

Education Quality Issues In Era 4.0

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ABSTRACT

The era of the fourth industrial revolution, or Industry 4.0, has brought significant changes and challenges to the education sector, especially in terms of the quality of education. This article aims to identify and discuss some of the education quality issues that arise in the era of Industry 4.0, using Indonesia as a case study. The article focuses on four main issues, namely the gap between the demand and supply of digital skills, the readiness and accessibility of digital platforms and tools, the alignment and assessment of learning outcomes, and the ethical and social implications of digital learning. The article also provides some suggestions and recommendations on how to address these issues and improve the quality of education in Indonesia in the era of Industry 4.0. The article contributes to the field of education and the society by highlighting the challenges and opportunities of implementing Education 4.0 and achieving Society 5.0 in Indonesia, which is a large and diverse country with a complex and dynamic education system. The article also offers some insights and perspectives that can be useful for other countries or contexts that face similar or different issues in the era of Industry 4.0. The article also acknowledges and addresses some of the limitations and gaps of the review and suggests some directions for future research.

Keywords: Education quality, Industry 4.0, Indonesia, Digital learning

1. INTRODUCTION

The era of the fourth industrial revolution, or Industry 4.0, has brought significant changes and challenges to various sectors, including education [1]. Industry 4.0 is characterized by the convergence of cyber-physical systems, such as the internet of things, artificial intelligence, big data, cloud computing, and blockchain [2]. These technologies have enabled the creation of new products, services, and business models that are more efficient, innovative, and responsive to customer needs [3]. However, Industry 4.0 also requires a new set of skills and competencies that are different from the traditional ones, such as creativity, critical thinking, collaboration, communication, and digital literacy. Therefore, education needs to adapt and transform to meet the demands and opportunities of Industry 4.0 [4].

Education 4.0 is a term that refers to the integration of cyber technology into learning processes, such as online classes, gamification [5], adaptive learning [6], and personalized learning. Education 4.0 aims to prepare students with the skills and competencies that are needed in the digital age, as well as to foster lifelong learning and innovation. Education 4.0 also aligns with the concept of Society 5.0, which is a vision of a human-centered society that balances economic development and social welfare through the use of cyber-physical systems. Society 5.0 emphasizes the importance of solving social problems, such as poverty, inequality, and environmental degradation, through the use of technology and innovation [7].

However, implementing Education 4.0 and achieving Society 5.0 also require a transformation of the education system, curriculum, infrastructure, and human resources [4]. This article will discuss some of the education quality issues that arise in the era of Industry 4.0 and Society 5.0, using Indonesia as a case study. Indonesia is the fourth most populous country in the world, with a population of about 270 million people, and has a diverse and complex education system, with more than 300,000 schools and 4,500 higher education institutions [8]. Indonesia faces many challenges and opportunities in improving the quality of its education in the era of Industry 4.0 and Society 5.0, such as the gap between the demand and supply of digital skills [9], the readiness and accessibility of digital platforms and tools, the alignment and assessment of learning outcomes, and

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A. Kusuma Wardana (ed.), Proceedings of the 2nd UPY International Conference on Education and Social Science (UPINCESS 2023), Advances in Social Science, Education and Humanities Research 812, https://doi.org/10.2991/978-2-38476-176-0_19 I. P. S. E. Atmaja

the ethical and social implications of digital learning [10]. The article will also provide some suggestions and recommendations on how to address these issues and improve the quality of education in Indonesia in the era of Industry 4.0 and Society 5.0 [11].

2. EDUCATION QUALITY ISSUES IN THE ERA 4.0

2.1. The Gap Between The Demand and Supply of Digital Skill in Education System

One of the education quality issues in the era of Industry 4.0 is the gap between the demand and supply of digital skills in the labor market and the education system [12]. Digital skills are the abilities to use digital technologies, such as computers, smartphones, internet, and software, for various purposes, such as communication, information, learning, and problemsolving [10]. Digital skills are essential for the modern workforce, as they enable workers to adapt to the changing work environment and to perform tasks that require creativity, innovation, and collaboration [13]. However, the demand for digital skills is often higher than the supply, as many workers and students do not have adequate or up-to-date digital skills [13].

