Oki Yusuf Barokah. (1970). Penerapan Teknologi Informasi Dan Komunikasi (TIK) Pada Pendidikan. *Jurnal Pengabdian Masyarakat Dan Penerapan Ilmu Pengetahuan*, *3*(2), 7–13.

Publisher: Perkumpulan Ilmuwan Administrasi Negara Indonesia
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https://doi.org/10.25299/jpmpip.2022.10702

Sabdarifanti, T., Hanifah, N., Rizqi, A. K., & Artajaya, U. (2021). Inovasi Kurikulum: Materi Pendidikan. *JIRA: Jurnal Inovasi Dan Riset Akademik*, *2*(10), 1460–1476. https://doi.org/10.47387/jira.v2i10.234

Safitry, Y., Kurnita, T., & Lindawati, L. (2016). Proses Pembelajaran Pada Materi Tari Tradisional Laweut Berdasarkan Pola Lantai Dengan Menggunakan Metode Pemodelan Di Kelas VIII-2 Smp Negeri 14 Banda Aceh. *Jurnal Ilmiah Mahasiswa Pendidikan Seni, Drama, Tari & Musik*, *1*(4), 325–333. http://www.jim.unsyiah.ac.id/sendratasik/article/view/5356

Santoso, R., Munawi, H. A., & Sukmawati, D. (2019). Perkembangan Teknologi Informasi dan Telekomunikasi terhadap Perubahan Perilaku Masyarakat. *Conference on Research & Community Services*, 586–592.

Satria Ramadhan, M., Diah Apriliani, S., Sahda Firjatullah, N., & Yolanda Puji Pratama, R. (2023). Dampak Perkembangan Teknologi Digital Di Sektor Pendidikan. *Journal of Comprehensive Science (JCS)*, *2*(6), 1772–1784. https://doi.org/10.59188/jcs.v2i6.399

Selan, M. A., & Wahyuni, K. T. (2022). Analysis of Information and Communication Technology Development in Indonesia. *Seminar Nasional Official Statistics*, *2020*(April), 197–206.

Subagio, I. K. A., & Limbong, A. M. N. (2023). Dampak Teknologi Informasi Dan Komunikasi Terhadap Aktivitas Pendidikan. *Journal of Learning and Technology*, *2*(1), 43–52. https://doi.org/10.33830/jlt.v2i1.5844

Utami, N. W. (2015). Gelap dalam Gemerlap: Gelapnya Akses Informasi Bagi Difabel dalam Gemerlap Era Digitalisasi. *CHANNEL Jurnal Komunikasi*, *3*(2), 41–50. https://doi.org/10.12928/channel.v3i2.3272

Warsihna, J. (2013). Pemanfaatan Teknologi Informasi dan Komunikasi (TIK) untuk Pendidikan di Daerah Terpencil, Tertinggal, dan Terdepan (3T). *Jurnal Teknodik*, *17*(2), 238–245.

Wirasti, M. K. (2007). Refleksi Penerapan Teknologi Informasi Dan Komunikasi Dalam Pendidikan Di Indonesia. *Perspektif Ilmu Pendidikan*, *15*(VIII), 91–98. https://doi.org/10.21009/pip.151.15

Wulandari, D. H., Br Simanungkalit, P. N., & Ndona, Y. (2023). Tantangan Pendidikan Kewarganegaraan Di Era Digital Pada Sd Negeri 054906 Tebasan Lama. *Jurnal Handayani*, *14*(1), 46. https://doi.org/10.24114/jh.v14i1.45307

Yahya, A. (2022). Pemanfaatan Teknologi Informasi Dalam Pendidikan Agama Islam. *Jurnal Teknologi Dan Bisnis*, *4*(2), 155–162. https://doi.org/10.37087/jtb.v4i2.105

Zen, Z. (2019). Inovasi Pendidikan Berbasis Teknologi Informasi : Menuju Pendidikan Masa Depan. *E-Tech : Jurnal Ilmiah Teknologi Pendidikan*, *6*(2), 1–12. https://doi.org/10.24036/et.v2i2.101346

Publisher: Perkumpulan Ilmuwan Administrasi Negara Indonesia
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