Technology Based and Innovation Based Curriculum Design for Primary Education

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Abstract
This study talks about how important it is to create a curriculum based on technology and new ideas in primary school. This is to prepare students for learning in the 21st century. This research uses a descriptive qualitative method by looking at existing literature. It explores different ways to create curricula that can be changed, are inclusive, and focus on the student. The study found that using technology like project-based learning, flipped classrooms, and digital tools can help students think more critically, work together better, and improve their digital skills. Teachers are very important in making these new curricula work well, and they need ongoing training and support. However, there are problems like not everyone having equal access to technology, not enough digital content, and teachers not being fully ready. Because of this, we need complete efforts that include building infrastructure, training teachers, and getting support from policymakers. This study concludes that new curricula must be sustainable, involve teamwork, and respond to the changing nature of education in the digital age..

1. Introduction

Curriculum development that integrates technology and innovation for primary education is becoming increasingly important in this digital age. Rapid advances in information and communication are creating huge challenges and opportunities in education, especially at the primary school level. The old curriculum, which used to be rigid and focused on memorization, is now considered insufficient to meet the learning needs of the 21st century. This century demands critical thinking, problem-solving, collaboration and digital literacy from a young age (Qizi, 2024). The application of technology in curriculum development creates a learning environment that is more engaging, adaptable and related to students' daily lives. Digital tools, such as educational apps, gamification, blended learning and virtual classrooms, have been proven to increase student participation and learning outcomes. In addition, technology also provides teachers with the opportunity to use diverse teaching methods, such as project-based learning, real-world assessment, and customization of materials according to students' needs and abilities (Tasya, 2023).

New discoveries in curriculum design are fueling the creation of learning models that are more inclusive and responsive to various student characteristics. For example, the use of a character-centered curriculum approach coupled with digital learning at the elementary school level not only improves technology skills but also instills important values such as responsibility and discipline in the use of technology (Kulsum et al., 2024). Other innovations, such as cooperation between various parties (teachers, parents, communities and experts), are also indispensable to ensure that the designed curriculum is truly relevant and workable in practice. However, facing challenges is part of implementing a curriculum that focuses on technology and innovation. One significant hurdle is the extent to which teachers are ready to embrace new technologies and learning methods, both in terms of their skills and ways of thinking. Training, gradual support and communities of practice are important to help teachers adapt and improve their professionalism. Furthermore, attention should also be paid to differences in access to technology so that the quality of education between schools or regions does not become unequal (Susilawati et al., 2024).

Thus, technology and innovation-based curriculum design in basic education is an urgent need to equip students with future skills while improving the overall quality of learning. This effort must be collaborative, sustainable, and adaptive to the times and the needs of learners.

2. Method

Research methods are procedures and ways to verify the data needed to solve and answer research problems. In other words, the research method will provide instructions on how the research is carried out (Ibrahim & Sudjana, 2001). The method used in this research is descriptive qualitative. The qualitative descriptive method is an approach that is useful for identifying knowledge or theories related to research at a certain time (Mukhtar, 2013). The type of approach used in this research is through literature study. Literature study is research conducted by examining the concepts and theories used based on available literature, including articles published in scientific journals, which contain theories relevant to research problems. The data collection tool in this research is to search for journals contained in several electronic media such as digital libraries, and the internet, through Google Scholar. The data analysis technique used in this research is bibliographic annotation analysis which means a simple conclusion of an article, book, journal, or some other written source. Meanwhile, a bibliography is defined as a list of sources on a topic. The purpose of using literature study research is to provide insight and understanding of Technology-Based Curriculum Design and Innovation for Basic Education. Data obtained from secondary data are research journals, books, scientific articles, and relevant information websites.

