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Integrity of Educational Technology in Curriculum 2013: Challenges and Opportunities for Improving Learning Quality

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ABSTRACT

This research endeavours to explore the complexities and prospects associated with the incorporation of educational technology into the 2013 Curriculum, aiming to elevate the standard of learning outcomes. Adopting a Systematic Literature Review (SLR) framework guided by PRISMA protocols, the study systematically examines a wide array of scholarly works to gain insights into the evolution, constraints, and strategic applications of technology within the educational landscape. The analytical procedure encompasses the formulation of key research inquiries, the establishment of stringent inclusion and exclusion benchmarks, comprehensive literature retrieval from databases such as Google Scholar, Scopus, and JSTOR, meticulous article screening, data coding, and the synthesis of core findings. From an initial pool of 229 publications, a mere 21 articles satisfied the rigorous inclusion criteria after an exhaustive selection process. The analysis underscores several critical obstacles in the realm of technology integration, including disparities in digital infrastructure accessibility, inadequate technological proficiency among educators, resource scarcity in underdeveloped regions, and prevailing socio-cultural apprehensions towards the assimilation of technological tools in educational environments. Nevertheless, the study also highlights promising avenues, such as the strategic adoption of the Technological Pedagogical Content Knowledge (TPACK) framework, the expansion of e-learning ecosystems and digital platforms, alongside robust governmental initiatives aimed at fostering digital transformation within the education sector. Ultimately, the findings affirm that the effective integration of technology into the 2013 Curriculum possesses substantial potential to revolutionise learning quality, contingent upon the implementation of well-crafted policies, sustained professional development for educators, and the equitable distribution of technological resources throughout Indonesia.

INTRODUCTION

The incorporation of technology into Indonesia's educational framework, particularly within the context of the 2013 Curriculum, has emerged as a pivotal strategy for advancing learning quality. Despite this emphasis, numerous obstacles continue to hinder effective implementation. While the 2013 Curriculum was conceptualised to foster the integration of technological tools within teaching and learning processes, its adoption has been inconsistent across the nation's diverse regions. According to data from the Ministry of Education and Culture, approximately 60% of students have access to learning devices, with negligible differences observed between male and female students. However, a pronounced digital divide persists, marked by stark disparities in technological access between urban and rural communities (Ministry of Education and Culture, 2020a).

Moreover, a significant barrier lies in the limited technological proficiency among educators. Findings from a survey conducted by the Ministry of Education and Culture reveal that merely 40% of teachers without an ICT specialisation possess the necessary readiness to incorporate technology into their teaching practices. This statistic underscores a widespread lack of preparedness among educators to effectively embed digital tools within the curriculum (Ministry of Education and Culture, 2023b). The situation is further aggravated by inadequate professional development opportunities and insufficient institutional support. Although initiatives such as the Information and Communication Technology-Based Learning (PembaTIK) programme have been introduced to strengthen teachers' ICT capabilities, participation levels remain suboptimal, thereby limiting the programme's overall impact on educational transformation (Ministry of Education and Culture, 2023c).

The incorporation of technology into educational practices transcends the simple deployment of hardware and software, demanding a fundamental shift in instructional methodologies. Rooted in constructivist theory, learning is perceived as an active, dynamic process wherein students develop their understanding through meaningful interactions with their environment and firsthand experiences. Within this framework, technology serves as an enabler of active learning, empowering learners to independently investigate, evaluate, and synthesise information. For example, the application of computer-based simulations and interactive tools can transform abstract, complex concepts into tangible and intuitive learning experiences (Masgumelar & Mustafa, 2021).

In addition, the Technological Pedagogical Content Knowledge (TPACK) framework highlights the critical role of educators' expertise in seamlessly blending technology with pedagogical techniques and subject-specific content to foster enriched learning environments. TPACK integrates three fundamental domains: technological competence, pedagogical insight, and content mastery (Tondeur et al., 2020). By effectively navigating the intersections of these domains, teachers can craft innovative instructional approaches that go beyond traditional content delivery, leveraging technology to deepen students' conceptual understanding. For instance, in mathematics instruction, the use of dynamic geometry software enables students to actively engage with mathematical principles, enhancing both their cognitive involvement and conceptual grasp (Janah, 2022).

A growing body of research has explored the multifaceted dimensions of technology integration within the 2013 Curriculum. Harahap & Dalimunthe (2024) highlight that the adoption of technological tools, particularly e-learning platforms, has the potential to significantly enhance learning outcomes by leveraging digital resources

such as computers and internet connectivity. Conversely, other studies have identified the limited technological proficiency among educators as a critical impediment to effective integration. Moreover, recent findings underscore the pivotal role of institutional support and ongoing professional development in ensuring the successful embedding of technology within educational practices. Sundari et al. (2024) further argue that a deep understanding of the Technological Pedagogical Content Knowledge (TPACK) framework is essential, as it equips teachers with the necessary competencies to harmonise technology, pedagogy, and subject content, thereby fostering meaningful and engaging learning environments.

