

# The Impact of Technological Advancements on Education and Local Wisdom in Indonesia

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## ABSTRACT

The rapid advancement of technology has allowed a country to improve several aspects of society's life. Two important aspects that need technological intervention are education and local wisdom. These aspects are crucial in creating a smart and digitally skilled generation with a strong national identity. This article then aims to explain the role, implementation, and influence of digital technology on the development of education and local wisdom in Indonesia. The method used is a qualitative research method that focuses on a literature review by studying and analyzing textual material, such as books, journal articles, and conference proceedings. The result of the research shows that technological advancement has a positive influence on the education system and local wisdom in Indonesia. In the educational context, technology has created an attractive learning atmosphere, thus causing students to be more motivated and actively engaged in the classroom. The use of technology can also promote Indonesian local wisdom to the global environment through digital platforms, especially social media.

**Keywords:** digitalization, technological advancement, educational system, local wisdom, digital platforms

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## INTRODUCTION

The world is facing rapid technological advancement. Many academics view that the current world development is starting to enter the gate of Society 5.0 which combines artificial intelligence with society. Technology is increasingly being utilized by humans to solve their social problems (Maulinda et al., 2021). Quoting Volti (2009), technology can be defined as a system created by humans using knowledge and organization to produce objects and techniques to achieve certain goals. Conceptually, technology has several aspects including physical (process), metaphysical (principle), sociocultural (nomenclature),

function (application of science), benefit, purpose, and economy. Throughout history, technology has changed the way humans view life. Every technological breakthrough often has an effect on increasing accessibility in human life, erasing the perception of distance, and turning challenges into simplicity (Midyanti & Sukmayadi, 2021). In other words, technology is able to meet human needs by minimizing their energy use.

Given that technology has an important role in improving people's lives and advancing the life of the nation, the Government of Indonesia then issued Law Number 11 of 2019 concerning the National System of Science and Technology

which stipulates that the system must respect traditional science and local wisdom. This law also states that the National System of Science and Technology recognizes, respects, develops, and maintains the diversity of traditional knowledge, local wisdom, natural resources, and culture as part of national identity (Siregar et al., 2023). The importance of technological advancement is further emphasized by the Indonesian government through the National Research Master Plan (RIRN) 2017-2045, which sets out the four pillars of Indonesia's vision 2045 and underlines the urgency of creative and digital economic development platforms as one of the indicators of sustainable economic development. In other words, RIRN highlights the significance of science and technology in creating added value for an innovation-based economy (Suryanegara, 2023).

Therefore, the government also needs to adapt the education and learning system to advances in information technology (Manurung, 2021). This is because the education system in the future will no longer be judged based on the number of student graduations, but based on students' readiness to function well in the 21st century and the Fifth Industrial Revolution (Baron et al., 2022). A very significant change in the world of education occurred in the learning process that once adopted a distance learning system during the pandemic. This system has caused all learning materials to undergo a digitization process that can be accessed by all students via the internet (Mahmud & Koniyo, 2023). Technology can indeed be a powerful tool in the learning transformation process due to its ability to help improve the relationship between educators and students, generate innovative learning and collaboration approaches, eliminate accessibility gaps, and implement learning experiences that are engaging and meet the needs of all students (Trust, 2018). Therefore, the use of technology in education in Indonesia can provide many benefits, namely increasing the efficiency of learning, increasing the accessibility of education, and enabling distance learning. Various technologies such as computers, internet, social media, and mobile devices are increasingly used in the learning process in Indonesia (Rabani et al., 2023).

In addition to education, technology has also begun to influence the development of local wisdom that is part of a nation's cultural

heritage. Today, the integration of local wisdom has become part of character-building education in Indonesia, so there are many innovations in the introduction and development of local wisdom through the use of technology (Indah & Rohmah, 2021). The internet can then be used to promote local wisdom in a region or country so that it can be known by people around the world. Moreover, Indonesia has abundant local wisdom that must be promoted, so that local and foreign tourists can visit and enjoy the beauty of Indonesian local wisdom (Wahyuningsih & Wijayanti, 2021).

