# Digital Technology-Based Curriculum Development Management: Implications For Student Graduation Competencies in The Industrial Era 5.0

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**ABSTRACT:** The development of a digital technology-based curriculum is an urgent need in the Industry 5.0 era to prepare competent graduates to face the dynamics of the world of work that focuses on human collaboration and technology. This research aims to analyze the management of curriculum development based on digital technology and its implications on students' graduation competencies with a focus on 21st-century skills such as digital literacy, critical thinking, and collaboration. Using a literature study approach with a descriptive qualitative method. This research identifies that integrations such as e-learning, Augmented Reality (AR), Virtual Reality (VR), and Gamification increase student engagement and support personalized and project-based learning. However, challenges such as the digital divide, limited infrastructure, and lack of teacher competence still hinder implementation. This study recommends strengthening technology infrastructure, teacher training, and inclusive education policies to ensure that the curriculum is relevant to the needs of Industry 5.0, so as to produce graduates who are adaptive, innovative, and ready to complete in the global workforce.

**KEYWORDS:** Curriculum Development Management, Digital Technology-Based Curriculum, Graduation Competencies, Industry 5.0

## INTRODUCTION

Technological developments have brought us into the Era of Society 5.0, where the integration between humans and technology is becoming closer. The concept of Society 5.0 was first introduced by the Japanese government in 2019 in response to the Industrial Revolution 4.0, with the aim of creating a society centered on people and technology(Rahmawati, Ruslan, and Bandarsyah 2021). In this era, technologies such as artificial intelligence (AI), Internet of Things (IoT), and big data are used to improve the quality of human life and solve social problems. It is a blend of high technology and concern for human values. In the midst of accelerating global digital transformation, education is the main pillar of human resource development in the face of urgent demands to adapt. The Society 5.0 era demands a curriculum that not only imparts theoretical knowledge, but also develops students' ability to think critically as well as apply technology ethically in solving complex problems.

These technologies not only improve the efficiency and effectiveness of learning, but also open up new opportunities to create a more personalized and interactive learning experience. Students who are used to the ease of technology, will quickly accept these technologies in their learning process. On the one hand, student involvement in the learning process can be enhanced through more innovative and engaging teaching methods, which are tailored to the individual needs of each student.(Falah Syifa, Furqon, and Setiawan 2025) The implementation of the Independent Curriculum since 2022 has opened up opportunities to integrate digital elements in curriculum development, but it is still faced with obstacles such as unequal access to technology, lack of teacher competence in digital management, and a curriculum that is not fully aligned with the demands of the digital era.

A technology-based curriculum is the integration of features or products derived from technology in the curriculum, which can be in the form of hardware or software features, with the aim of facilitating the process of delivering data to learner participants so that education is efficient and exciting. In the merger, technology is linked to the most important curriculum as the bottom in the formulation of objectives, for the fulfillment of educational materials, educational strategies, and assessments. The position of technology is the most important as a tool to help achieve the goals of the curriculum (Siti, 2022). Digital technology-based curriculum development management involves a strategic process that includes planning, implementation, and evaluation, where technology is not only an aid, but rather a catalyst for personalized and project-based learning.

The main implication of digital technology-based curriculum development management on student graduation competencies in the Industry 5.0 era is the formation of a holistic and adaptive graduate profile. The competencies required are no longer limited to technical skills (hard skills) such as programming and data analysis, but also include emotional intelligence, ethical decision-making skills, and deep digital literacy to collaborate with autonomous systems. In this era, graduates are expected to be able to face the rapidly changing work dynamics, and digital technology plays a role in reducing social disparities through inclusive education. However, without proper management, technology integration has the potential to weaken students' basic competencies, such as critical thinking and creativity, if not balanced with a human-centric approach. Therefore, this study aims to analyze the management pattern of digital technology-based curriculum development to optimize student graduation competencies, with strategic implications for national education policies in the midst of the transition to a 5.0 society.