Although considerable efforts have been made to incorporate technology into the 2013 Curriculum, numerous challenges remain unresolved. In response to these persistent issues, the present study seeks to explore both the obstacles and opportunities surrounding the integration of educational technology within this curriculum framework. Employing a Systematic Literature Review (SLR) methodology, this research aims to synthesise existing academic literature to deliver a nuanced and comprehensive analysis of the progress, barriers, and potential strategies for enhancing learning quality through the effective application of educational technology.

METHODOLOGY

This research adopts the Systematic Literature Review (SLR) methodology, in strict alignment with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. The process, as tailored to the PRISMA framework, involves the following steps: (1) formulating precise and focused research inquiries related to the integration of technology in the 2013 Curriculum; (2) setting clear inclusion and exclusion parameters for selecting pertinent literature, focusing on works that discuss educational technology, the 2013 Curriculum, and its execution; (3) conducting a comprehensive and methodical search of literature through databases such as Google Scholar, Scopus, and JSTOR, using targeted search terms like ‘technology integration in education,’ ‘2013 Curriculum,’ ‘educational technology challenges,’ and ‘opportunities for technology in learning’; (4) applying a rigorous process of screening, categorisation, and eligibility assessment to the identified articles, following the PRISMA flowchart; (5) systematically coding and extracting relevant data from the selected articles that meet the inclusion criteria; and (6) synthesising the insights gleaned from these articles to address the research queries concerning the prevailing trends, challenges, and opportunities in the integration of technology within the 2013 Curriculum to foster enhanced learning quality (Zawacki-Richter et al., 2020).

This study initiated the literature selection process by sourcing 229 articles across multiple databases. Following an extensive screening procedure, only 21 articles were deemed to meet the inclusion criteria. Additionally, the research includes a PRISMA flow diagram that outlines the stages of literature selection and offers a comprehensive analysis of the key findings pertinent to the research aims.

Table 1. Inclusion criteria for Literature Review

Category	Inclusion Criteria
Publication type	Scientific articles published in https://scholar.google.com
Journal specifications	Top international journals and national journals for the last 5 years
Journal index	Google Scholar, SINTA 1-6, Scopus Q1-NonQ, GARUDA, Crossref, and ICI
Publication Year	2020-2024
Research country	Indonesian and Foreign

Variable	The effectiveness of technology integration in learning based on Curriculum 2013, and the factors that influence the success or obstacles in its implementation.
Field	Education, Educational Technology, Social Sciences, and General
Type of study	Theoretical and empirical
Keywords	Educational Technology Integration, Curriculum 2013, Challenges and Opportunities in Learning, Technology in Education (in Bahasa Indonesia and English
Subject	A study involving educators, students and stakeholders in the implementation of technology in learning, as well as an analysis of its challenges and opportunities in the context of Curriculum 2013.

