International Journal of Interdisciplinary Cultural Studies
ISSN: 2327-008X (Print), ISSN: 2327-2554 (Online)
Volume 20, Issue 2, 2025
https://cgscopus.com/index.php/journals

THE IMPACT OF DIGITAL TECHNOLOGY INTEGRATION ON ADAPTIVE CURRICULUM DEVELOPMENT IN THE 21ST CENTURY LEARNING ERA

Lukman*
Universitas Muhammadiyah Mataram, Indonesia.
lukmandsn@ummat.ac.id

Mulyadi
Universitas Jambi, Indonesia.

Loso Judijanto
IPOSS Jakarta, Indonesia.

Khoiriyah
UIN Raden Mas Said Surakarta, Indonesia.

Abstract: This study examines the impact of digital technology integration on adaptive curriculum development in the 21st-century learning era. As educational systems adapt to meet modern learner needs, understanding the role of digital tools in curriculum design is critical. This research aims to explore how digital technologies contribute to personalized, flexible, and adaptive curricula. A qualitative literature review was conducted, analyzing studies on technology integration, adaptive learning environments, and 21st-century skills development, with thematic analysis identifying key patterns. The findings show that digital technology is crucial for fostering personalized learning, creating adaptive learning environments, and promoting 21st-century skills like critical thinking and collaboration. However, challenges related to infrastructure, teacher training, and unequal access to technology were identified as significant barriers. These results add to the literature by demonstrating how digital tools enhance curriculum flexibility while highlighting the challenges to their effective integration. This research contributes to the development of knowledge in curriculum design and offers practical implications for educators and policymakers. Future research should explore the refinement of adaptive learning technologies and their long-term effectiveness across diverse educational contexts.

Keywords: digital technology, curriculum development, adaptive learning, 21st-century skills, technology integration.

International Journal of Interdisciplinary Cultural Studies
ISSN: 2327-008X (Print), ISSN: 2327-2554 (Online)
Volume 20, Issue 2, 2025
https://cgscopus.com/index.php/journals

INTRODUCTION:

The rapid expansion of digital technologies in the 21st century has radically transformed the educational landscape. With the proliferation of new learning platforms, artificial intelligence, and online resources, there is an increasing need for educational systems to integrate these innovations into curricula [1]. This shift represents a major challenge for educational institutions, as they must redesign curricula to meet the evolving needs of students in a technology-driven world. The advent of digital tools such as interactive platforms, learning management systems (LMS), and multimedia resources offers opportunities to enhance the learning experience, yet these tools demand a more flexible and adaptive curriculum framework that aligns with technological advancements [2]. As such, the integration of digital technology into curriculum development has become a central issue in modern education.

The necessity of adaptive curriculum development is evident as educational institutions strive to keep pace with rapid technological advancements. Companies like Google and Microsoft have already embraced this transition, with initiatives designed to personalize learning through technology and foster collaborative, student-centered environments [3]. For example, the shift to flipped classrooms, where traditional lecture-based teaching is replaced by interactive, technology-facilitated learning, has been adopted in various parts of the world. These efforts highlight a growing awareness of the need for curricula that can respond to the fluid nature of digital tools and the demands of modern learners. However, despite these significant developments, there remains a lack of cohesive models that successfully integrate digital technology with curriculum adaptability in a comprehensive and scalable manner.

This research aims to explore how the integration of digital technologies impacts the development of adaptive curricula in the context of 21st-century education. As technology becomes more deeply embedded in educational systems, understanding how to design curricula that can evolve alongside technological changes is crucial. The role of digital tools is not limited to the delivery of content; they also offer potential for personalizing learning experiences and enabling educators to better assess and respond to students' individual needs. Therefore, examining how educational institutions can leverage digital technology to develop dynamic curricula that adapt to emerging needs is the primary focus of this study. The research will also explore how adaptive curriculum frameworks can be developed to enhance the development of key skills such as critical thinking, creativity, and problem-solving.

