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Period Front Education Era Revolution Industry 4.0 Going To Society 5.0

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ABSTRACT

Background: Education must continuously evolve in response to technological advancement and societal change. During the Industrial Revolution 4.0, educational systems integrated internet networks and information technology through learning models such as blended learning, case-based learning, and hybrid learning. The emergence of Society 5.0 has further transformed education by emphasizing human-centered technology and 21st-century competencies, including critical thinking, creativity, communication, collaboration, and digital literacy.
Objective: This study aims to analyze the development of education from the Industrial Revolution 4.0 toward Society 5.0 and identify the challenges and strategies needed to address technological transformation and modern competency demands.
Method: This study employed a descriptive qualitative approach using library research methods. Data were collected from scientific journals, articles, books, and relevant documents related to education in the Industrial Revolution 4.0 and Society 5.0 eras. Data analysis was conducted systematically through data collection, reduction, interpretation, and conclusion drawing.
Findings and Implications: The findings reveal that educational transformation in the Society 5.0 era requires not only technological mastery but also the strengthening of critical thinking, creativity, communication, collaboration, and digital literacy skills. Technology-based learning through IoT, artificial intelligence, problem-based learning, and project-based learning plays an important role in improving learning quality. Teachers remain central figures as facilitators, motivators, and character builders who cannot be replaced by technology.
Conclusion: Education in the Society 5.0 era must continuously innovate through curriculum reform, teacher competency improvement, and wise technology integration to produce adaptive, creative, critical, and competitive human resources.

INTRODUCTION

Advances in information technology are unavoidable, including in education. Technology and education are increasingly integrated to improve the quality of learning. The Ministry of Education and Culture has launched a digitalization program for schools and developed various educational applications to facilitate this change (Kalimullina et al., 2021).

Education in the context of the Fourth Industrial Revolution is evolving in response to shifting industrial demands by incorporating a curriculum relevant to contemporary circumstances. This curriculum aims to broaden global perspectives through the use of technology, specifically the Internet of Things (IoT). The Ministry of Education recommends that students master the use of technology such as smartphones, laptops, and computers in the educational process. Furthermore, this initiative requires improving teachers' skills in information and communication technology.

Educators play a crucial role in the success of school digitalization initiatives, developing superior human resources (Riinawati & Noor, 2024). In the educational context, teachers in the Industry 4.0 era must possess a strong passion for learning and strong technological competencies. Educators are expected to foster a new generation capable of addressing the challenges of the Fourth Industrial Revolution, where humans are increasingly being replaced by artificial intelligence and machines in various areas of life.

The concept of Smart Society 5.0 emerged as a response to the anticipated disruptions caused by the Industrial Revolution 4.0, which could diminish human roles and weaken human identity (Ziatdinov et al., 2024). This approach will enhance individual character and resilience in critical thinking, problem-solving, and coping with adversity and environmental change through the use of more advanced technology. Therefore, educators must be proficient in using various supporting tools, such as Google Meet, Google Classroom, and Zoom, while also developing basic teaching competencies.

Overall, the implementation of Industrial Revolution 4.0 and Society 5.0 in Indonesia is still incomplete; however, the concept of Society 5.0 is being promoted globally by Japan. Society 5.0 is an industrial revolution characterized by advances in the Internet of Things, big data, and artificial intelligence, with the aim of improving human life, in contrast to the Industrial Revolution 4.0 which focused on technological advancements for commercial productivity. The Society 5.0 trend has an indirect impact, as Indonesia, as a developing country, has the right to actively participate in preparing for the future of Society 5.0 (Saragih, 2022).

Society 5.0 is a civilization capable of addressing many societal problems and challenges through the use of technology derived from the Industrial Revolution 4.0 period. B. The Internet of Things, artificial intelligence, big data, and robotics to improve the quality of human existence. The idea of the Industrial Revolution 5.0 has the potential to drastically change the way we live, work, and interact. However, the Industrial Revolution 5.0 is not actually a new concept. This contrasts with the Industrial Revolution 4.0 which marked the rise of the industrial era. Collaboration between humans, technology, and digital platforms is increasingly realized. Currently, some robots are designed to operate alongside and interact directly with humans. Society 5.0 presents different problems in several domains, particularly in education and learning (Rafsanjani, 2023).

