Curriculum Implementation in Learning in the Digital Era

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Abstract

The development of digital technology has brought significant changes to the provision of education, including curriculum and learning practice. This article aimed to describe and analyze curriculum implementation in learning in the digital era, particularly in relation to curriculum transformation, technology integration, digital competence, the changing role of the teacher, learner-centered learning, online learning quality, and the challenges of implementation. The study used a qualitative approach with a descriptive-narrative design. The data sources consisted of twenty scholarly articles addressing curriculum transformation, educational technology, digital competence, e-learning, online learning, the Merdeka Curriculum, learner-centered learning, project-based learning, and competency development in the twenty-first century and the Industry 5.0 era. Data were collected through documentation study and literature review and were analyzed by identifying, grouping, interpreting, and synthesizing relevant themes. The results showed that digital technology has become an important component of curriculum implementation and has influenced curriculum design, learning strategies, teacher roles, learner activities, learning resources, interaction, and assessment. However, effective technology integration cannot be achieved merely through the provision of digital devices and platforms; it requires teacher competence, learner readiness, adequate infrastructure, appropriate pedagogical design, institutional support, and attention to gaps in digital access. The study also indicated that digital curriculum implementation should strengthen digital literacy, critical thinking, creativity, collaboration, communication, problem-solving, and lifelong learning. Curriculum implementation in the digital era should therefore be understood as a continuous educational transformation that integrates technology with clear pedagogical goals while maintaining a strong orientation toward learner development.

Keywords: *curriculum implementation; digital learning; educational technology; digital literacy*

1. INTRODUCTION

The development of digital technology has brought fundamental changes to many areas of life, including the provision of education. These changes are marked not only by the increasing use of digital devices in the learning process but also by changes in the ways learners obtain information, interact, communicate, collaborate, and construct knowledge. Under these conditions, the education curriculum faces the demand to adapt to technological developments and to the characteristics of twenty-first-century learning.

The curriculum is essentially the principal instrument that directs the educational process. It determines the goals to be achieved, the competencies to be developed, the material to be studied, the learning experiences to be provided, and the forms of evaluation used to ascertain learners' development. Changes in the social, economic, technological, and cultural environment therefore have direct and indirect consequences for curriculum development and implementation.

The digital era gives rise to the need for a curriculum oriented not only toward the mastery of knowledge but also toward the ability to use technology productively, critically, creatively, collaboratively, and responsibly. Erstad et al. (2021) showed that digital competence is a complex matter because it is not limited to the technical ability to operate digital devices; it also concerns the ability to understand, evaluate, create, and use information and technology appropriately within learning contexts.

These changes make technology no longer merely a learning aid but part of the educational ecosystem. Technology can influence how the curriculum is designed, how learning material is presented, how teachers teach, how learners learn, and how learning outcomes are evaluated. Studies of the role of technology in twenty-first-century curriculum change indicate that technology is an important factor in curriculum transformation, enabling education to respond to changing societal and workplace needs (“The Role of Technology in 21st Century Educational Curriculum Changes,” 2025).

Technology also has the potential to support improvements in learning outcomes and the development of twenty-first-century skills. The use of technology allows learning to take place more flexibly, interactively, and collaboratively, and not to be confined to the conventional classroom. Studies of the role of technology in education indicate that technology integration can support the achievement of learning outcomes while developing the skills required in the twenty-first century (“The Role of Technology in Education,” 2024).

Nevertheless, digital transformation in education does not automatically produce better learning. The availability of technological devices, learning platforms, internet connectivity, and digital learning resources does not guarantee that the curriculum will be implemented successfully. Successful implementation still depends on the

readiness of teachers, learners, and schools; on the design of learning; on infrastructure; and on the capacity of all educational actors to use technology pedagogically.

Ali et al. (2018) showed that the implementation of e-learning faces various barriers, which may arise from technological, organizational, individual, and learning-environment factors. This finding indicates that the digitalization of education must be understood as a change to a whole system rather than merely the procurement of devices.