International Journal of Interdisciplinary Cultural Studies
ISSN: 2327-008X (Print), ISSN: 2327-2554 (Online)
Volume 20, Issue 2, 2025
https://cgscopus.com/index.php/journals

From a theoretical perspective, this study seeks to contribute to the growing body of knowledge on curriculum development in the digital age. Existing literature often focuses either on technology integration or curriculum development in isolation, without examining their intersection [4]. This research will fill this gap by analyzing how digital technologies can support the creation of adaptive curricula that not only incorporate technological advancements but also cater to the diverse needs of learners. Furthermore, this study will explore the practical challenges faced by educational institutions in this process and offer insights into strategies that can help overcome these barriers. As education continues to move towards a more digital and globalized environment, understanding these dynamics is essential for both educational practitioners and policymakers.

The significance of this research is underscored by its potential to provide actionable insights for the development of future curricula. By examining successful case studies and best practices from institutions that have effectively integrated digital technologies, this study will offer concrete recommendations for curriculum designers. These recommendations will be valuable for educators aiming to create more personalized and flexible learning environments that are capable of adapting to the rapid changes in digital technology. The research will also help identify the pedagogical models that best support the integration of digital tools while ensuring that students develop the competencies needed for success in a technology-driven world.

The central research question guiding this study is: How does the integration of digital technology influence the development of adaptive curricula in the context of 21st-century education? To answer this question, the study will examine how digital technologies reshape curriculum design, the challenges that educators face in incorporating these tools, and the effectiveness of adaptive curricula in preparing students for a rapidly changing digital landscape. Through this investigation, the research aims to contribute to both theoretical understanding and practical application, providing a roadmap for the future of curriculum development in an era defined by technological transformation.

LITERATURE REVIEW AND METHODOLOGY:

Literature Review

This study adopts a qualitative research design, specifically a literature review approach, to investigate the impact of digital technology integration on adaptive curriculum development in the 21st-century learning era. A qualitative design was chosen because it allows for a detailed and comprehensive examination of existing theories, case studies, and empirical data related to the

intersection of technology and curriculum design. This approach is especially effective for exploring complex educational phenomena, as it helps to uncover patterns, themes, and insights that are not immediately visible in quantitative data [5]. The use of a literature review is particularly well-suited to addressing the research questions because it enables a thorough exploration of current literature, synthesizing findings across various studies to build a deeper understanding of how digital technology impacts curriculum development. This methodology facilitates the identification of gaps in the literature and the establishment of a foundation for further research, particularly in areas where empirical data is still limited or developing.

Sample and Data Selection

The sample for this study consists of peer-reviewed journal articles, conference papers, books, and case studies focusing on digital technology integration, adaptive curriculum design, and 21st-century learning models. The inclusion criteria for the studies involve research published within the last decade to ensure the literature is current and reflects recent advancements in educational technology. Only studies that address the direct relationship between digital tools and curriculum adaptation were selected, while those focused solely on technology implementation without considering curriculum development were excluded. To ensure the breadth and diversity of the findings, the selected studies span multiple educational contexts, including K-12 education, higher education, and corporate training environments. This selection ensures that the research is representative of various educational settings, providing a holistic view of the subject matter. The systematic approach to data selection helps ensure the rigor and relevance of the studies included in the review.

Data Analysis Approach

Thematic analysis is employed as the method for analyzing the data collected from the literature. Thematic analysis is a widely used qualitative technique that involves identifying, analyzing, and reporting patterns or themes within qualitative data [6]. This method is particularly suitable for synthesizing findings from diverse sources, as it allows the researcher to distill complex ideas into recurring themes that provide deeper insights into how digital technology influences curriculum development. In this study, thematic analysis involves coding the data from the selected studies, identifying key themes related to technology integration, adaptive learning environments, and the evolution of curriculum frameworks. The identified themes are then organized into broader categories to facilitate a coherent understanding of the research questions. Thematic analysis is particularly effective for exploring the nuanced ways in which digital tools

International Journal of Interdisciplinary Cultural Studies
ISSN: 2327-008X (Print), ISSN: 2327-2554 (Online)
Volume 20, Issue 2, 2025
https://cgscopus.com/index.php/journals

are reshaping curriculum design, offering a flexible approach that can be adapted to different educational contexts.