Society Era 5.0 is a concept originating in Japan to denote a new era characterized by superior technology. This idea relates not only to industrial industries but also to how individuals overcome challenges through the integration of real and virtual environments. The idea of Society 5.0 was developed in response to issues facing Japan, including declining population growth rates, shrinking working-age demographics, and global warming caused by the greenhouse effect. The primary goal of Society 5.0 is to advance human welfare through the integration of diverse services supported by cutting-edge technology. In the medical field, for

instance, this vision is realized through hospitals that are able to disseminate health data and facilitate wider access to home care services, particularly for the elderly. In terms of mobility, technology is introduced to sparsely populated areas to overcome distribution limitations and reduce scarcity of essential goods and services. Within the infrastructure sector, the application of advanced technologies such as detectors and sensors plays a crucial role in identifying and addressing problems that require timely repair. Furthermore, the development of financial technology (*fintech*) provides more efficient access to financial services, though it also introduces new regulatory and security challenges. The implementation of these integrated systems demands specialized skills; therefore, enhancing individual competencies becomes a strategic priority. These rapid developments, while offering significant opportunities, simultaneously present complex challenges that Indonesia must anticipate and address to fully harness the potential of Society 5.0. (Widhi et al., 2023).

Learning refers to the active phase of teachers and students in implementing a learning program. These stages include activity plans that explain basic skills and important ideas, detailing time allocation, indicators for achieving learning objectives, and the procedural process of learning activities in the main content of each topic (Jimenez et al., 2024) . The Industrial Revolution 4.0 and Society 5.0 require a new and creative educational framework capable of overcoming the difficulties posed by the Industrial Revolution 4.0 and Society 5.0. In the field of education, it is conceivable that humans and robots can participate in the learning process, both in physical and virtual classrooms as is currently the case. Students may encounter robots operated by instructors. However, with the newly implemented system,

In today's society, the role of educators cannot be replaced by technology. The irreplaceable role of teachers includes face-to-face classroom interaction, establishing emotional bonds between educators and students, developing character, and modeling values. During the global coronavirus pandemic, advances in the 5th Industrial Revolution and related technologies are considered extremely beneficial. Every aspect relies on existing technology (Javaid et al., 2020). Technology is like an angel.

The only assistant. Technology facilitates all aspects, from learning and conceptual understanding to course materials and educational outcomes. The Industrial Revolution 5.0 era has transformed our perception of school. The modifications implemented relate not only to pedagogical approaches, but more importantly, to the overall concept of education.

Therefore, the creation of current and future curricula must enhance students' competencies in pedagogical aspects, life skills, collaborative living, and critical and creative thinking. It also enhances interpersonal skills, transferable skills, and implicit skills that are useful in many work situations, such as interpersonal skills, living together, the ability to be a globally minded citizen, and media and fact literacy.

RESEARCH METHOD

The research methodology used is bibliographic or qualitative descriptive literature research. Research data is obtained from bibliographic sources or specialized literature exchanges on the issue under discussion. Data is collected, analyzed, and conclusions are drawn.

RESULT AND DISCUSSION

Education is one aspect impacted by the COVID-19 pandemic. Learning, previously conducted face-to-face, has shifted to a more mobile format during the

pandemic. Through online learning, you can learn without the constraints of time and place. This means learning can occur anytime and anywhere (Anderson et al., 2021).

This situation will also accelerate the transition from the Industrial Revolution 4.0 era to the Society 5.0 era. What is a revolution? This revolution refers to the advancement of a new civilization based on technology. The Society 5.0 era is a process of collaboration between humans and technology. This civilization was introduced by Japan in 2019 (Deguchi et al., 2020).