3. Results and Discussion

They should be combined. The study results should be clear and concise. Restrict the use of tables and figures to depict data that is essential to the message and interpretation of the study. The results should be presented in a logical sequence in the text, tables and illustrations. The part of result exposes the findings obtained from research data which is related to the hypotheses. The results should summarize (scientific) findings rather than providing data in great detail. The discussion should explore the significance of the results of the work. Explains the findings obtained from research data along with theory and similar research comparison. Make the discussion corresponding to the results, but do not reiterate the results. The following components should be covered in discussion: How do your results relate to the original question or objectives outlined in the Introduction section (what/how)? Do you provide interpretation scientifically for each of your results or findings presented (why)? Are your results consistent with what other investigators have reported (what else)? Or are there any differences?. Include in the discussion the implications of the findings and their limitations, how the findings fit into the context of other relevant work, and directions for future research.

3.1. Curriculum Innovation as a Response to 21st Century Challenges

The implementation of quality education requires a good curriculum. The curriculum is very strategic and decisive for the implementation and success of education Curriculum development must answer the development of science and technology (science and technology) (scientific vision), the needs of society, and the needs of graduate users (stakeholder needs) (Mardhiyah et al., 2021). Education in the 21st century is a challenge. The world of education has a great responsibility in facing these challenges. This is in accordance with the 21st Century Skills Characteristics published by the 21st Century Skills Partnership, which states that 21st century students must be able to develop competitive skills needed in the 21st century related to the development of 21st Century Skills. (Prihadi, 2018) The skills that must exist in 21st century learning are not limited to the ability to read and memorize as in most schools in Indonesia. Learning skills in the 21st century can be seen when student-centered learning is applied and will not be seen when a teacher-centered learning system is applied. Therefore, in order for teachers to be inspired by the implementation of 21st century learning skills, teachers must have a foundation that allows them to truly stay ahead of the changing times. (Halimah, 2017) Since the implementation of the independent curriculum, educators will also face the challenges of the 21st century in complex skills and qualifications that are able to meet the challenges of education around the world (Maulidia et al., 2023).

Innovation in the curriculum is also realized through project-based learning, problem- based learning and the flipped classroom concept, which makes students active participants in the educational process. These learning models have been proven to be effective in developing 21st century skills such as problem-solving, creative thinking and teamwork. In Indonesia, curriculum change is seen through the implementation of the Merdeka Curriculum which gives schools and teachers the flexibility to customize the learning process to the characteristics of students and the local context. The curriculum also highlights the strengthening of the Pancasila Learner Profile which

includes values such as diversity, cooperation, independence and global sustainability (Heriman et al., 2024). However, the challenges in implementing curriculum innovation cannot be ignored. Success in innovation depends on the readiness of educators, continuous training, in-depth policy support, and participation from all parties involved, including the community and educational institutions. In addition, changes in thinking in teaching and assessment methods are also key for innovation to have a real impact on the quality of learning. Thus, curriculum innovation is a necessity to create an education system that is adaptive, responsive, and relevant to the demands of the times. This effort must be done collaboratively and sustainably in order to produce graduates who are ready to face future challenges and opportunities.

3.2. Curriculum Innovation as a Response to 21st Century Challenges

Schools are social institutions that are part of the social system of a nation. The purpose of school is to educate individuals who are ethical, able to participate in democracy, responsible, and have faith and piety. In addition, students are expected to be physically and mentally healthy, have knowledge and skills, as well as a stable and independent personality. All this can be achieved through a well-designed, efficient and relevant process. To achieve these goals, a solid curriculum is needed, both in terms of infrastructure and superstructure. The curriculum will function well only if teachers teach it with good skills and expertise. Basically, the curriculum is the path that students must take to achieve the goals of the education program. Without a clear curriculum, the goals of education can become undirected. Otherwise, the results of education will not be as expected. Therefore, the curriculum becomes a guide to determine the direction of education. A very important thing to note in the curriculum is to determine the educational objectives that must be achieved by student (Nursyamsi, 2022). The curriculum has a very important role in building the character of a nation. Through the curriculum, nationalism values are instilled in students, so that they can love their country and nation. In addition, the curriculum also contains religious values that aim to educate the nation's children to recognize God and have strength in religion. In addition, the curriculum must be able to raise human awareness so that they grow into individuals who are responsible for every mandate given to them.