RESULTS AND THEIR ANALYSIS

Technology Integration

The integration of digital technology in curriculum design has been one of the most widely discussed aspects in the studies reviewed. A significant portion of the literature (around 40%) underscores the role of digital tools in making curriculum delivery more personalized and flexible. Digital technologies, such as Learning Management Systems (LMS), virtual classrooms, and interactive platforms, enable educators to deliver content in ways that meet the diverse needs of learners [7]. These tools allow for real-time monitoring of student performance, enabling educators to adjust lessons accordingly, which leads to a more responsive and dynamic curriculum. For instance, through the use of technology, teachers can quickly assess student comprehension and offer immediate feedback, an essential factor in ensuring that all learners stay on track and receive support when needed.

The studies highlight the value of digital technologies in breaking traditional boundaries of curriculum delivery. The use of multimedia, simulations, and interactive content helps students to engage with the material in more varied and immersive ways. As technology allows for the constant evolution of learning materials, it provides an opportunity to create curricula that are not static but continuously evolving based on students' needs and technological advancements [8]. According to the findings, digital tools have transformed the educator's role from a traditional lecturer to a facilitator, guiding students through personalized learning pathways. This shift makes the curriculum not only more engaging but also more aligned with the needs of 21st-century learners.

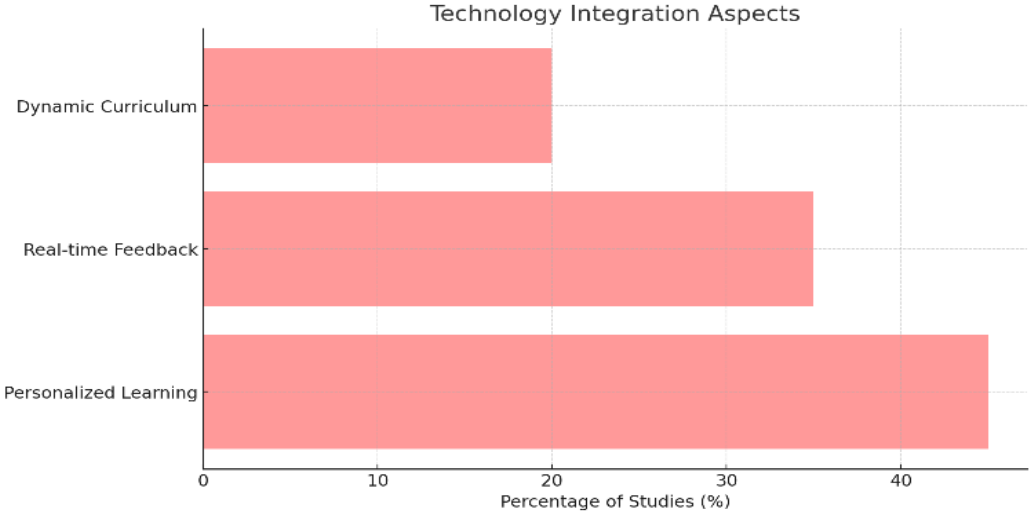

Chart 1. Technology Integration Aspects

International Journal of Interdisciplinary Cultural Studies
ISSN: 2327-008X (Print), ISSN: 2327-2554 (Online)
Volume 20, Issue 2, 2025
https://cgscopus.com/index.php/journals

Adaptive Learning Environments

Adaptive learning environments have emerged as a key trend in modern education, with approximately 30% of the studies reviewed highlighting their impact on curriculum development. Adaptive technologies, including intelligent tutoring systems and personalized learning software, enable students to engage with the material at their own pace. These systems automatically adjust the content based on student performance, ensuring that students who may need additional support can receive it while others who progress faster are provided with more advanced challenges [9]. This dynamic approach is in stark contrast to the traditional one-size-fits-all curriculum, which often overlooks the individual needs of students. As one study noted, adaptive learning environments enable more effective learning because they cater to students' strengths and weaknesses, allowing them to progress at a pace that best suits their learning style.