Education is a planned and conscious effort to create an environment and learning process, so that students can actively develop spiritual abilities, self-control, social skills, and the potential of the nation. (HAM 2003) According to Kunandar, it is a means of education to achieve prosperity, progress, and the survival of a nation. Based on these two opinions, the world of education is very crucial in forming the next generation of the nation who are qualified, have strong skills to face challenges, and are able to innovate towards improvement (Cobo, 2013).

In the era of Society 5.0, the education sector plays a crucial role in improving the quality of human resources. In addition to education, various factors and stakeholders, including the government, Community Organizations (Ormas), and the entire community, also play a role in welcoming the era of Society 5.0. In the 5.0 era, industry is beginning to enter the virtual world, connecting humans, machines, and data, collectively known as the Internet of Things (IoT) . Industry 5.0 has introduced flexible mass production technology, enabling robots to function independently or collaborate with humans, managing manufacturing processes through synchronized time, and unifying and managing production processes. A distinctive aspect of Industry 5.0 is the use of artificial intelligence (AI). In the context of Society 5.0, a conducive educational environment is crucial.

Students should be introduced to and encouraged to engage in critical and constructive thinking within an educational framework. This ensures that the skills learned can be effectively utilized in everyday life. This also helps them address existing problems by applying the information and skills acquired as a result of their education at school. The emergence of Society 5.0, which marks the peak of the 4.0 era, presents significant challenges and opportunities for the world of education. Educators are crucial educational agents in the Society 5.0 era and must possess adequate skills. They must effectively communicate lesson content and stimulate students' critical and creative thinking.

In addition to developing curricula and educational facilities appropriate to the Society 5.0 era, educators are also required to ensure optimal curriculum implementation. Consequently, teachers must possess several core and complementary competencies, including educational expertise, technology commercialization expertise, globalization acumen, future strategy competency, and counseling skills. Educators must possess a technology-oriented mindset, demonstrate collaboration, demonstrate creativity and risk-taking, possess a strong sense of humor, and adopt a holistic teaching approach . The quality of education in the context of Society 5.0 depends on teachers, who serve as crucial agents of change. Educators' primary task is to quickly equip themselves to adapt to the Society 5.0 era and the myriad challenges they will face.

According to (George & George, 2024), the advantages of adopting Society 5.0 :

a. Online healthcare providers will deliver effective, data-driven medical care by connecting and exchanging medical information currently scattered across hospitals. Remote medical care allows seniors to reduce the frequency of hospital visits. Furthermore, individuals can measure and monitor health

metrics, such as heart rate, at home, thereby increasing the life expectancy of those in good health.

b. Mobility in areas with inadequate public transportation will be improved by the presence of delivery cars and drones, making online buying and selling transactions easier for everyone.
c. Infrastructure improvements for safety and productivity are increasingly being made due to advances in information and communication technology, which allows for mitigation or detection of any negative impacts, thus allowing for early remediation.
d. At that time, the financial technology system for international money transfers was still burdensome for some stakeholders, both in terms of time and administrative costs.
e. The blockchain created will reduce time and costs while ensuring security.

The educational landscape in the Society 5.0 era is expected to offer a more significant learning experience through the facilitation of enjoyable educational activities. The education sector in the era of Society 5.0 is confronted with a series of complex and multidimensional challenges that require strategic responses. Among these challenges are the implications of the transition from Industry 4.0 to Society 5.0, which demand adaptive learning systems; growing environmental issues that call for sustainable educational practices; and rapid advances in information technology that reshape teaching and learning methods. In addition, the convergence of science and technology requires curricula that integrate interdisciplinary knowledge, while the shift toward an innovation-driven economy highlights the urgency of fostering creativity and problem-solving skills among students. The increasing significance of creative and cultural industries further necessitates education that values local wisdom while promoting global competitiveness. Moreover, shifts in global economic power underscore the need for graduates with international perspectives and resilience in facing global market dynamics. At the same time, the pervasive influence of technology requires critical digital literacy to mitigate its risks. Finally, the education sector must address issues of quality, investment, and systemic transformation to ensure inclusivity, equity, and sustainability. Collectively, these challenges illustrate the necessity of comprehensive reforms in educational policy and practice to fully prepare future generations for the demands of Society 5.0 (Carayannis & Morawska, 2023).