The same issue is apparent in the implementation of online learning. Castro and Tumibay (2019), through a literature review and meta-analysis, showed the importance of attending to the design and implementation of online learning in determining learning effectiveness. Technology therefore cannot be separated from the quality of the accompanying pedagogical design.

In the context of curriculum development, technology also raises the question of how a curriculum should be designed so that it does not merely follow technological developments but remains oriented toward human needs and educational goals. Costa et al. (2023) discussed how digital education gives rise to questions of curriculum design and how the curriculum needs to be rethought within a digital environment.

This transformation is also relevant to the Indonesian educational context. The implementation of the Merdeka Curriculum, for example, takes place within an educational environment increasingly influenced by digital technology. Haq and W. (2024) examined the implementation of the Merdeka Curriculum in secondary schools in the digital era and pointed to the importance of considering the relationship between curriculum policy and the conditions of its implementation.

Sari and Rugaiyah (2024) likewise situated the implementation of the school curriculum within the context of the digital era 4.0 as an important part of efforts to build quality human resources. This indicates that curriculum implementation needs to be directed so as to develop learner competencies relevant to changes in the social and technological environment.

These changes also encourage the development of more learner-centered approaches to learning. Harahap and Sulasmi (2026) discussed learner-centered curriculum innovation in the digital era. This approach positions learners not merely as recipients of information but as active subjects in the learning process.

In subsequent developments, digital literacy has become an important component of curriculum design. Jordan et al. (2025) positioned the integration of digital literacy into curriculum design as an important framework for twenty-first-century learning.

Digital literacy concerns not only the ability to operate technology but also the ability to access, evaluate, use, process, and produce information responsibly.

Haryaka (2025) connected digital literacy with the ability to think critically and with collaborative learning. This shows that technology should not be positioned as the final goal of learning; it should be a means that supports the development of the ability to think, communicate, collaborate, solve problems, and produce knowledge.

On the other hand, the digitalization of the curriculum can also give rise to new problems. Khoza and Mpungose (2020) showed that the digitalization of the curriculum in higher education has implications for how educational institutions organize learning. Digitalization is not merely the transfer of learning material into digital format; it concerns changes in the structure, practice, and experience of education.

Konstantinidou and Nisiforou (2022) likewise emphasized the importance of the quality of design and implementation in online learning. Changes in the learning environment require adjustments to design so that learning retains academic and pedagogical quality.

Implementation problems become still more complex when technology is used to support project-based learning (PBL). Meng et al. (2023) identified various challenges in implementing PBL through e-learning platforms. This shows that technology can open new opportunities for learning but at the same time requires appropriate design and management.

Demirel et al. (2026) showed that the challenges of e-learning in higher education require an integrated framework. Van Der Merwe et al. (2023), meanwhile, showed that the implementation of e-learning also faces structural and contextual challenges, particularly in Sub-Saharan African countries.

The development of digital technology ultimately calls for continuous curriculum transformation. Lubis et al. (2022) explained that curriculum transformation toward educational innovation needs to respond to the development of digital technology. Zou et al. (2025) likewise showed that twenty-first-century digital learning is marked by developments in trends, challenges, and innovations in technology integration.

In a broader context, Radhiani et al. (2026), through a systematic review of twenty-first-century digital learning trends and teachers' technology integration, showed the importance of the teacher's position in the process of digital transformation. Teachers remain important actors who determine how technology is translated into meaningful learning experiences.

Zulistiani and Khoiri (2025) further connected the development of a digital-technology-based curriculum with graduate competencies in the Industry 5.0 era. This indicates that curriculum implementation needs to be directed toward the

formation of competencies that are not only suited to technological needs but also relevant to human needs and to changes in the world of work.