## METHODS

This study uses a *library research approach* with a type of descriptive qualitative method. Research is research whose data collection is carried out by collecting data from various literature and can also be in the form of documentation materials, magazines, journals, and newspapers (Sarjono, 2008). The main focus of this study is to identify patterns, trends, and theoretical implications related to curriculum development management with competency demands in the 5.0 era without requiring direct interaction with the subject. The descriptive method in this study involves mapping concepts from the literature and critically evaluating the implications of developing a digital technology-based curriculum on shiva competencies such as digital skills, adaptability, and collaboration with intelligent systems. The data used are scientific journal articles, textbooks, as well as theses and dissertations that discuss curriculum management, digital technology in education, and the Industrial 5.0 era collected through *Google Scholar* and articles related to inclusion criteria that include publications in the period 2015-2025, in Indonesian and English as well as direct relevance to the research title.

## RESULT AND DISCUSSION

The development of a digital technology-based curriculum in the Industrial Era 5.0 shows a significant impact on students' graduation competencies. Based on literature reviews from various sources, the integration of digital technology such as learning-based learning *e-learning*, interactive apps, and collaboration platforms play an important role in improving students' digital skills. In education, a ground-based approach *e-learning* has been shown to be effective in improving conceptual mastery and critical thinking skills.(Habibah et al. 2022) *E-learning* Not only does it bring ease of access to learning, but it also increases student motivation and involvement in the teaching and learning process.(Alatas, Azni, and AS 2022) In addition, the investigation-based learning model is mainly supported by technology such as *ChatGPT (AI)* It also contributes significantly to improving students' digital literacy skills.(Hadiq and Ramadhan 2023) The importance of critical thinking skills in learning is able to lead students to face the challenges of the increasingly complex digital era while preparing students to collaborate with machines and make optimal use of technology.

The digital technology-based curriculum, especially in the context of the Independent Learning-Independent Campus (MBKM) program, is designed to meet the evolving needs of the industry, focusing on automation, artificial intelligence, and interconnectivity. In this case, MBKM provides students with the opportunity to gain learning experiences outside the classroom that are relevant to the world of work, such as the development of Internet of Things (IoT)-based applications and projects.(Caingcoy 2023) MBKM provides flexibility to students in choosing learning paths that suit their interests and talents, supporting their competency development efforts. The program serves as a medium for students to interact directly with the industrial world, bridging the gap between theory and practice.(Ulum et al. 2023) Thus, the digital technology-based curriculum implemented within the framework of MBKM has great potential to create graduates who are ready to compete in the job market and are able to adapt quickly to the changes that occur in the 5.0 era.

The development of a curriculum based on digital technology also requires increasing teachers' competence in designing innovative learning. Technology training for teachers has been proven to improve their ability to integrate digital technology. This is in line with a study that shows an increase in understanding of KKG knowledge and skills in the use of *e-learning* Based *Moodle* from 19% to 35% through workshop activities.(Inggriyani, Fazriyah, and Purbasari 2019) In addition, the use of Augmented Reality (AR) and Virtual Reality (VR) in learning not only increases students' interest but also aids in the understanding of complex concepts.

The use of AR in education allows students to see 3D objects in a real context, while VR provides a simulation experience that is close to reality.(February 2022) This way students can be actively involved in the learning process, increase their motivation and engagement with the teaching material.

The use of digital technology in education such as gamification can improve student interaction and transform the learning experience. Research results by Bouchrika shows that gamification serves as a valuable tool to improve user interactivity and engagement with learning systems. By using gamification techniques, students become more motivated to actively participate in the learning process, which supports their academic achievement.(Bouchrika et al. 2019) Project-based learning (PjBL) offers an immersive learning experience where students engage in real-life projects that are relevant to their lives. This is reinforced by research by Paraniti and Suma, who stated that improving teachers' ability to design high-skill learning (HOTS) is key to creating a richer learning experience.(Paraniti and Suma 2022) The use of interactive media in the classroom can help students engage more deeply, spontaneously, and creatively in their learning. In a study by Lewin, it was found that the integration of technology in learning design promotes a shift from teacher-centered learning to student-centered learning, which supports collaboration between students.(Lewin, Cranmer, and McNicol 2018) This approach not only increases students' motivation but also allows them to learn contextually, relevant to real life, thereby deepening their understanding of the material being studied.