This paper then aims to explain in more depth the role, implementation and influence of technological advances on the development of education and local wisdom in Indonesia. The influence of technology on local wisdom education is also identified. This is very interesting to explore further, given that traditional values are still very strongly embedded in the life of the nation and state of the Indonesian people, including in the education sector and local wisdom, so that the entry of technology can have a negative impact on the erasure of these national values. However, the Indonesian government seeks to utilize technological advances in social life without having to eliminate traditional values that have long become the identity of the Indonesian nation. This is evidenced by the issuance of various laws and other regulations that emphasize that the application of technology must respect and maintain traditional knowledge and local wisdom.

## **METHOD**

The method used was a qualitative research method that focused on constructing, organizing, and interpreting textual material. This method was typically employed to explore the meaning of certain social phenomena experienced by individuals or communities in a scientific setting (Malterud, 2001). Qualitative research thus offered a robust framework for examining the complex relationship between technological advancement, education, and local wisdom in Indonesia. By utilizing textual materials, the author was able to trace the development of technology and its implementation in education and local wisdom, which played an important role in advancing the nation.

Subsequently, this study employed data collection techniques in the form of a literature review by gathering literature that was selected, researched, and analyzed. The literature review played an essential role as the foundation for all types of research. This technique contributed as a basis for developing science, shaping policy and practice guidelines, providing effective evidence, and generating new ideas and insights for the research field (Snyder, 2019). The research procedure using the literature review technique consisted of three stages: (1) preparing the research topic, (2) searching for relevant reference sources, and (3) documenting the findings from these sources (Creswell, 2012).

The data sources used comprised two types: primary data and secondary data. Primary data focused on legislation and other regulations issued by the Indonesian government related to the application of technology. Meanwhile, secondary data was obtained from reputable national and international journals that discussed technology, education, and local wisdom.

## **RESULTS AND DISCUSSION**

### **The Role of Technology in Improving the Effectiveness of the Education System**

As the global education landscape evolves, technology influences pedagogical approaches and enriches learning experiences. Integrating technology into the classroom can act as a significant asset in advancing students' cognitive development (Widodo & Akbar, 2024). Through technology, learning and teaching activities can be carried out without any restrictions and time differences. Teaching with technology in the classroom helps increase students' willingness to learn more and changes their perception of learning activities in general. The use of technology then has a positive effect in improving students' motivation and literacy skills as well as helping teachers to provide instruction in a variety of ways through digital platforms (Nugraha et al., 2022; Rabani et al., 2023).

The Indonesian government through the Ministry of Education and Culture has signaled the integration of technology into teachers' teaching practices. In Minister of Education and Culture Regulation No. 65/2013 on Process

Standards for Primary and Secondary Education, the government encourages teachers to utilize technology to improve learning efficiency and effectiveness. A number of national policies also state that teachers in Indonesia should not always rely on the use of blackboards in the classroom. They are encouraged to utilize technology more because it is more engaging, thus increasing students' enthusiasm for learning and making classrooms more attractive (Mali, 2016). In 2011, the government initiated the establishment of the Rumah Belajar platform to support the digitization of education and create an online learning environment. This platform has a number of very useful features, such as online classes, learning materials related to the education curriculum, communication facilities for the educator community, question banks, and virtual laboratories (UNICEF, 2021).

The Indonesian government has placed digitalization at the forefront of its education agenda. The realization of this goal involves leveraging the transformative power of technology to achieve desired outcomes, such as expanding access to education to remote areas, providing diverse learning materials and online courses, and improving essential digital skills (Rizal et al., 2019). The government then imposes no restrictions on the digital platforms that schools can use, so the use of information and communication technology tools in Indonesia is very diverse, ranging from everyday communication applications to creative and educational technologies. Further details can be seen in Table 1 (Noegroho & Zahra, 2024).

