

Education and Technology Synergy for Society 5.0: Addressing Social Disparities and Supporting Sustainable Development

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ABSTRACT

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The concept of Society 5.0 was introduced by the Japanese government as a vision for the future society that prioritizes human needs and is supported by advanced technology. This research aims to explore the role of technologies such as Artificial Intelligence (AI) and the Internet of Things (IoT) in addressing social disparities and achieving the Sustainable Development Goals (SDGs). The method used is a qualitative approach based on literature study with relevant literature analysis. The results indicate that technology integration can enhance educational access in remote areas, but it also faces significant infrastructure challenges. Collaboration between the public and private sectors is crucial for realizing the potential of Society 5.0 in education.

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INTRODUCTION

The concept of Society 5.0 was first introduced by the Japanese government as a vision to create a future society that is human-centred and supported by advanced technologies such as Artificial Intelligence (AI), Internet of Things (IoT), and big data. In Society 5.0, technology is used to address various social and economic challenges, such as unequal access to education, social inequality, and resource sustainability. Nakamura explains that Society 5.0 is an effort to integrate technology that aims to create a better life, where humans and technology coexist to improve welfare and quality of life (Nakamura, 2021: 44-62). Yonekura explains that Society 5.0 is a transformation that puts humans at the centre of technology integration to solve social problems in a more adaptive way (Yonekura, 2020: 34-56). In a global context, Society 5.0 is also expected to help address major global issues such as social inequality and the achievement of Sustainable Development Goals (SDGs). AI technology can be used to improve access to quality education in remote areas, while IoT can be used to improve infrastructure and healthcare services in less developed regions (Smith and Tanaka, 2021: 102-120). This is in line with SDG 4 (Quality Education) which targets equitable access to education and SDG 10 (Reducing Inequalities) which seeks to address social disparities between urban and rural communities and ensure equal access to education and opportunities (United Nations, 2018: 18-27).

The integration of technology in education according to Kusuma allows students in remote areas to gain access to learning materials through digital platforms and AI-based software that helps personalise their learning process (Kusuma, 2019: 78-95). However, the implementation of Society 5.0 also faces various challenges, especially in developing countries (World Economic Forum, 2022: 30-48). The gap in access to technology and digital infrastructure that remains high in some countries, including Indonesia, is an obstacle to creating an inclusive society. Therefore, synergy between the government, private sector, and society is needed to overcome these obstacles so that the goals of Society 5.0 can be achieved (Putri, 2022: 67-85).

Despite the enormous potential that technology has to raise educational standards, there are still several obstacles in the way of its adoption. Two crucial aspects that must be taken into account are the availability of sufficient infrastructure and teacher preparation. The disparity in educational opportunities across different regions particularly in isolated and underdeveloped areas is one of the primary issues. This leads to disparities in access to high-quality education. The Central Statistics Agency (BPS, 2022) figures show that there are still notable

differences in Indonesia's urban and rural populations' access to schooling. As a result, it is critical to investigate how breakthroughs in AI-based learning might help address this problem.

The use of learning platforms customized to students' needs, data analysis to track students' progress, and the creation of interactive learning tools are a few examples of AI-based learning innovations. In order for educators to make the most of this technology, it is also crucial that they receive training on the application of AI in the classroom. It is intended that by performing a thorough examination, helpful recommendations for educators and policy makers can be uncovered. This study adds to the body of knowledge demonstrating how, in the Society 5.0 era, education may be made better by utilizing artificial intelligence (AI) technology to close access barriers.

METHODS

A qualitative research method based on library research is a research approach that focuses on collecting and analysing data from various literatures, such as books, journals, scientific articles, reports, and other written sources. This method is used to gain a deep understanding of a particular topic or phenomenon through existing theoretical studies (Creswell & Poth, 2018: 30). The purpose of writing this article is to explore how education can synergise with technology in the framework of Society 5.0 to overcome social inequality and support the achievement of Sustainable Development Goals (SDGs). This article will discuss the role of technologies such as Artificial Intelligence (AI), Internet of Things, and big data analysis in improving access to education, expanding learning opportunities for all, and facilitating more inclusive education.