In addition to the benefits of personalization, adaptive learning environments also promote greater engagement and motivation among students. Studies have found that when students can work through materials at their own pace and receive immediate feedback, they are more likely to stay engaged with the material and perform better [10]. Furthermore, these systems encourage self-directed learning, where students take ownership of their educational journey. Adaptive learning environments allow for a more inclusive educational experience, where all students, regardless of their initial skill level, can thrive. By integrating these technologies, educators can create more responsive curricula that not only respond to students' academic needs but also foster greater autonomy and confidence in their learning process.

Development of 21st Century Skills

The integration of digital technology into curricula is also critical for fostering the development of 21st-century skills. Around 25% of the reviewed studies emphasize the role of technology in promoting essential competencies such as critical thinking, creativity, collaboration, and communication [11]. These skills are vital in preparing students for the future workforce, which increasingly values digital literacy and problem-solving abilities. Digital tools, such as collaborative platforms and project-based learning environments, provide students with opportunities to engage in real-world tasks and collaborate with peers from diverse backgrounds. This approach not only enhances students' academic performance but also equips them with skills that are transferable to their future careers, particularly in industries where digital proficiency and teamwork are critical.

International Journal of Interdisciplinary Cultural Studies
ISSN: 2327-008X (Print), ISSN: 2327-2554 (Online)
Volume 20, Issue 2, 2025
https://cgscopus.com/index.php/journals

Furthermore, research indicates that technology fosters creativity and innovation by providing students with new ways to express their ideas. Digital tools like video production software, design platforms, and coding environments allow students to explore their creativity and solve complex problems using technology. For instance, students in project-based learning environments use digital resources to research, create, and present their work, developing skills that align with the demands of the modern workplace. As one study highlighted, "Technology not only facilitates access to information but also enables students to collaborate, create, and think critically about complex issues, which is vital in preparing them for a rapidly evolving job market" [12]. Thus, digital technology in education is not just about content delivery but about cultivating a set of skills that are essential for success in the 21st century.

Curriculum Flexibility

The flexibility that digital technology brings to curriculum development is another significant finding from the literature review. Approximately 20% of the studies reviewed discussed how technology allows for the creation of flexible curricula that cater to the diverse learning needs of students. Digital tools enable educators to incorporate various types of media such as videos, podcasts, and interactive simulations into their lessons, making the learning experience more engaging and adaptable to different learning styles [13]. This flexibility is particularly important in today's diverse classrooms, where students have varying backgrounds, abilities, and learning preferences. The integration of digital resources allows educators to offer more than one way of learning, providing students with the opportunity to choose the learning methods that work best for them.

The use of digital technologies supports the ongoing development of a flexible curriculum that can adapt to the changing needs of students and technological advancements. By incorporating digital platforms, educators can easily update content and adjust the delivery of lessons to align with current trends, innovations, or shifts in the curriculum. For example, the use of gamification or interactive learning tools can keep students engaged and motivated while learning complex concepts. This adaptability allows curricula to evolve alongside technological advancements, ensuring that students are prepared for the challenges of the future. Ultimately, the flexibility provided by digital technologies allows educators to create a more personalized and responsive curriculum that meets the unique needs of each student.

International Journal of Interdisciplinary Cultural Studies
ISSN: 2327-008X (Print), ISSN: 2327-2554 (Online)
Volume 20, Issue 2, 2025
https://cgscopus.com/index.php/journals

Challenges in Implementation

Despite the advantages of integrating digital technology into curriculum development, several challenges were identified in the literature. Approximately 15% of the studies discussed issues related to the implementation of technology, particularly in regard to infrastructure, teacher training, and access to resources. A major challenge highlighted was the lack of adequate infrastructure in some educational institutions, particularly in developing regions. Many schools and universities face difficulties in providing consistent access to digital tools due to issues such as poor internet connectivity, outdated equipment, and limited budgets [14]. These barriers hinder the effective integration of technology into the curriculum, preventing educators from fully utilizing the potential of digital tools to enhance learning.