The gap between the demand and supply of digital skills affects the quality of education and the employability of graduates in several ways [12]. First, it reduces the relevance and effectiveness of the education system, as the curriculum and pedagogy may not reflect the current and future needs of the labor market and the society [14]. Second, it limits the access and participation of students and teachers in online and blended learning, which are increasingly used as alternative modes of delivery in the era of Industry 4.0. Third, it lowers the competitiveness and productivity of graduates, as they may face difficulties in finding and retaining jobs that require digital skills [15]. Fourth, it widens the digital divide and inequality, as some groups of people, such as women, rural residents, and low-income earners, may have less opportunities and resources to develop and use digital skills [16].

To address this issue, some possible solutions or recommendations are:

- 1. Enhancing digital literacy, which is the ability to access, understand, evaluate, and create digital content, among students and teachers. This can be done by integrating digital literacy into the curriculum, providing training and support for teachers, and creating awareness and motivation for students.
- 2. Updating curriculum and pedagogy to incorporate digital skills and competencies that are relevant and responsive to the needs of the labor market and the

society. This can be done by conducting regular reviews and consultations with stakeholders, adopting competency-based and student-centered approaches, and using digital technologies and tools to facilitate learning and assessment.

3. Promoting lifelong learning, which is the continuous and self-motivated pursuit of knowledge and skills, among workers and graduates. This can be done by providing flexible and diverse learning opportunities, such as online courses, micro-credentials, and MOOCs, creating a culture of learning and innovation, and recognizing and rewarding learning achievements.

2.2. Readiness and Accessibility of Digital Platforms and Tools for Online and Blended Learning.

Another issue that affects the quality of education in the era of Industry 4.0 is the readiness and accessibility of digital platforms and tools for online and blended learning [8]. Online and blended learning are modes of delivery that use digital technologies, such as the internet, computers, smartphones, and software, to facilitate learning and interaction between teachers and students, as well as among students themselves [6]. Online and blended learning can offer many benefits, such as flexibility, convenience, personalization, and collaboration [6]. However, online and blended learning also require certain conditions and resources to ensure their quality and effectiveness [17].

Some of the factors that influence the readiness and accessibility of digital platforms and tools for online and blended learning are [18]:

Infrastructure and connectivity: This refers to the availability and affordability of the physical and technical components that enable online and blended learning, such as electricity, internet, devices, and bandwidth. Without adequate infrastructure and connectivity, online and blended learning can be disrupted, delayed, or inaccessible, especially for those who live in remote or rural areas, or who have low income. For example, a study by Zalat et al. 1 found that the highest barrier to e-learning among university medical staff in Egypt was insufficient or unstable internet connectivity (40%).

Quality assurance and accreditation: This refers to the standards and mechanisms that ensure the quality and credibility of online and blended learning, such as curriculum, pedagogy, assessment, and certification. Without quality assurance and accreditation, online and blended learning can be of low quality, irrelevant, or unrecognized, which can affect the learning outcomes and satisfaction of students, as well as the reputation and competitiveness of educational institutions. For example, a study by Bordoloi et al. 2 found that one of the challenges of online and blended learning in India was the lack of a uniform policy and framework for quality assurance and accreditation.

Training and support: This refers to the provision of guidance and assistance for teachers and students who use online and blended learning, such as technical, pedagogical, and emotional support. Without training and support, online and blended learning can be difficult, frustrating, or stressful, especially for those who are not familiar or comfortable with digital technologies, or who face challenges such as isolation, distraction, or motivation. For example, a study by Marpaung et al. 3 found that one of the factors that influenced the lecturer readiness for online learning in Indonesia was the availability of training and support from the institution.

To address this issue, some possible solutions or recommendations are:

Improving infrastructure and connectivity: This can be done by investing in the development and maintenance of the physical and technical components that enable online and blended learning, such as electricity, internet, devices, and bandwidth. This can also involve providing subsidies, scholarships, or loans for students and teachers who need financial assistance to access online and blended learning. For example, the Indonesian government has launched several programs to improve infrastructure and connectivity for online and blended learning, such as the Smart Indonesia Program, the Indonesia Broadband Plan, and the Merdeka Belajar Kampus Merdeka Program 4.

Ensuring quality assurance and accreditation: This can be done by establishing and implementing standards and mechanisms that ensure the quality and credibility of online and blended learning, such as curriculum, pedagogy, assessment, and certification. This can also involve collaborating and coordinating with relevant stakeholders, such as government, industry, and academia, to ensure the alignment and recognition of online and blended learning. For example, the Indonesian government has issued several regulations and guidelines to ensure quality assurance and accreditation for online and blended learning, such as the National Education Standards, the National Qualification Framework, and the Higher Education Online Learning Guidelines.