RESULT AND DISCUSSION

Society 5.0 is the concept of a future society that integrates advanced technologies such as Artificial Intelligence (AI), the Internet of Things, and big data with everyday life, yet focuses on humans as the centre of all innovation. Unlike Industry 4.0 which focuses on automation and efficiency of production processes, Society 5.0 emphasises on creating solutions to social problems such as social inequality, demographic change, and economic inequality. According to Nakano, this society uses technology to achieve a balance between economic growth and solving social problems (Nakano, 2021: 45-67). Sankai argues that Society 5.0 is a new way of looking at the relationship between humans and technology. In his view, Society 5.0 is not only about technological innovation, but also about how technology can be used to improve human interaction and create a better environment. Sankai argues that technology should serve as a tool to empower people, not the other way round, thereby promoting better social development and reducing existing inequalities (Sankai, 2018: 12-25). Society 5.0 is an advanced phase of the information-based society created by the digital revolution that integrates technology into every aspect of daily life with the aim of creating added value for society. Society 5.0 seeks to strike a balance between technological advancement and human well-being, and address pressing social issues, such as economic inequality and environmental concerns (Tanaka, 2019: 30-48). The ultimate goal of Society 5.0 is to achieve sustainability by integrating technologies that support a better and more inclusive society. Harayama highlights the importance of collaboration between the public and private sectors in creating innovative solutions that can address global challenges and improve people's quality of life (Harayama, 2020: 65-80).

The SDGs are a set of global goals developed by the United Nations (UN) in 2015, with the aim of achieving sustainable development by 2030. There are 17 goals, but the most relevant to education and technology is SDG 4 (Quality Education) which aims to ensure equitable access to quality education for all and promote lifelong learning opportunities. In this context, technologies such as Artificial Intelligence (AI) and big data can be used to design more personalised and effective learning experiences. For example, by utilising AI algorithms, educational institutions can identify each student's strengths and weaknesses, thereby providing learning materials that suit individual needs. This helps create an inclusive learning environment and supports every student to reach their full potential. UNESCO states in its report that technology-enabled education can accelerate the achievement of SDG 4 (UNESCO, 2020: 23-34) and SDG 10 (Reducing Inequality) which aims to reduce income and opportunity inequalities between countries as well as within societies themselves.

Society 5.0 can help address this issue by utilising digital technology to expand access to education. For example, e-learning platforms and learning apps accessible from mobile devices allow students in remote areas to get quality education without having to move. In addition, government programmes that integrate technology in education can help provide resources and training for teachers in underserved areas. Thus, Society 5.0 can serve as a tool to reduce the education gap and create equality in access to education (United Nations, 2015: 22-25). According to a report from the UNDP, the use of digital technology can reduce social inequality through increased access to education and health services (UNDP, 2019: 65-80).

Society 5.0 offers a framework for achieving the SDGs through the innovative application of technology. The integration of AI and IoT enables a more inclusive and affordable education system, especially in remote areas. This is in accordance with the explanation put forward by Ishikawa who emphasises that technology can accelerate the achievement of the SDGs by making education more adaptive and accessible to all (Ishikawa, 2022:

89-105). In Society 5.0, the use of big data can serve as a foundation for curriculum development and teaching methods that are more responsive to the needs of society. Through data analysis, educational institutions can identify learning trends, measure teaching effectiveness and tailor educational programmes to be more relevant to the needs of industry and the labour market. For example, data collected from various sources can be used to design a curriculum that covers not only academic knowledge, but also practical skills needed in the world of work. In this way, Society 5.0 can increase the relevance of education and prepare future generations to face global challenges (Zawacki, Marin, Bond & Gouverneur, 2019: 30). Society 5.0 also encourages collaboration between the government, private sector and educational institutions in creating a more adaptive education system. Involving various parties, including industry, can result in relevant training programmes and best practices that can be adopted by schools. For example, partnerships between universities and companies can result in internship programmes that allow students to gain hands-on work experience. Such programmes can not only enhance students' skills, but also help companies to gain work-ready talent. Society 5.0 is thus a platform for collaboration-based educational innovation (Rumble & Harmad, 2020: 50-63).

In this era, digital literacy and skills are crucial to prepare individuals for the changing dynamics of the world of work. Therefore, education should emphasise the development of skills such as critical thinking, creativity and the ability to collaborate. By integrating technology in learning, students can be taught how to use digital tools to solve complex problems and innovate. For example, the use of technology-based collaborative projects can train students to work together, share ideas and develop creative solutions to social problems. Society 5.0 can also support the sustainability-focused goals of the SDGs by educating future generations about environmental issues and the importance of safeguarding natural resources. By utilising technology, education can deliver better information and increase environmental awareness among students. Curricula that integrate learning about sustainability and eco-friendly practices can help create more environmentally responsible individuals. Through such an approach, it not only creates quality education, but also prepares individuals to contribute to sustainable development (United Nations, 2021:15-17).