On the basis of the foregoing, curriculum implementation in the digital era can be understood as a multidimensional issue. The curriculum needs to undergo transformation, but that transformation must be accompanied by the readiness of teachers, learners, and schools, and by infrastructure, learning design, and systems of evaluation. This article therefore aims to describe and analyze curriculum implementation in learning in the digital era, particularly in relation to curriculum transformation, technology integration, digital competence, the changing role of the teacher, learner-centered learning, and the challenges of implementation. Guided by this aim, the study addressed three research questions: (RQ1) How is the curriculum implemented in learning practices in the digital era? (RQ2) How does the integration of digital technology influence curriculum design, teaching, learning, and assessment? (RQ3) What challenges affect the implementation of a technology-based curriculum, and what conditions are required to address them?

2. METHOD

Research Design

This study employed a qualitative approach with a descriptive-narrative design. A qualitative approach was chosen because the study was oriented toward obtaining an in-depth understanding of curriculum implementation in learning in the digital era on the basis of relevant research findings and scholarly analyses. The descriptive-narrative design was used to describe and interpret the phenomenon through scholarly discourse rather than to test hypotheses or measure variables.

Data Sources

The research data were secondary data obtained from twenty predetermined scholarly articles. These sources addressed a range of themes related to curriculum transformation, educational technology, digital competence, e-learning, online learning, the Merdeka Curriculum, learner-centered learning, project-based learning, and the development of competencies in the twenty-first century and the Industry 5.0 era. Because the study analyzed the phenomenon through scholarly literature rather than fieldwork, it involved documentary data sources rather than human informants.

Data Collection Techniques

Data were collected through documentation study and literature review. Each source was analyzed to identify ideas, findings, concepts, challenges, and recommendations concerning curriculum implementation in a digital environment. Because the study relied on documentary sources, interview and observation protocols were not used.

Data Analysis

Data were analyzed in several stages. The first stage was the identification of the main themes across the whole body of literature. The second stage was the grouping of information on the basis of shared issues. The third stage was the interpretation of the relationships among technology, curriculum, teachers, learners, learning design, and the educational environment. The final stage was the arrangement of the results of the analysis in a narrative-descriptive form so as to produce a systematic account of curriculum implementation in the digital era. The analytic framework addressed seven principal themes: (1) curriculum transformation in the digital era; (2) technology integration in learning; (3) digital competence and literacy; (4) the changing role of the teacher; (5) learner-centered learning; (6) the quality of online learning; and (7) the challenges of implementing a technology-based curriculum.

Trustworthiness

Trustworthiness was addressed with reference to the criteria of credibility, transferability, dependability, and confirmability. Credibility was supported by source triangulation, that is, by corroborating analytic claims across multiple independent scholarly sources rather than relying on a single source. Transferability was supported by describing the corpus and the analytic themes so that readers can judge the applicability of the findings to other contexts. Dependability and confirmability were supported by maintaining a systematic and traceable analytic procedure that linked each theme to its supporting sources. Because the study did not involve human participants, member checking was not applicable.

Ethical Considerations

Because the study analyzed publicly available scholarly literature and did not involve human participants or personal data, the ethical requirements centred on academic integrity, the accurate representation of sources, and proper attribution.

3. RESULTS

The thematic analysis produced seven interrelated themes that together address the three research questions, as summarized in Table 1. The themes were derived from the reviewed sources and are presented below with their supporting evidence.

Table 1

Themes, Core Focus, and Supporting Sources Derived from the Analysis

Theme	Core focus / analytic codes	RQ	Key supporting sources
Curriculum transformation as a response to digital development	Rethinking goals, content, strategy, and assessment; beyond digitizing material	RQ1, RQ2	Lubis et al. (2022); Zulistiani & Khoiri (2025)