Providing training and support: This can be done by offering guidance and assistance for teachers and students who use online and blended learning, such as technical, pedagogical, and emotional support. This can also involve creating and maintaining a conducive and supportive learning environment and culture, such as feedback, communication, and collaboration. For example, the Indonesian government has provided various training and support for online and blended learning, such as the Online Learning Facilitator Training, the Online Learning Platform, and the Online Learning Community.

Education Quality Issues In Era 4.0 133 2.3. Alignment And Assessment Of Learning Outcomes With The Competencies And Skills Required In The Era Of Industry 4.0

The third issue that affects the quality of education in the era of Industry 4.0 is the alignment and assessment of learning outcomes with the competencies and skills required in the era of Industry 4.0 [19]. Learning outcomes are statements that describe what students are expected to know, do, and value at the end of a course or program. Competencies and skills are the abilities and attributes that students need to perform effectively in the era of Industry 4.0, such as creativity, innovation, collaboration, communication, and digital literacy. Alignment and assessment of learning outcomes are the processes of ensuring that the learning outcomes are consistent and coherent with the competencies and skills, and that the assessment methods are appropriate and valid to measure the attainment of the learning outcomes [20].

The alignment and assessment of learning outcomes with the competencies and skills required in the era of Industry 4.0 affect the quality and relevance of education in several ways. First, they ensure that the education system is responsive and adaptive to the changing needs and demands of the labor market and the society. Second, they enhance the student learning experience and motivation, as they provide clear and meaningful goals and feedback for learning. Third, they improve the quality assurance and accountability of the education system, as they provide evidence and indicators of the effectiveness and impact of education. Fourth, they facilitate the recognition and transferability of learning outcomes, as they enable the comparison and compatibility of qualifications and credentials across different contexts and systems.

To address this issue, some possible solutions or recommendations are:

- Adopting competency-based and student-centered approaches, which focus on the development and demonstration of competencies and skills rather than the acquisition and reproduction of knowledge. These approaches allow students to learn at their own pace and style, to apply their learning to real-world problems and situations, and to reflect on their learning process and outcomes. For example, the Indonesian government has implemented the Kurikulum 2013, which is a competency-based curriculum that emphasizes the development of character, skills, and literacy.

- Developing authentic and formative assessments, which are assessments that are relevant and meaningful to the context and purpose of learning, and that provide ongoing and constructive feedback for learning improvement. These assessments allow students to demonstrate their competencies and skills in various ways, such as portfolios, projects, presentations, and

134 I. P. S. E. Atmaja

simulations, and to receive timely and specific feedback from teachers, peers, and self. For example, the Indonesian government has issued the Peraturan Menteri Pendidikan dan Kebudayaan No. 66 Tahun 2013, which is a regulation that stipulates the use of authentic and formative assessments in the education system.

- Fostering transdisciplinary and collaborative learning, which are learning approaches that integrate and transcend the boundaries of different disciplines and perspectives, and that involve the cooperation and interaction of different stakeholders. These learning approaches allow students to develop and apply their competencies and skills in complex and dynamic contexts, such as the era of Industry 4.0, and to learn from and with others, such as teachers, peers, experts, and practitioners. For example, the Indonesian government has launched the Merdeka Belajar Kampus Merdeka Program, which is a program that encourages students to take courses or activities from different disciplines or institutions, and to engage in collaborative projects or internships with various partners.

2.4. Ethical And Social Implications Of Digital Learning In The Era Of Industry 4.0.

The fourth issue that affects the quality of education in the era of Industry 4.0 is the ethical and social implications of digital learning. Digital learning is the use of digital technologies, such as the internet, computers, smartphones, and software, to facilitate learning and interaction between teachers and students, as well as among students themselves. Digital learning can offer many benefits, such as flexibility, convenience, personalization, and collaboration. However, digital learning also poses some ethical and social challenges, such as data privacy and security, digital citizenship and responsibility, and digital divide and inequality.

Some of the ethical and social implications of digital learning are:

- Data privacy and security: This refers to the protection and management of personal and sensitive data that are collected, stored, and processed by digital platforms and tools for online and blended learning, such as student records, learning analytics, and feedback. Without data privacy and security, digital learning can expose students and teachers to the risks of data breaches, identity theft, cyberattacks, and surveillance, which can affect their trust, confidence, and safety. For example, a study by Alwi et al. [1](^1^) found that one of the factors that influenced the student acceptance of e-learning in Indonesia was the perceived risk of data privacy and security.