**Table 1.** Examples of Information and Communication Technology Use in School Classrooms in Indonesia

<b>Function</b>	<b>Information and Communication Technology Equipment</b>
Video conferencing (remote learning)	Zoom, Google Meet, Cisco Webex
Learning management system or student digital activity monitoring	Jamteacher, Gredu, Quintal, Classroom Application, Moodle, Canvas, Blackboard

Function	Information and Communication Technology Equipment
Creation of interactive content	Canva, Microsoft PowerPoint, Google Forms, Flipgrid
Gamified learning	Kahoot, Quizizz, Quizlet
Online communication and collaboration	WhatsApp, Facebook, Google Classroom, Google Docs, Microsoft Teams
Educational resources (audio-visual content, e-books, learning modules)	Merdeka Belajar, Mengajar, Google, YouTube, TikTok, Google Scholar

Launched in 2019, Merdeka Belajar policy became Indonesia's initiative to meet the demands of the Industrial Revolution 4.0 era. The policy examines the root causes that negatively impact Indonesia's education system, demonstrates the intent and reach of the education rejuvenation program, and reveals how technology tools and interventions play a key role in policy implementation. A number of technology platforms were launched to facilitate the implementation of Merdeka Belajar, including Rapor Pendidikan, ARKAS, SIPLah, and Merdeka Mengajar Platform (Wang et al., 2023).

Rapor Pendidikan shows the results of school assessments in the form of learning indicators accompanied by root cause analysis, school plans, and improvement recommendations. The platform has provided positive support to Indonesian schools in their transformation process towards data-driven decision-making. Citing the results of a research survey by Wang et al. (2023), more than 80% of respondents agreed that Rapor Pendidikan plays a crucial role in identifying priority areas for academic improvement, allowing schools to formulate better academic plans in the future. Meanwhile, ARKAS can be used to process financing, planning, and reporting on government funds. It is usually used in conjunction with SIPLah, a procurement platform that connects schools with nine different e-commerce partners to provide a wider choice of products. ARKAS and SIPLah can streamline the financing process by

providing easy and transparent workflows for teachers (Wang et al., 2023).

Furthermore, Platform Merdeka Mengajar (PMM) acts as a central network for educational resources by providing teachers with access to learning materials provided by the government. Not only that, PMM has also created opportunities for collaboration and knowledge sharing among teachers from different regions. For example, teachers from remote areas in easternmost Indonesia, such as Papua, can exchange ideas and experiences with teachers from westernmost Indonesia, such as Aceh. PMM is further supported by other government programs, most notably Guru Penggerak, which aims to improve teachers' performance as leaders by promoting a wide range of positive behaviors, such as technology implementation, through special training programs. These programs not only contribute to teachers' professional development, but also promote a sense of unity and collective growth within the teaching community, especially among educators in border areas (Noegroho & Zahra, 2024).

In early 2022, the Ministry of Education, Culture, Research and Technology has introduced the Merdeka Curriculum as part of the government's initiative to address the learning setbacks experienced during the pandemic. This innovative curriculum emphasizes the important role of technology in promoting active student engagement, personalized learning, and more adaptive education methods. Students are also encouraged to actively utilize digital tools and resources in research, information gathering, data analysis, and presentation of findings. The government also seeks to increase students' accessibility to online databases, digital libraries, software simulations, and multimedia creation tools. Therefore, the regulation has promoted educational principles that view learning as a holistic development process connected to other aspects of students' lives (UNESCO, 2023).

In his research, Sewang (2022) then combined traditional and online learning systems which is called blended learning. According to him, blended learning is able to provide a number of benefits, such as higher classroom efficiency, higher teaching flexibility, and students feel more comfortable. This is because the system is

an integration of strong and beneficial elements of face-to-face learning and web-based learning. Research results by Sewang (2022) even showed that students in Indonesia who were taught through blended learning performed better in every exam. The blended learning approach provides an efficient atmosphere for the development of students' communication skills as evidenced by their increased engagement during the learning process. Thus, whether it is used as the main or supporting equipment in the learning process, technology has a crucial role in creating an effective and efficient education system.

### **The Role of Technology in Promoting Local Wisdom on the Global Stage**

Indonesia is known as a country with abundant local wisdom. Quoting Zakiyah et al. (2022), local wisdom is a set of unwritten rules that become a reference for people in running their lives, such as (1) rules regarding human relationships, for example in social interactions between individuals and groups related to hierarchy in society, marriage rules, and manners; (2) rules regarding the relationship between humans and nature, animals, and plants aimed at maintaining nature conservation; and (3) rules regarding human relationships with God or spiritual matters. Local wisdom can take the form of customs or traditions, institutions, words of wisdom, and so on. A number of programs and regulations have been issued to maintain local wisdom owned by the community in the midst of globalization. However, strengthening local culture and wisdom in the current era needs to involve incorporating traditional values and knowledge into contemporary technology and society. This aims to maintain and promote the community's cultural heritage while adapting to the rapidly evolving global landscape (Wahdiniawati et al., 2023).