To actualize or prepare for the Society 5.0 era, students cannot simply understand or acquire theoretical knowledge during learning activities. They must be equipped to engage in critical and constructive thinking to facilitate an enjoyable learning experience. This can be achieved by formulating a learning framework in educational institutions that encompasses many elements (Ria & Wahidy, 2020), including:

1. Initially, implement HOTS (Higher-Order Thinking Skills), which include the ability to solve complex problems, engage in critical analysis, and demonstrate creativity. HOTS is implemented by presenting real-world problems to students through current challenges. This includes environmental and health issues, as well as the use of science and technology. Students are required to analyze and solve these problems.
2. Second, by revitalizing the progressive learning paradigm that emphasizes not only content mastery but also technology integration to drive Society 5.0.
3. Third, by selecting an appropriate learning model. This aims to provide an environment for students to explore the principles of knowledge and creativity.

In this regard, educators can choose from a variety of pedagogical approaches, including discovery learning, project-based learning, problem-based learning, and inquiry-based learning. The application of diverse learning models aims to stimulate student engagement and foster critical thinking.

4. Fourth, by improving instructor skills. Educators must develop competencies in the cognitive, emotional, and psychomotor domains to adapt to the Society 5.0 era by enhancing scientific knowledge, attitudes, and abilities.
5. Fifth, by offering advanced infrastructure and tailored educational resources, including IT-enabled smart buildings such as classrooms, libraries, and laboratories, enhanced with IoT and AI technologies, as well as supplementary learning materials for students (Ria & Wahidy, 2020).

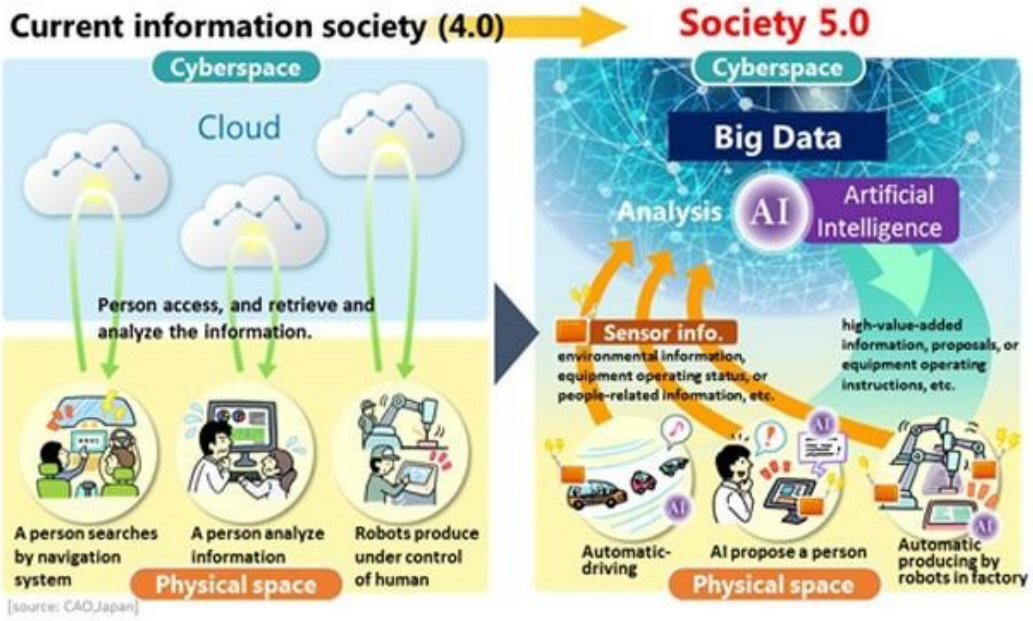
The 21st century has introduced changes to the education system, including curricula and teaching staff. The government and educators must agree to modify the education system to improve the quality of human resources ready to face the challenges of globalization. Various transformations and obstacles frequently arise in Society 5.0, particularly in the field of education. In the Society 5.0 era, education is crucial for improving human resource capacity. Furthermore, society is expected to embrace and participate in the emergence of Society 5.0.