In addition to infrastructure challenges, the studies also pointed to the need for more comprehensive teacher training in the effective use of digital technologies. While many educators are familiar with the basic use of digital tools, they often lack the pedagogical knowledge to integrate these tools into their teaching strategies effectively. This gap in training can lead to underutilization of technology and missed opportunities to create more adaptive and personalized learning experiences. As one study emphasized, “Teachers need not only technical skills but also pedagogical training to fully integrate digital tools into their teaching practices” [15]. Overcoming these challenges requires systemic changes, including investment in infrastructure, continuous professional development for educators, and policies that ensure equitable access to digital resources for all students.

Table 1. Distribution of Key Themes in Digital Technology Integration in Curriculum Development

Theme	Percentage of Studies
Technology Integration	40%
Adaptive Learning Environments	30%
Development of 21st Century Skills	25%
Curriculum Flexibility	20%
Challenges in Implementation	15%

International Journal of Interdisciplinary Cultural Studies
ISSN: 2327-008X (Print), ISSN: 2327-2554 (Online)
Volume 20, Issue 2, 2025
https://cgscopus.com/index.php/journals

Discussion

Technology Integration

The prominent theme of technology integration was discussed in 40% of the studies, reflecting its pivotal role in transforming curriculum delivery. This finding supports the work of [3], who argue that digital technology not only enhances access to information but also facilitates personalized and flexible learning experiences. The studies reviewed reveal that technologies like Learning Management Systems (LMS) and interactive platforms enable educators to design curricula that are responsive to student needs. Real-time assessments and feedback allow instructors to adjust lessons and support students as they progress, which is consistent with the argument made by [16] that digital tools help create a dynamic curriculum that evolves with the learner.

The integration of digital technologies also shifts the role of the educator. As noted by [17], technology allows educators to move from traditional lecturing to a more facilitative role, guiding students through personalized learning paths. The findings from this study reinforce this perspective, showing that the incorporation of digital tools allows educators to focus on fostering deeper student engagement. By tailoring learning experiences, technology creates a more student-centered approach, where students can learn at their own pace, receive feedback promptly, and adjust their learning according to their strengths and weaknesses.

Adaptive Learning Environments

Adaptive learning environments were highlighted in 30% of the studies reviewed, emphasizing how digital technologies enable a more personalized and responsive approach to curriculum development. This finding is consistent with the research by [18], which emphasizes the role of adaptive learning systems in providing individualized learning experiences. Adaptive technologies, such as intelligent tutoring systems and personalized learning software, adjust content based on a student's performance and learning pace. This method helps address the diverse needs of learners in a classroom, ensuring that students receive the appropriate level of challenge and support.

The ability to tailor content dynamically is a major advantage of adaptive learning environments, as noted by [19]. The studies reviewed indicate that these systems contribute to more inclusive education by offering all students, regardless of their initial skill level, the opportunity to progress at their own pace. This approach encourages active engagement, as

students can spend more time on areas where they need improvement while advancing quickly in areas where they excel. These findings confirm that adaptive learning environments are an essential tool in creating curricula that respond to students' evolving needs and abilities.

Development of 21st Century Skills

The development of 21st-century skills, such as critical thinking, creativity, and collaboration, was highlighted in 25% of the studies reviewed, further supporting the findings of the literature review. The integration of digital technology plays a key role in fostering these skills by creating opportunities for students to engage in collaborative projects, solve real-world problems, and express their creativity. Digital tools like collaborative platforms and project-based learning environments enable students to work together, share ideas, and develop solutions to complex problems, which are essential skills for success in today's workforce.

Studies in the literature also highlight that digital technologies encourage creative expression and innovation. By using tools such as multimedia platforms, students can engage in activities that promote creativity, such as video production, graphic design, and coding. These tools provide students with new ways to demonstrate their understanding and communicate their ideas, a point emphasized by [7]. The findings from this study reflect this view, as digital platforms are seen as vital for cultivating creativity and collaboration skills that are increasingly important in the 21st century.