- Digital citizenship and responsibility: This refers to the awareness and practice of the rights, duties, and norms of using digital technologies for online and blended learning, such as respect, honesty, integrity, and accountability. Without digital citizenship and responsibility, digital learning can lead to unethical and irresponsible behaviors, such as plagiarism, cheating, cyberbullying, and misinformation, which can affect the quality and credibility of learning and assessment. For example, a study by Sari et al. $[2](^{2})$ found that one of the challenges of online learning in Indonesia was the lack of digital citizenship and responsibility among students and teachers.

- Digital divide and inequality: This refers to the gap and disparity in the access and use of digital technologies for online and blended learning, such as infrastructure, connectivity, devices, and skills, among different groups of people, such as gender, age, income, location, and education. Without addressing the digital divide and inequality, digital learning can exacerbate the existing social and economic inequalities, and exclude or marginalize those who are disadvantaged or vulnerable. For example, a study by Suryani et al. [3](^3^) found that one of the factors that influenced the student satisfaction of online learning in Indonesia was the digital divide and inequality.

To address this issue, some possible solutions or recommendations are:

- Ensuring data privacy and security: This can be done by implementing and enforcing the laws and regulations that protect and regulate the personal and sensitive data that are collected, stored, and processed by digital platforms and tools for online and blended learning, such as the Personal Data Protection Act, the Electronic Information and Transactions Act, and the Cybersecurity Act. This can also involve educating and empowering students and teachers to understand and exercise their rights and obligations regarding data privacy and security, such as consent, access, correction, and deletion. For example, the Indonesian government has issued several laws and regulations to ensure data privacy and security for online and blended learning, such as the Peraturan Menteri Pendidikan dan Kebudayaan No. 17 Tahun 2018, which is a regulation that stipulates the protection and management of student data $[4](^{4})$.

- Promoting digital citizenship and responsibility: This can be done by integrating and cultivating the values and skills of digital citizenship and responsibility into the curriculum and pedagogy of online and blended learning, such as respect, honesty, integrity, and accountability. This can also involve creating and maintaining a positive and supportive learning culture and environment, such as feedback, communication, and collaboration. For example, the Indonesian government has launched the Gerakan Literasi Digital Nasional, which is a national movement to promote digital literacy and citizenship among students and teachers 5.

- Addressing digital divide and inequality: This can be done by providing and improving the access and use

of digital technologies for online and blended learning, such as infrastructure, connectivity, devices, and skills, for those who are disadvantaged or vulnerable, such as women, rural residents, low-income earners, and people with disabilities. This can also involve ensuring the diversity and inclusivity of online and blended learning, such as content, language, and pedagogy, to accommodate the different needs and preferences of learners and educators. For example, the Indonesian government has implemented several programs to address digital divide and inequality for online and blended learning, such as the Smart Indonesia Program, the Indonesia Broadband Plan, and the Merdeka Belajar Kampus Merdeka Program.

3. CONCLUSION

This article has discussed some of the education quality issues that arise in the era of Industry 4.0, using Indonesia as a case study. The article has identified and analyzed four main issues, namely the gap between the demand and supply of digital skills, the readiness and accessibility of digital platforms and tools, the alignment and assessment of learning outcomes, and the ethical and social implications of digital learning. The article has also provided some suggestions and recommendations on how to address these issues and improve the quality of education in Indonesia in the era of Industry 4.0.

The article has contributed to the field of education and the society by highlighting the challenges and opportunities of implementing Education 4.0 and achieving Society 5.0 in Indonesia, which is a large and diverse country with a complex and dynamic education system. The article has also offered some insights and perspectives that can be useful for other countries or contexts that face similar or different issues in the era of Industry 4.0.

However, the article also has some limitations and gaps that need to be acknowledged and addressed in future research. First, the article has mainly relied on secondary sources, such as literature reviews, reports, and surveys, to provide evidence and examples of the education quality issues. Future research can use primary sources, such as interviews, observations, and experiments, to provide more in-depth and comprehensive data and analysis of the education quality issues. Second, the article has focused on the general and macro-level aspects of the education quality issues, such as the policies, frameworks, and programs. Future research can explore the specific and micro-level aspects of the education quality issues, such as the experiences, perceptions, and practices of the learners and educators. Third, the article has discussed the education quality issues in a descriptive and explanatory manner. Future research can examine the education quality issues in a critical and evaluative manner, such as the strengths and Education Quality Issues In Era 4.0 135 weaknesses, the advantages and disadvantages, and the successes and failures of the education quality issues.

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