The educational landscape must shift its learning paradigm. This includes curriculum and pedagogical competencies, as well as developing educators capable of disseminating knowledge and utilizing internet technology according to students' needs. Furthermore, educators must actively contribute to the development of students' character and ethics, ensuring they develop into ethical members of Generation Z and reject deviant behavior in an era where technology facilitates such actions without moral considerations. The government has initiated a program that emphasizes educators as facilitators, teachers, learners, and sources of true inspiration through independent learning. In a national seminar titled "Preparing Professional Education in the Era of Society" on Wednesday, February 3, 2021, Dwi Nurani, S.KM., M.Si., emphasized that academic freedom will foster quality education for all Indonesians. Improving services and access to basic education involves developing and enhancing infrastructure and technology platforms in elementary schools. National education based on technology and adequate infrastructure is expected to facilitate the establishment of schools and/or classrooms in the future.

"Furthermore, the implementation of independent learning requires coordination between all stakeholders, including local governments, the private sector (industry, etc.), school administrators, educators, and the community." Principals must demonstrate leadership by collaborating with local governments and the community to implement effective education in schools. "Improving the human resources of educators and school administrators requires sustainable development at the local and international levels to effectively address the challenges posed by the industrial sector and to navigate the era of Industrial Revolution 4.0 and Society 5.0," she said (Nurani, 2021).

In the context of Society 5.0, prioritizing competence and adaptability is crucial. To adapt to the Society 5.0 era, it is crucial to understand generational evolution. Addressing the challenges of the Industrial Revolution 4.0 in relation to Society 5.0 in education requires 21st-century life skills, commonly referred to as the 4Cs (Creativity, Critical Thinking, Communication, and Collaboration). Educators are expected to be innovative individuals, capable of teaching, enlightening, inspiring, and serving as role models for their students. In the 21st century, students are expected to possess six fundamental literacies: scientific literacy, numeracy, financial literacy,

information literacy, and cultural and civic literacy. In addition to basic reading, additional skills include reasoning, critical thinking, effective communication, collaboration, and problem-solving skills. A key aspect is demonstrating behavior (character) that aligns with the Pancasila student profile, including initiative, perseverance, curiosity, adaptability, leadership qualities, and socio-cultural awareness.



Picture 1. Method Work Society 5.0

Developing superior human resources capable of adapting to the Society 5.0 era, while ensuring students develop a Pancasila-based student profile for balance. Enhancing Pancasila values for students can be achieved through intracurricular, extracurricular, and co-curricular activities, community cultural empowerment, and school-based initiatives .

CONCLUSION

particularly the gap between technical progress and social well-being, which further highlights the gap between technology and humanity. The ultimate goal of Society 5.0 is to eliminate the distinction between technology and humanity, fostering a society where all individuals can experience life to the fullest. This philosophy aims for economic progress and technical advancement with an emphasis on humanity, benefiting not just a select few, but all of humanity. Although Society 5.0 began in Japan, its goals extend beyond the success of a single country. Rather, its existing structures and technologies will undoubtedly help address societal issues globally.

Educators play a crucial role in learning activities, as they must help students identify solutions to current challenges and encourage innovation in addressing them. The origins of the problem. This initiative seeks to ensure that students can enhance their innovation and creativity in practical contexts. Various methods are employed to equip students to become creative, imaginative, and principled individuals, one of which is by enhancing the learning experience through technological advancements.

Indonesia is currently in the Industrial Revolution 4.0 and is ready to transition to Society 5.0. The emergence of Society 5.0 indirectly influences the acceleration of transformation in several fields, including the economy, social, cultural, and

educational sectors. This is closely related to changes in schools. The resources developed to meet each period are people who were once students in the education system.

Therefore, education is deemed necessary to undergo modification and advancement in line with current needs, namely the Society 5.0 era, which coincides with the Fourth Industrial Revolution that emphasizes the acceleration of technological progress. The Society 5.0 period has impacted the evolution of education by transforming learning models, methodologies, and media.

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