Source : Data Processed in 2025

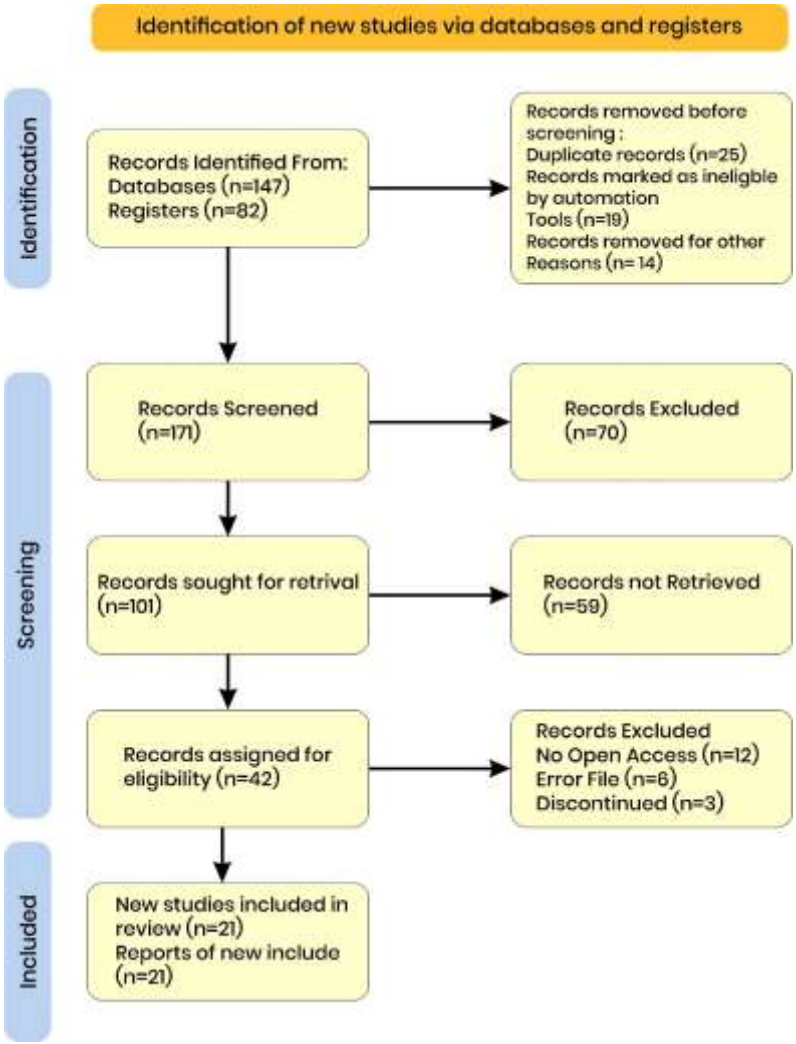

Fig 1. PRISMA Flow Diagram

RESULTS AND DISCUSSION

Challenges in Enhancing the Quality of Education

Through a comprehensive review of the literature, several critical obstacles to the integration of technology within the 2013 Curriculum have been identified, which may hinder the advancement of educational quality. These barriers encompass both

technological access and the proficiency of educators in effectively integrating technology into their teaching practices.

1. Technological Access

A significant challenge uncovered is the disparity in access to technology across different regions of Indonesia. According to the Ministry of Education and Culture (2022), although urban schools are equipped with sufficient technological infrastructure, approximately 40% of rural schools continue to struggle with accessing essential technologies such as the internet and digital learning tools. This divide creates a pronounced gap in the quality of technology-driven education between urban and rural settings. This issue hampers the ability of both students and teachers to fully utilise technology to its potential in the learning environment. Wahyudi & Jatun (2024) highlight that technology has the potential to offer more inclusive and equitable educational opportunities, such as through e-learning or blended learning models, which introduce innovative delivery methods and expand access to educational services. Nevertheless, the successful implementation of these methods is still impeded by significant infrastructural challenges and the varying levels of technological preparedness across Indonesia's diverse regions.

2. Teacher Proficiency in Technology Utilisation

A further critical obstacle to the seamless integration of technology lies in the inadequate proficiency of educators in effectively utilising technological tools in their teaching practices. Analysis of existing literature indicates that roughly 45% of teachers in Indonesia report feeling inadequately trained to leverage technology in the classroom. The absence of consistent and comprehensive professional development opportunities leaves many teachers struggling to harmonise technology with their teaching methods and subject content. In the absence of adequate training, the integration of technology into learning processes is not only suboptimal but can potentially diminish the overall quality of education delivered. Research by Iskandar & Anriani (2023) underscores the pivotal role of Information and Communication Technology (ICT) skills in enhancing both pedagogical and professional capabilities. This study advocates for prioritising the development of ICT competencies among educators as a fundamental step to achieve effective technological integration in education.

3. Limitations in Infrastructure and Resources

Beyond the challenges of technology access and teacher expertise, another major hurdle lies in the inadequate infrastructure and resources available in schools throughout Indonesia, particularly in more isolated regions. While urban schools may boast state-of-the-art technological facilities, many rural schools, especially in eastern Indonesia, remain severely under-equipped with the essential hardware and software needed for tech-integrated education. A 2021 report from the Ministry of Education and Culture reveals that a mere 30% of rural schools have reliable internet connections and adequate computing devices to support digital learning initiatives. This deficiency not only restricts students' access to educational content but also hampers teachers' capacity to use

technology effectively in delivering lessons.
Research by Sucipto (2024) further emphasises that the widespread adoption of technology-based learning in Indonesia is still stymied by significant infrastructure gaps, particularly in remote areas. These include unreliable internet services and a lack of sufficient technological devices, which severely undermine the potential impact of technology-enhanced education in these regions.

4. Social and Cultural Barriers to Technological Integration

A significant obstacle lies in the social and cultural factors that hinder the adoption of technology within education. In certain regions of Indonesia, traditional views still dominate regarding the role of technology in learning, with many believing that in-person teaching is superior to tech-driven methods. This perspective is reflected in the limited engagement of parents in supporting the use of digital tools for learning at home. A 2020 survey by the Ministry of Education and Culture's Research and Development Agency revealed that only half of the parents were in favour of technology-based education, while the others preferred more conventional approaches. To overcome this, it is crucial to implement awareness campaigns that challenge these traditional views and encourage a more positive outlook on technology in education.
Further research by Rizqi (2023) highlights that while technological advancements have dramatically transformed the educational landscape, deep-rooted cultural resistance persists in various sectors. Many educational institutions and communities remain attached to traditional educational practices and exhibit reluctance to integrate technology into learning processes. This underscores the importance of adopting more flexible, informative strategies to shift these attitudes and facilitate a smoother transition to modern educational methodologies.