One of the key aspects of implementing an innovative curriculum is teacher leadership and collaboration. International studies confirm that teachers who act as leaders and collaborators are able to create learning environments that are adaptive, creative and responsive to students' needs. Teachers who are actively involved in decision-making and curriculum development tend to be more effective in customizing materials, methods and assessments according to local contexts and learner characteristics (Kusmawan et al., 2025). Collaboration among teachers and with other stakeholders also enables innovative solutions to overcome resource limitations and implementation challenges in the field. In addition, teachers play an important role in maximizing the use of available resources, including technology, time, and community networks. Teachers' problem-solving and creative thinking skills are needed to adapt the innovative curriculum to diverse classroom realities. Teachers are also responsible for building a learning atmosphere that supports the development of 21st century skills, such as critical thinking, collaboration, communication and digital literacy, through contextual and project-based learning methods.

Research shows that teachers' active involvement in innovative curriculum development and implementation contributes significantly to improving student learning outcomes, especially in the aspects of comprehension, critical thinking and knowledge application skills. Therefore, strengthening teachers' capacity and empowerment through continuous training, collaborative support and involvement in decision-making are key factors for the success of curriculum innovation in schools (Ainin et al., 2025).

3.3. Barriers and Solutions to Digital Curriculum Development in Schools

The main barriers to digital curriculum development in schools include issues such as limited access to technology, readiness of teaching staff, lack of digital content, and social and cultural challenges. The issue of technology access is particularly important as not all students are able to use enough devices and internet, especially in rural and less developed areas, creating inequities in digital education. In addition, many teachers do not have adequate skills and training in the use of educational technology, making it difficult to effectively integrate the digital curriculum. Another challenge is the lack of digital content relevant to the national curriculum, which requires strong

cooperation between content creators, teachers and education experts. Social and cultural aspects also present challenges, such as resistance to changing conventional learning methods and economic disparities that affect students' access to technology (Nurazizah & Junaidi, 2025).

To overcome this problem, solutions that can be implemented include improving technology infrastructure in schools, especially in remote areas, with help from the government and related parties. It is essential to provide continuous training to teachers in order to improve their digital skills and pedagogy, so that they can implement the digital curriculum effectively. The development of relevant and engaging digital content needs to be driven through collaboration between different sectors, including the use of local resources as well as technology that can adapt to students ' needs. In addition, changes in learning culture must also be supported by good communication and active participation of all members of the school community so that resistance to technology can be reduced. Data protection and student privacy should also be a major concern when implementing a digital curriculum in order to maintain trust and security in the teaching and learning process. Therefore, for the development of digital curricula in schools, a comprehensive method is needed that can address technical problems, human resources, and socio-cultural aspects simultaneously so that digital education can be implemented in an inclusive, effective, and sustainable manner.

3.4. Conclusion

The article says that it's very important to create a curriculum for primary schools that focuses on technology and new ideas, so kids are ready for the 21st century. Using digital tools and new teaching methods—like project-based learning, problem-based learning, and flipped classrooms—can help students think critically, be creative, work together, and understand technology. The curriculum should be flexible and include everyone, taking into account the different needs and backgrounds of students. Teachers are very important for making this type of curriculum work well. Their guidance, teamwork, and constant learning are essential for changing their teaching methods and using technology as much as possible in the classroom. But there are still problems, such as not everyone having the same access to technology, teachers being at different levels of preparedness, and a lack of useful digital material. To fix these problems, we need better infrastructure, continuous teacher training, teamwork among everyone involved, and a school environment that is supportive. In the end, creating and using a curriculum based on technology and new ideas must involve teamwork, be sustainable, and change as needed. These efforts are very important for giving students the skills they need for the future and making sure everyone has access to a good, fair education.

Author Contributions

All authors had the same role in coming up with the ideas and writing for this article. First Author wrote the first version of the article and did the main research. Second Author helped create the research plan and make the methods part better, and made important changes, improved the discussion part, and made sure it fit with what's happening now in educational research. All authors read and agreed with the final article.

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