Theme	Core focus / analytic codes	RQ	Key supporting sources
Technology integration in learning practice	Resources, delivery, communication, collaboration, assessment; system readiness	RQ2	Ali et al. (2018); Zou et al. (2025)
Strengthening digital literacy and competence	Critical, ethical, productive use; literacy embedded in design	RQ2	Erstad et al. (2021); Jordan et al. (2025); Haryaka (2025)
The changing role of the teacher	Facilitator and designer; combined digital and pedagogical competence	RQ1, RQ2	Radhiani et al. (2026)
Learner-centered learning	Active learners; flexible design; guided autonomy	RQ1	Harahap & Sulasmi (2026)
Online learning and the quality of implementation	Design and implementation quality; interaction, feedback, assessment	RQ1, RQ2	Castro & Tumibay (2019); Konstantinidou & Nisiforou (2022)
Challenges in implementing a digital curriculum	Infrastructure, access gap, competence, institutional readiness, design	RQ3	Ali et al. (2018); Demirel et al. (2026); Van Der Merwe et al. (2023); Meng et al. (2023)

Note. RQ = research question; PBL = project-based learning. The themes and codes were derived inductively from the reviewed scholarly sources.

3.1 Curriculum Transformation as a Response to Digital Development

The analysis showed that the development of digital technology drives changes in the way the curriculum is designed and implemented. The curriculum can no longer be oriented solely toward the mastery of content; it needs to make room for the development of digital skills, critical thinking, creativity, communication, collaboration, and problem-solving.

Studies of the role of technology in twenty-first-century curriculum change indicated that technological development is one of the drivers of curriculum transformation. Technology creates a learning environment different from that of conventional education, so that the goals, materials, strategies, and evaluation of learning need to be adjusted ("The Role of Technology in 21st Century Educational Curriculum Changes," 2025).

Lubis et al. (2022) situated curriculum transformation as part of the effort to bring about educational innovation in the era of digital technology. This transformation concerns not only the use of digital media but also changes in educational orientation and in learners' learning experiences. Zulistiani and Khoiri (2025) extended this concern by connecting the development of a digital-technology-based curriculum with graduate competencies in the Industry 5.0 era, indicating that the curriculum needs the capacity to adapt to technological change and to future competency needs.

3.2 Technology Integration in Learning Practice

The analysis showed that technology has become an important part of the conduct of learning. Technology was used to provide learning resources, deliver material, carry out communication, assign tasks, support collaboration, and conduct evaluation. However, effective technology integration is not determined solely by the availability of devices.

Ali et al. (2018) showed that the implementation of e-learning faces various barriers originating from technological, individual, organizational, and environmental factors. The presence of technology therefore cannot be separated from the readiness of the education system. Schools and educational institutions require infrastructure, technical support, policy, teacher competence, and a learning culture that supports the use of technology.

Zou et al. (2025) showed that twenty-first-century digital learning develops through various innovations in technology integration. This indicates that the use of technology in education is a continually changing process that requires ongoing adjustment.

3.3 Strengthening Digital Literacy and Competence

Digital competence emerged as one important outcome of curriculum transformation. Learners not only need to be able to use technological devices; they need to understand how to use technology critically, safely, ethically, productively, and creatively. Erstad et al. (2021) showed that the concept of digital competence has broad dimensions and cannot be reduced to technical skills, since it encompasses the ability to participate and learn within digital environments.

Jordan et al. (2025) emphasized the importance of integrating digital literacy into curriculum design, indicating that digital literacy needs to become part of the learning process rather than merely supplementary material. Haryaka (2025) connected digital literacy with critical thinking and collaborative learning; accordingly, the use of technology in the curriculum needs to be directed toward producing higher-order thinking and the ability to interact with others.

3.4 The Changing Role of the Teacher

The implementation of the curriculum in the digital era also produced changes in the role of the teacher. Teachers were no longer the sole principal source of information, because learners have access to various sources of knowledge through the internet and digital technology. Teachers act as facilitators, designers of learning experiences, mentors, guides, and managers of the learning process. Radhiani et al. (2026) showed the importance of teachers' technology integration in the development of twenty-first-century digital learning.

This change of role requires new competencies. Teachers need to possess both digital and pedagogical abilities in order to determine when, how, and why technology is used in learning. The use of technology without pedagogical ability can result in learning that merely changes its medium without changing the quality of the learning experience. Digital transformation therefore requires the continuous professional development of teachers.