While digital technology offers a great opportunity to improve the quality of education, there are a number of challenges that must be overcome in order for these benefits to be felt by all students. These challenges include the digital divide, where in hard-to-reach areas, the lack of adequate internet access results in students not being able to make the best use of educational technology, thus hindering the development of skills needed in the world of work. Inadequate technology infrastructure is also a significant challenge in the implementation of technology-based learning. Without the right infrastructure, the implementation of technology in education will be hampered, resulting in a gap in digital competence among students in different regions.(Nadifa and Ambarwati 2024)

Traditional education is often difficult to adapt to more innovative and technology-based approaches. Some educators may feel uncomfortable or less trained in using technology, resulting in delays in the implementation of more modern and effective learning methods. Most teachers need to receive adequate training and support in order to make effective use of technology in their teaching.(Njenga 2018) This has a considerable negative impact, especially in terms of equitable distribution of graduate competencies. In areas with infrastructure constraints, students tend not to get equal opportunities in developing skills that are urgently needed in this digital era, thus creating inequities in access to education.

The era of industry 5.0 emphasizes collaboration between humans and advanced technologies such as artificial intelligence (AI) and IoT to create more humanistic and sustainable solutions. In this context, curriculum development management is essential, given the rapid changes in technology, so the curriculum must be designed to be able to quickly adapt to new techniques, tools, and resources. The flexibility of the curriculum allows educational institutions to be more responsive to the needs of the industry. This continuous adjustment encourages students to develop an adaptive and essential mindset in a dynamic world of work. This is in line with research by Maskur which emphasizes that changes in the educational curriculum must pay attention to the impact on students, and the importance of developing a curriculum that is responsive to the needs of changing times and current educational conditions.(Mask 2023) The curriculum should be designed to cover 21st-century skills, such as digital literacy, critical thinking, communication, and collaboration. Approaches such as e-learning-based learning, VR and AR-based learning, learning with technology (AI), project-based learning (PjBL), and gamification have proven to be effective in increasing student engagement and preparing them for the challenges of the world of work.

Students' graduation competencies in the Industry 5.0 era include not only academic knowledge, but also practical and digital skills. A technology-integrated curriculum allows students to develop analytical and creative abilities through technology-based projects, such as app development or data analysis. In addition, this approach supports the formation of character and values, such as responsibility and adaptability, which are essential for dealing with a dynamic work environment. Teachers have a central role in the success of technology-based curriculum. They must be able to design learning that utilizes technology creatively and effectively. Educational institutions also need to support by providing adequate facilities and infrastructure, such as computer laboratories and stable internet access.

The main challenge in the implementation of a digital technology-based curriculum is the gap in access to technology, especially in rural areas. Actionable solutions include investment in technology infrastructure, ongoing training for teachers, and the development

of affordable and inclusive digital content. In addition, government policies, such as the Merdeka Learning program, can be a driver to ensure that the curriculum is relevant to the needs of the industry.

## CONCLUSION

The management of curriculum development based on digital technology is currently an important element in ensuring the competence of students graduating in the 5.0 era. The transformation of education towards digital has facilitated the integration of technology in the teaching and learning process, which is adjusted to the needs of industry and community dynamics. The implementation of digital technology in the curriculum allows for the development of competencies, practical skills required in the modern world. For example, the shift to digital-based learning offers a more interactive and holistic learning model that can improve students' digital literacy.

The curriculum should be designed to cover 21st-century skills, such as digital literacy, critical thinking, communication, and collaboration. Approaches such as e-learning-based learning, VR and AR-based learning, learning with technology (AI), project-based learning (PjBL), and gamification have proven to be effective in increasing student engagement and preparing them for the challenges of the world of work.

Unequal access to technology can result in instability in competency development among students. Finally, it is important to create an inclusive learning environment that is able to bridge the digital divide. Therefore, education policy should focus on providing wider access to technology and training for all students to ensure that all individuals are ready to face the challenges of the ever-evolving digital age.

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