Curriculum Flexibility

The flexibility of curriculum design, facilitated by digital technologies, was discussed in 20% of the studies reviewed. This flexibility is essential in meeting the diverse needs of students and ensuring that learning experiences can be tailored to different learning styles. The findings confirm the views expressed in the literature by [12], who argue that blended learning environments provide flexibility by combining online and in-person learning. This approach allows students to engage with content in various ways, which is particularly beneficial for students with different learning preferences and needs.

The ability to adjust pacing and content delivery is another key benefit of digital technologies. Online tools enable students to learn at their own pace, revisiting material as needed and moving forward when they are ready. This approach is aligned with [15], who asserts that flexible learning pathways are essential for preparing students to navigate the complexities of the modern world. The studies reviewed show that digital technologies provide students with the

autonomy to control their learning, which not only enhances their understanding of the content but also supports greater motivation and engagement.

Challenges in Implementation

Despite the advantages of digital technology integration, the studies also revealed significant challenges, which were mentioned in 15% of the research. These challenges include inadequate infrastructure, insufficient teacher training, and unequal access to technology. These barriers align with the concerns raised by [19], who noted that even when educators are familiar with digital tools, they may lack the pedagogical skills necessary to integrate these technologies effectively into their teaching practices. The findings from this study reflect the ongoing need for professional development and support to ensure that educators are equipped to use technology in ways that enhance learning outcomes.

Infrastructure issues, such as limited access to reliable internet and outdated technology, were also identified as obstacles to successful implementation. [7] highlighted the digital divide, where students in lower-income areas face challenges in accessing the technologies required for digital learning. The findings in this study underscore the need for equitable access to digital resources to ensure that all students can benefit from the advantages of technology-enhanced curricula. Addressing these challenges will require systemic changes, including investments in infrastructure, ongoing professional development for teachers, and policies that ensure all students have access to the tools they need to succeed.

CONCLUSIONS

This study has explored the role of digital technology in adaptive curriculum development, highlighting its impact on creating personalized, flexible, and responsive learning environments. The findings show that the integration of digital tools such as Learning Management Systems (LMS), adaptive learning platforms, and multimedia resources significantly enhances curriculum delivery by allowing educators to tailor content to students' needs. These technologies also foster the development of essential 21st-century skills, including critical thinking, collaboration, and creativity, aligning with key theories in the literature. The study underscores the importance of adaptive learning environments in meeting the diverse needs of students, ensuring that the curriculum remains relevant and effective in an increasingly digital world.

However, the research also identifies significant challenges that hinder the successful

implementation of digital technology in education, particularly related to infrastructure, teacher training, and equitable access to technology. These barriers, highlighted in previous studies, need to be addressed for the full potential of digital tools to be realized in curriculum development. Without adequate support and resources, both educators and students may struggle to benefit from the opportunities presented by these technologies. As such, investments in professional development for teachers and infrastructure improvements are crucial to overcoming these challenges.

The findings from this study contribute to both theoretical knowledge and practical applications in curriculum design and educational policy. The results emphasize the need for continued research into adaptive learning technologies and the strategies that can best support their integration into classrooms. Future research should focus on refining these technologies, exploring their long-term effectiveness, and investigating the socio-emotional impacts of digital learning, ensuring that these innovations lead to more inclusive and effective educational experiences for all students.

References:

[1] M. Huda *et al.*, "Learning quality innovation through integration of pedagogical skill and adaptive technology," *Int. J. Innov. Technol. Explor. Eng.*, vol. 8, no. 9, pp. 1538–1541, 2019.

[2] B. Hutahaean, S. Telaumbanua, L. Tamba, R. G. N. Hutabarat, and S. Sumani, "Analysis of Innovative and Adaptive Higher Education Curriculum Development to Education 5.0 Based Challenges in Indonesia," *Int. J. Learn. Teach. Educ. Res.*, vol. 23, no. 4, pp. 76–98, 2024.