3.5 Learner-Centered Learning

Digital transformation provided opportunities for the development of more learner-centered learning. Technology enabled learners to access various sources, select materials, undertake exploration, work collaboratively, and produce learning artifacts. Harahap and Sulasmi (2026) showed the importance of learner-centered curriculum innovation in the digital era, an orientation that shifts learners from recipients of information to active participants in the learning process.

Learner-centered learning also requires a flexible curriculum design. Learners have different characteristics, needs, learning paces, and digital experiences, so that technology can be used to provide variety in activities and learning resources. Nevertheless, such flexibility still requires the teacher's guidance. Learners do not automatically become capable of independent learning simply because they have access to technology; they still need guidance to identify relevant sources, evaluate information, and use technology responsibly.

3.6 Online Learning and the Quality of Curriculum Implementation

Online learning is one concrete form of curriculum implementation within a digital environment. Castro and Tumibay (2019) showed that online learning can be an effective learning alternative when it is designed and implemented appropriately.

Konstantinidou and Nisiforou (2022) emphasized the importance of assuring the quality of online learning through adaptations in design and implementation. This shows that moving learning from the physical classroom to an online environment cannot be accomplished merely by transferring learning material to a digital platform.

The quality of online learning depends on interaction, learning structure, learner activity, feedback, assessment, and the quality of the learning design. The implementation of the curriculum in an online environment therefore requires mature pedagogical planning.

3.7 Challenges in Implementing a Digital Curriculum

The analysis showed that there are a number of challenges in implementing a technology-based curriculum. These challenges include limited infrastructure, teachers' digital competence, learners' readiness, the quality of learning design, access to technology, and institutions' capacity to manage change.

Ali et al. (2018) identified various barriers to e-learning implementation. Demirel et al. (2026) likewise showed the need for an integrated framework in understanding the challenges of e-learning in higher education. Van Der Merwe et al. (2023) showed that the challenges of e-learning implementation can have structural and contextual dimensions, indicating that the digitalization of education cannot be carried out with the same approach in all environments.

Meng et al. (2023) showed that project-based learning through e-learning platforms also faces implementation challenges. Accordingly, the more complex the learning design used, the greater the need for pedagogical and technological support.

4. DISCUSSION

The findings indicate that curriculum implementation in the digital era needs to be distinguished from the mere digitalization of learning material. Digitalizing material means changing teaching resources from a conventional form into a digital form, whereas curriculum transformation encompasses broader change in goals, content, strategy, learning experience, the role of the teacher, the role of the learner, and the system of evaluation. Costa et al. (2023) showed that digital education has consequences for curriculum design: the curriculum needs to be rethought because a digital environment creates different patterns of interaction and learning experience. The use of digital presentations, videos, learning platforms, or applications does not in itself demonstrate that the curriculum has been transformed. Transformation occurs only when technology is used to support pedagogical goals and to produce meaningful change in the learning experience.

The digital era requires a curriculum capable of developing learners' digital competence. Such competence becomes increasingly important because learners live in an environment saturated with information and technology. Erstad et al. (2021) showed that digital competence is a complex concept: learners need to understand how information is obtained, used, evaluated, and produced within a digital environment. Jordan et al. (2025) emphasized that digital literacy needs to be integrated into curriculum design, meaning that it should not be taught only as a separate subject or topic but developed through various learning activities. This has implications for teachers, who need to design activities that encourage learners to use technology to seek information, analyze data, produce work, collaborate, and solve problems.

Technology should not become the center of learning. The center of learning remains the goals of education and the development of learners; technology functions as a means to support the achievement of those goals. Studies of the effectiveness of online learning show that the quality of learning is determined not only by the technological platform used but by the design and implementation of the learning (Castro & Tumibay, 2019). Konstantinidou and Nisiforou (2022) showed that the

quality of online learning requires adaptations in design. The selection of technology must therefore consider the characteristics of the material, the needs of learners, teacher competence, the forms of interaction, and the learning goals. The principal question in technology integration is thus not “which technology is used?” but “for what learning goal is technology used, and how does it help learners achieve that goal?”