Innovation in education through digital technology has created new opportunities such as e-learning, the use of AI to personalise learning, and online learning platforms. These technologies allow students to learn anytime and anywhere, which can directly expand access to quality education. The use of big data in education enables in-depth analysis of students' learning needs, so that the curriculum can be customised to suit individual learning styles and needs. Smith mentioned that the use of data can help schools design more targeted programmes. In the era of Society 5.0, digital literacy is becoming an important foundational skill, along with critical thinking, creativity and collaboration. These are crucial to prepare students for complex global challenges (Clara, 2019: 102-118). Technology has great potential to reduce disparities in access to education, especially in remote areas that are difficult to reach by conventional education. The use of digital devices in remote schools can provide equal access to learning materials (Fahmy, 2021: 78-92). Technology, especially the internet, has opened the door for students in remote areas to access educational resources that were previously difficult to reach. With e-learning platforms, students can take online courses, access learning materials, and interact with teachers and classmates without geographical restrictions. For example, Coursera, Ruang Guru, and Khan Academy provide various courses that can be accessed for free or at an affordable cost. In this way, students from remote areas can obtain quality education equivalent to that of students in big cities. Virtual classrooms provide opportunities for students in remote areas to participate in learning that may not otherwise be available. Using tools such as Zoom, Google Classroom and Microsoft Teams, teachers can teach students remotely. Virtual classrooms allow students to still get an education without having to travel long distances to school.

Virtual classrooms also allow for better teacher training, so teachers in remote areas can improve their skills and adopt more modern and effective teaching methods. With proper training, teachers can utilise technology to improve teaching and learning in the classroom. Technology also enables students from different locations to collaborate and learn together while allowing students to interact, share knowledge and work on group projects, regardless of their physical location. This cross-regional collaboration not only expands access to education, but also improves students' social and collaborative skills, which are essential for the future world of work. It also creates opportunities for students to meet people from different backgrounds, increasing intercultural understanding and reducing prejudice. Thus, technology not only provides access to education, but also broadens students' horizons.

Some examples of successful technology implementation include: Firstly, the Digital Literacy Programme (DLP) in Kenya was launched in 2013 with the main objective of improving digital skills among public primary school students. The programme aims for every student to have access to digital devices such as tablets, while teachers are equipped with laptops and training to integrate technology in the learning process. The initiative is part of Kenya's efforts to reduce the digital divide and prepare the younger generation for challenges in an increasingly digitalised world. The DLP implementation focuses on developing Information and Communication Technology (ICT) infrastructure in schools, including training more than 75,000 teachers to effectively use digital

tools. In addition, the programme also provides internet access in remote areas. The positive impact is seen in increased student engagement, critical thinking and problem-solving skills through the use of multimedia content and digital educational applications. In addition to government assistance, the programme is supported by partnerships with the private sector and international organisations to ensure the distribution of digital devices to schools across Kenya. Despite challenges such as limited funding, disparities between urban and rural schools, and initial resistance to technological change, the programme continues to grow with efforts to expand internet connectivity and innovate educational content. Next steps include implementing new technologies such as artificial intelligence (AI) and virtual reality (VR) to enrich students' learning experience.

Secondly, Ruang Guru App is one of the technology-based education programmes that has been successfully implemented in Indonesia and focuses on reducing social disparities in education. Ruang Guru provides access to various learning materials, including learning videos, practice questions, and online tutors that can be accessed by students across Indonesia, including remote areas. This helps students who may not have access to adequate tutoring or learning resources. The results show that the use of Ruang Guru improves students' understanding of the subject matter and optimises the teaching and learning process. The author also notes that better access to educational resources helps students from disadvantaged backgrounds to catch up academically (Nursyam, 2021: 65-74). Ruang Guru not only provides access to students but also empowers them to learn independently. Study results show increased motivation to learn among students and improvements in academic achievement, especially for those living in areas with limited access to education (Harahap, 2020: 12-19). In addition, the opportunities offered by this app are increased accessibility of education and flexibility in learning. However, the application also has challenges, such as limited technological infrastructure in remote areas and the need for training for teachers to utilise the application effectively (Setiawan, 2022: 128-135).