Opportunities for Enhancing Educational Quality

Despite the considerable obstacles identified, this research also uncovers a range of promising opportunities that could be harnessed to improve and accelerate the quality of education through the incorporation of technology into the 2013 Curriculum. With appropriate policies and ongoing professional development, these opportunities can facilitate substantial improvements in educational outcomes.

1. Adoption of the TPACK Framework

A key opportunity highlighted is the adoption of the Technological Pedagogical Content Knowledge (TPACK) framework. This approach empowers educators to fuse their expertise in technology, teaching methods, and subject matter to design learning experiences that are both impactful and pertinent to students. According to Sanusi et al. (2023), training teachers using the TPACK framework significantly enhances their ability to integrate technology into their teaching practices. Properly structured training enables educators to incorporate digital tools more effectively into their lessons, thus boosting both the quality and engagement of the learning experience.

Further studies by Safitri et al. (2021) emphasize that the implementation of TPACK successfully bolstered student motivation, with 75% of respondents expressing support for this model. The study concludes that technological integration in education fosters a more engaging and effective learning atmosphere, which, in turn, aids in the enhancement of teachers' pedagogical skills in the digital era.

2. Optimising E-Learning and Digital Platforms

An additional promising opportunity lies in the adoption of e-learning and digital educational platforms. These resources offer enhanced flexibility and accessibility, even in regions lacking sufficient physical infrastructure. Their application not only supports distance learning but also allows students to engage with course materials at their convenience and from virtually any location, enriching the overall learning experience. Additionally, these platforms provide avenues for fostering collaborative learning approaches and nurturing vital 21st-century competencies such as digital proficiency and problem-solving abilities (Putro et al., 2023).

A study by Wityastuti et al. (2022) underscores the significant role digital platforms played during the Covid-19 pandemic, serving as a crucial mechanism for maintaining educational continuity. Tools like WhatsApp and Zoom were extensively utilised to facilitate real-time communication between instructors and learners, enabling live content delivery and interactive discussions. Nonetheless, the study also emphasises the critical need for both educators and students to enhance their digital skills in order to fully maximise the benefits of e-learning.

3. Institutional Support and Government Policy

A significant avenue for advancement lies in leveraging institutional backing and governmental policies aimed at ensuring the widespread accessibility of educational technologies throughout Indonesia. One notable initiative, "Merdeka Belajar," seeks to equip educators with the technological expertise necessary to overcome challenges related to their digital proficiency. With robust governmental, institutional, and educational community support, the integration of technology can be significantly enhanced, thereby fostering substantial improvements in educational quality.

Studies by Sitopu et al. (2023) stress that empowering teachers through targeted training, facilitated by well-crafted governmental policies, enables them to effectively engage with contemporary curricula and embed technological tools into their teaching methods. This emphasises that comprehensive institutional and policy support is pivotal in driving the overall enhancement of educational standards.

CONCLUSION

This research identifies that embedding technology into the 2013 Curriculum encounters multiple substantial obstacles. These challenges include disparities in access to technological tools, insufficient teacher proficiency in leveraging technology effectively, inadequate infrastructure and resources in isolated regions, and deep-rooted social and cultural opposition to the adoption of technological methods in education. The digital divide between urban and rural regions exacerbates the disparity in learning outcomes, while the absence of ongoing professional development impedes many educators from fully integrating technology into their teaching. Additionally, entrenched cultural values, particularly in communities and households that favour traditional pedagogical approaches, present significant barriers to the digital evolution of the educational sector. However, the study also highlights key opportunities to enhance learning quality through technological integration. The implementation of the Technological Pedagogical Content Knowledge (TPACK) framework offers potential to equip teachers with the necessary skills to merge technology with instructional strategies and content delivery. Meanwhile, the use of e-learning platforms and digital tools introduces flexibility and fosters the cultivation of essential 21st-century competencies. Government-driven initiatives and institutional backing, exemplified by the "Merdeka Belajar" programme, are pivotal in advancing these efforts, promoting both teacher training and equitable access to technological resources. By adopting a holistic strategy that includes infrastructure development, boosting teacher expertise, shifting public perceptions, and enforcing sustainable educational policies, the integration of technology into the 2013 Curriculum is poised to elevate educational quality nationwide.

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