Although technology develops rapidly, the teacher retains an important position in curriculum implementation. Technology provides various resources and possibilities for learning, but the teacher determines how those resources are used. Radhiani et al. (2026) showed the importance of teachers' technology integration in the development of twenty-first-century learning, which requires the ability to select relevant technology and use it in accordance with pedagogical needs. Teachers are also responsible for guiding learners in confronting the various problems that arise within a digital environment, including distinguishing relevant from irrelevant information, judging the credibility of sources, using information ethically, and communicating responsibly. The development of teacher competence is therefore one important component of digital curriculum implementation.

A digital curriculum offers substantial opportunities for the development of learner-centered learning. Learners can obtain access to varied learning resources and can learn through diverse activities. Harahap and Sulasmi (2026) showed that learner-centered curriculum innovation is relevant to developments in the digital era. In this approach, learners are encouraged to become active subjects with room to explore and construct knowledge. However, learner-centered learning does not mean that the teacher loses a role; on the contrary, the teacher needs to be more active in designing the learning environment, providing direction, offering feedback, and ensuring that learners achieve the learning goals.

Digital technology offers opportunities to develop collaborative and project-based learning. Learners can work together without always being in the same physical space. Meng et al. (2023) showed that e-learning platforms can support project-based learning but that its implementation faces certain challenges. Project-based learning requires coordination, division of tasks, communication, monitoring of the process, and clear assessment. Its implementation in a digital environment therefore requires a curriculum design that enables learners not only to produce a product but also to experience thinking, collaboration, reflection, and problem-solving. Technology can strengthen these processes by providing spaces for collaboration, sources of information, tools for production, and media for communication, but it still requires pedagogical management so that learning does not become merely the activity of using an application.

The digitalization of the curriculum also raises the issue of equity of access. Not all learners have the same devices, internet connectivity, digital ability, and learning environment. Ali et al. (2018) and Van Der Merwe et al. (2023) showed that the implementation of e-learning faces various barriers, which indicate that the digitalization of education can produce inequality if it is not accompanied by adequate policy and support. Demirel et al. (2026) likewise showed that the challenges of e-learning need to be viewed in an integrated way, since technological problems cannot be separated from human and institutional factors. Digital curriculum implementation must therefore attend to the principles of accessibility and inclusivity, so that technology broadens learning opportunities rather than creating new barriers for learners with limited access.

In the Indonesian context, curriculum transformation needs to be viewed in relation to the development of Merdeka Curriculum policy. Haq and W. (2024) showed that the implementation of the Merdeka Curriculum in secondary schools takes place within the context of the digital era. A curriculum that provides greater room for flexibility and learner activity has the opportunity to use technology more contextually to support exploration, project-based learning, collaboration, the search for learning resources, and the development of creativity. However, curricular flexibility also requires the capacity of teachers and schools; without such readiness, flexibility can produce inconsistent practice or merely administrative change. Sari and Rugaiyah (2024) connected the implementation of the school curriculum in the digital era with efforts to build quality human resources. Curriculum implementation must therefore be directed toward the development of learners' real competencies rather than the mere fulfilment of curriculum documents.

Technological change toward the Industry 5.0 era shows that the competency needs of learners continue to develop. Education requires not only individuals who are able to use technology but also individuals who are able to work together with technology while retaining human capacities such as creativity, empathy, communication, collaboration, and problem-solving. Zulistiani and Khoiri (2025) connected the development of a digital-technology-based curriculum with graduate competencies in the Industry 5.0 era. This perspective shows that the curriculum must maintain a balance between technological competence and human competence. Technology should not replace the educational goal of human development; rather, it should be used to strengthen human capacity to learn, create, communicate, collaborate, and solve problems.

On the basis of the literature synthesis, curriculum implementation in the digital era needs to be directed toward seven principles.

Alignment between technology and learning goals. Technology should be selected on the basis of pedagogical needs rather than merely to follow trends.