The importance of local wisdom is then emphasized in the development of the Capital City of the Archipelago (IKN) in East Kalimantan. In Law No. 3 of 2022 on the National Capital City, it is stated that spatial planning, land and land ownership transfer, environment, natural disaster mitigation, and defense and security must be carried out by observing and protecting the individual and communal rights of local communities and

cultural values that represent local wisdom. The law also discusses the technology used in smart city development as a key concept of IKN. Thus, it is clear that Indonesian legislation has facilitated the development of local wisdom based on technology and culture (Siregar et al., 2023).

Technology is also utilized to beautify artworks and introduce them to the global scene. With technology, the messages contained in culture-based artworks and local wisdom become easier to understand by the community and the younger generation (Azis et al., 2020). Live art performances also often incorporate digital innovations to increase accessibility, engagement, and artistic expression. Technology plays a crucial role in promoting and expanding the reach of live performances to audiences around the world through the Internet. Figure 1 is an example of video mapping that creates a connection between objects and projected animation that can showcase local wisdom to audiences in a creative and artistic context (Midyanti & Sukmayadi, 2021).



**Figure 1.** Video Mapping of Prambanan Temple and Ramayana Performance 2016

The development of new media has been a powerful catalyst in connecting traditional and modern elements and expanding the reach of communication and engagement. With its digital platforms and interactive features, new media serves as a dynamic channel to promote art performances. Technological advancements have offered augmented reality (AR), virtual reality (VR), and immersive experiences. Geographical limitations do not hinder artists because, through technology, they can provide access to audiences around the world to watch their art performances. For example, Figure 2 shows an AR feature of a Sundanese art performance that

enables viewers to access the content on their mobile devices before, after, and during the performance (Midyanti & Sukmayadi, 2021).



**Figure 2.** Mobile Augmented Reality of Sundanese Artwork Performance

Furthermore, digital online platforms also provide a new method of preserving and storing performing arts for future generations. These platforms are able to preserve cultural heritage by converting recordings, images and sounds into digital formats and then creating digital repositories for storage. This certainly helps protect cultural heritage from the risks caused by globalization and cultural degradation (Severo & Venturini, 2016). Streaming is also increasingly used by artists to popularize their art. Through the use of live streaming technology, audiences can conveniently access performances in various places using only a webcam and an internet network (Yan, 2021).

Wahyuningsih & Wijayanti (2021) added that social media has provided many benefits in promoting Indonesian local wisdom, such as (1) increasing flexibility and mobility for people to upload videos about Indonesian local wisdom on YouTube; (2) providing opportunities to introduce Indonesian local wisdom through social networks connected to the whole world; (3) increasing people's innovative abilities in creating interesting content and videos; and (4) social media is able to promote tourism related to Indonesian local wisdom. Therefore, it can be

said that the rapid development of technology underscores the importance of adapting the performance process of local wisdom-based artworks so that they can be effectively communicated to the current generation, ultimately facilitating information exchange and contributing to the maintenance of cultural identity.

### **The Influence of Technological Advances on Education Based on Local Wisdom**

Local wisdom values can act as a fortress for students to absorb information and build their competencies. This is because the quality of graduates must not only have quality competencies, but also values that are inherent in the characteristics of the Indonesian nation. Therefore, studying local wisdom is an unavoidable requirement (Baron et al., 2022). In the digital era, digital literacy can also be used in language learning based on local wisdom. This is because the results of information transformation are expected to be able to support the cultural literacy of the community. Cultural literacy refers to knowledge about the history and perspectives of various cultural groups produced through reading, writing, and other activities that require interaction with culture and reflection on that culture (Nelisa et al., 2029). By carrying local wisdom in digital literacy-based learning, students are expected to be able to recognize their culture and the values contained therein (Manurung, 2021). The inclusion of local wisdom-based learning tools can also improve students' thinking skills (Baron et al., 2022). In the process of national culture and character education, students can be actively involved in developing their potential, carrying out the internalization process, appreciating the values of the nation that become their personality in socializing, developing a more prosperous community life, and developing a dignified community life (Zakiyah et al., 2022). Therefore, the integration of local wisdom into the learning system in Indonesia not only enriches learning materials but also increases strong national and cultural awareness. This is in line with the spirit of the Merdeka curriculum which aims to produce a generation of the nation with noble character, love for the homeland, and Pancasila personality (Fauziah et al., 2023).