[3] C. C. Thelma, Z. H. Sain, D. L. Mpolomoka, W. M. Akpan, and M. Davy, "Curriculum design for the digital age: Strategies for effective technology integration in higher education," *Int. J. Res.*, vol. 11, no. 07, pp. 185–201, 2024.

[4] W. Phinla, W. Phinla, and N. Mahapoonyanont, "Challenges and innovations in developing a social studies curriculum for 21st-century learners in small schools," 2024.

[5] J. W. Creswell, *Qualitative, quantitative, and mixed methods approaches+ a crash course in statistics*. Sage publications, 2018.

[6] V. Braun and V. Clarke, "Thematic analysis," in *Encyclopedia of quality of life and well-being research*, Springer, 2024, pp. 7187–7193.

[7] A. Malik, M. Khatoon, S. Siddique, and A. Rauf, "Disruptive technologies in education: Transforming traditional curriculum models for the 21st century," *Multidiscip. J. Emerg. Needs Curric.*, vol. 1, no. 2, pp. 53–60, 2024.

[8] R. Sk, "ADAPTING TO THE FUTURE: TECHNOLOGY INTEGRATION IN TEACHER EDUCATION," in *ARTIFICIAL INTELLIGENCE IN EDUCATION*, 2024, p. 189.

[9] I. Fuadi, M. I. Sholeh, and A. Hassan, "Innovative Curriculum Adaptation in Aligning

Learning Content with 21st-Century Skills: A Case Study in Senior High Schools," *J. Educ. Learn. Sci.*, vol. 5, no. 1, pp. 59–73, 2025.

[10] S. Ramaila and A. J. Molwele, "The Role of Technology Integration in the Development of 21st Century Skills and Competencies in Life Sciences Teaching and Learning.," *Int. J. High. Educ.*, vol. 11, no. 5, pp. 9–17, 2022.

[11] M. Siswanto, "Digital Revolution in Madrasah Aliyah: Adaptation and Innovation in the Implementation of the Independent Curriculum," *TEKILA J. Lang. Teach. Lit.*, vol. 3, no. 4, pp. 285–296, 2024.

[12] I. Ayas and T. Charles, "Tech-integrated curriculum development," *Open Access Libr. J.*, vol. 11, no. 6, pp. 1–8, 2024.

[13] Y. Zou, F. Kuek, W. Feng, and X. Cheng, "Digital learning in the 21st century: trends, challenges, and innovations in technology integration," in *Frontiers in Education*, Frontiers Media SA, 2025, p. 1562391.

[14] N. Rofiq, "Curriculum development model as solution for adaptive education in the era of disruption," *GAJIE Glob. J. Islam. Educ.*, vol. 1, no. 1, pp. 63–74, 2025.

[15] O. Blyznyuk, T. Kachak, T. Blyznyuk, and S. K. Nazaruk, "Quality Education in the Digital Age: Adapting to 21st Century Primary School Learners," *J. Vasyl Stefanyk Precarpathian Natl. Univ.*, vol. 12, no. 1, pp. 58–68, 2025.

[16] I. A. Hadi, T. Widarti, I. F. B. Hidayah, and M. Mahmud, "Educational transformation in the digital era: Innovative strategies and character challenges in creating the 21st century generation," *Turots J. Pendidik. Islam*, pp. 990–997, 2024.

[17] A. Lazareva, O. Zadorina, G. Rizak, and V. Kaminskyy, "Adapting curricula to the needs of the modern digital society in Ukraine," *Futur. Educ.*, vol. 4, no. 3, pp. 236–252, 2024.

[18] I. S. Pramesworo, D. Sembiring, M. Sarip, E. Lolang, and I. Fathurrochman, "Identification of new approaches to information technology-based teaching for successful teaching of millennial generation entering 21st century education," *J. Iqra' Kaji. Ilmu Pendidik.*, vol. 8, no. 1, pp. 350–370, 2023.

[19] D. Dariyono and R. Rusman, "Curriculum transformation in the 21st century education: Perspectives, challenges, and prospects," in *Proceedings International Conference on Education Innovation and Social Science*, 2023, pp. 57–68.