Strengthening teachers' digital competence. Teachers require both technological and pedagogical ability so that they can integrate technology meaningfully.

Developing learners' digital literacy. Learners need the ability to use, evaluate, create, and share information critically and responsibly.

Reinforcing active, learner-centered learning. Technology should be used to create room for exploration, collaboration, creativity, and problem-solving.

Assuring the quality of digital learning. Online and digital learning should be designed on the principles of interaction, feedback, assessment, and learning support.

Attending to the digital divide. Digital curriculum implementation must take account of differences in access to devices, the internet, and digital ability.

Developing an adaptive curriculum. The curriculum needs the capacity to respond to technological developments without losing its orientation toward educational goals and learners' needs.

Implications. Theoretically, the findings reinforce a view of digital curriculum implementation as a process of pedagogical transformation rather than the substitution of media. Practically, they suggest that improving implementation depends less on the procurement of devices than on strengthening teachers' digital and pedagogical competence, developing learners' digital literacy, ensuring adequate infrastructure and institutional support, designing quality online learning, and reducing gaps in digital access.

Limitations and Suggestions. This study was based on a qualitative synthesis of a purposively selected corpus of twenty scholarly sources rather than on primary fieldwork; its findings therefore reflect the analyzed literature and are not derived from direct observation of schools or classrooms. Future research could examine digital curriculum implementation empirically through case studies, phenomenological studies, or ethnographic studies in specific school settings, drawing on interviews, classroom observation, and documentation, and could compare implementation across diverse institutional and cultural contexts and levels of digital access.

5. CONCLUSION

Curriculum implementation in learning in the digital era is a process of transformation that encompasses more than the use of technology. Digital change influences how the curriculum is designed, how learning is conducted, the role of the teacher, learner activity, learning resources, the forms of interaction, and the system of evaluation. The analysis showed that technology has substantial potential to support curriculum implementation by broadening access to learning resources,

increasing the flexibility of learning, developing collaboration, reinforcing active learning, and developing twenty-first-century skills. These benefits do not arise automatically, however; technology needs to be placed within a clear pedagogical design aligned with learning goals.

Digital competence is an important part of curriculum implementation. Learners need the ability to use technology critically, creatively, productively, ethically, and responsibly. At the same time, teachers require digital and pedagogical competence in order to integrate technology into learning effectively.

Digital curriculum implementation also strengthens the need for learner-centered learning. Technology gives learners the opportunity to access wider learning resources, to collaborate, to develop projects, and to construct knowledge more actively. This process nonetheless still requires the role of the teacher as facilitator, guide, learning designer, and provider of feedback.

At the same time, the implementation of a technology-based curriculum faces various challenges, among them limited infrastructure, gaps in access, differing digital competence, institutional readiness, the quality of learning design, and the need for teachers' professional development. The digitalization of the curriculum therefore needs to be carried out systematically and cannot rely solely on the provision of technological devices. In the Indonesian context, curriculum implementation in the digital era needs to be directed toward developing human resources able to adapt to technological change while possessing strong human competencies. The curriculum needs to integrate digital literacy, critical thinking, creativity, collaboration, communication, problem-solving, and the capacity for lifelong learning. Curriculum implementation in the digital era should thus be understood as a continuous process of educational transformation whose success is determined by the connection among curriculum design, teacher competence, learner readiness, school leadership, technological infrastructure, the quality of learning design, and policy support. Technology is ultimately not the goal of education but a means of creating learning experiences that are more relevant, flexible, meaningful, and suited to the demands of twenty-first-century life.

Declarations

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Author Contributions.

Zulpan: conceptualization, research design, methodology, literature identification and analysis, interpretation of findings, and writing—original draft. Sri Muliana: literature review,

data interpretation, writing—review and editing, and critical revision of the manuscript. Both authors contributed to the final review and approval of the manuscript.

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The authors declare that there is no conflict of interest related to the research, authorship, or publication of this article.

Data Availability.

This study analyzed publicly available published literature; no new empirical data were generated, and all sources analyzed are listed in the References.

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