SMA Batik 2 Surakarta is one of the schools that has implemented local wisdom-based character

education through arts and culture learning. The school also provides various supporting facilities, such as a batik studio, karawitan studio, traditional dance studio, and batik exhibition space to showcase the work of its students. Not only that, SMA Batik 2 Surakarta also developed I-Spring based on arts and culture learning technology to improve student learning achievement in two-dimensional artwork material. This technology can internalize local wisdom values to be actualized by students in their behavior and actions in real life. After internalization is carried out continuously, students can have a cultural identity within themselves (Fatro et al., 2019). In addition to schools, the use of technology in local wisdom-based education is also applied in the community. One of them is the Holistic Village Development and Empowerment Program called the Local Wisdom-Based Literacy Park (TALI RAFIKA) in Cicadas Village, Bandung. This program was initiated by the Ministry of Education and Culture which aims to help address village problems in various aspects through efforts to increase awareness/behavior, insight/knowledge, and community capabilities. A team was then formed to implement technological literacy education by providing an understanding of the application of digital machines and technology. They will conduct training in utilizing social media such as Facebook, Instagram, or YouTube as a way that can be used by the community to market local products, especially citronella oil (Maulinda et al., 2021). In this context, home-based citronella oil entrepreneurs are given training so that they can use social media to obtain important information related to their products, so that product quality can also improve. Thus, the TALI RAFIKA program not only increases the knowledge of village communities, but is also expected to be able to eradicate poverty in the form of incapability, lack of knowledge and capabilities, and lack of capital and resources. Technological literacy education can ultimately increase technological literacy for the community in Cicadas Village, so that they have the knowledge and ability to use information technology, especially social media (Maulinda et al., 2021).

## **CONCLUSION**

Technological advances have brought about significant changes in people's lives, including in the education and local wisdom sectors. Indonesia then tried to utilize this technology to advance the education system and popularize its local wisdom. Various digital platforms have been created by the government to facilitate the learning process to run more effectively and produce graduates with digital capabilities. This is further emphasized by the government through the formation of the Merdeka Belajar policy which is Indonesia's initiative to meet demand in the Industrial Revolution 4.0 era. Not only that, technology is also utilized to develop local wisdom to make it more beautiful and attractive. Digital platforms, especially social media, are used to promote local wisdom to the global arena. However, the use of technology in the fields of education and local wisdom in Indonesia is still not running optimally.

## **Recommendations**

This article then provides a number of recommendations to policy makers, educators, and the community so that the use of technology in both sectors is better. First, forming a strategic education roadmap. A well-structured plan has a crucial role in uniting efforts, clarifying goals, and coordinating actions. In this context, the government needs to develop a specific roadmap to examine the unique challenges faced by schools in Indonesia, especially those in remote areas. Second, facilitate inclusive and sustainable digital education and skills development by focusing on differentiated learning. Teachers should not adopt a one-size-fits-all approach, but a differentiated learning approach based on the needs of their students. Third, periodically assess and improve the quality of learning materials available on digital platforms. The government needs to ensure that there is a mechanism for digital platforms, such as Rumah Belajar, to receive regular feedback from their audiences to ensure that the products and services provided meet their needs.

Moving on to the fourth recommendation, which is to improve digital security to prevent cybercrime. The government needs to create a digital platform that is safe for children. This can be done by integrating security into digital

products based on the principle of safety by design. Detection and reporting of Child Sexual Abuse Material (CSAM) on educational platforms also need to be emphasized. Fifth, provide comprehensive digital training to the community. The government needs to ensure that people in remote areas also receive digital training, so that they have the ability to help promote local wisdom through technology. Sixth, increase the promotion of local wisdom on social media. In addition to relying on the community, the government must also be directly involved in promoting Indonesia's local wisdom. This action is taken so that the community, especially the younger generation, can get to know their own culture, considering that many young Indonesians are more into following and enjoying foreign cultures.

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