In the application of technology in education, there are still many challenges and problems that occur, including: (1) infrastructure limitations, in many areas especially in remote areas, access to fast and reliable internet is often not available. Without adequate infrastructure, the use of technology in learning becomes difficult, if not impossible. According to a survey conducted by the Indonesian Internet Service Providers Association, equitable internet access can improve the efficiency of the learning process in areas that have been isolated (APJII, 2022: 34-50). To overcome these problems, the government and educational institutions should work together to improve technological infrastructure. This could include investment in better internet networks, provision of hardware such as computers and tablets, and technical training for teachers and students. (2) Many students and teachers in remote areas lack the necessary skills and knowledge to use technology effectively. Low digital literacy can hinder the utilisation of technology in the teaching and learning process. Therefore, digital literacy training should be an integral part of the education curriculum. Schools and educational institutions should provide training programmes designed to improve technology skills for both students and teachers. This can be done through workshops, online courses or hands-on training. By improving digital literacy, students and teachers will be better equipped to utilise technology in learning. (3) While technology has the potential to widen access to education, the fact is that technology itself can exacerbate inequality if access is unequal. Students from lower economic backgrounds may not have access to the necessary devices for technology-based learning.

To address this issue, government programs and non-profit organisations should be in place to provide devices to students in need. For example, Corporate Social Responsibility (CSR) in the form of tablets, laptops, or smartphones for underprivileged students aims to provide access to technology to children in underserved areas. Wilson revealed that private investment in education technology can accelerate equitable access to facilities and infrastructure that support the teaching and learning process in schools, especially those in rural areas (Emily Wilson, 2018: 89-105). In addition, scholarships or financial support programmes can help low-income families to purchase the necessary devices. (4) In many cases, both teachers and students may be resistant to the changes that come with technology integration. Attachment to traditional teaching methods can be an obstacle to the adoption of more innovative technologies. To overcome this resistance, it is important to involve all stakeholders, including teachers, students and parents, in the transition process. Incentivising teachers to use technology in their teaching, as well as demonstrating the tangible benefits of using technology in learning, can help reduce resistance. Experience sharing sessions and case studies from schools that have successfully implemented technology can also be inspiring.

Cross-sector collaboration is a key element in creating an adaptive education system that can meet the challenges of the digital era and support the sustainable development goals (SDGs). Collaboration between the government, private sector and non-governmental organisations (NGOs) is essential to expand access to education and improve its quality. The government can provide supportive regulations and policies, while the private sector can contribute the technology and innovation needed in the learning process. Non-governmental organisations, such as NGOs, can assist in reaching underserved communities (David Roberts, 2019: 123-137). In creating an adaptive education system, technology plays an important role, especially in providing learning solutions that can

be tailored to the needs of individual students. Thompson elaborates that this curriculum adaptation allows each student to learn in a way that best suits their learning style and rhythm, which is crucial for success in the digital age (Sarah Thompson, 2020: 45-62). The private sector also plays an important role in providing technological infrastructure for schools, especially in hard-to-reach areas.

With cooperation between the government and private companies, infrastructure development such as internet networks and digital learning devices can be done more efficiently. Collaboration between universities, research centres and industry can encourage innovation in learning methods. Universities can conduct research to develop more effective education methods, while the industrial sector can provide technology or tools that support the implementation of the research results. The synergy between academic research and industry resources can create a learning environment that is more dynamic and responsive to the changing needs of the world of work. Cross-sector collaboration plays a major role in achieving SDG 4 (Quality Education) and SDG 10 (Reducing Inequalities). By bringing together resources and expertise from different sectors, education programmes can be more inclusive and reach vulnerable groups, including children from underprivileged families and rural communities. This collaboration not only improves access, but also the quality of education, so that people can attain the skills needed to contribute to sustainable development.

CONCLUSIONS

Society 5.0 is a future concept that integrates advanced technologies such as Artificial Intelligence (AI), the Internet of Things and big data with everyday life, with the main focus on humans as the centre of innovation. Unlike Industry 4.0, which emphasises automation and efficiency, Society 5.0 aims to create solutions to social problems, such as social inequality, demographic change and economic inequality. The concept emphasises a balance between economic growth and solving social problems, with collaboration between the public and private sectors as the key to sustainable innovation. SDGs (Sustainable Development Goals) are global goals launched by the United Nations to achieve sustainable development by 2030, with a focus on the goals of quality education (SDG 4) and reducing inequality (SDG 10). In this context, technology plays an important role in creating a more personalised and inclusive learning experience, and expanding access to education in remote areas through e-learning platforms and educational apps.

The use of digital technology in education offers great opportunities, such as e-learning, personalised learning with AI, and big data analysis to develop relevant curriculum. However, challenges such as limited infrastructure, low digital literacy and resistance to change need to be overcome. Cross-sector collaboration between the government, private sector and NGOs is a key element in creating an adaptive education system capable of achieving the SDGs, expanding access to education and improving its quality. Examples of successful implementation of educational technology in various countries show the great potential of technology to overcome educational disparities and improve the quality of learning. Thus, society 5.0 can serve as an innovative platform to create better, inclusive and sustainable education in the future.

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