Integrating Technological Pedagogical Content Knowledge (TPACK) into the Merdeka Curriculum at an elementary school in Parepare: A collaborative approach

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Abstract

The Merdeka curriculum, applied to all levels of education in Indonesia, is a response to the rapid development of information technology, a current challenge for education in Indonesia. As such, teachers must master Technological Pedagogical Content Knowledge (TPACK) in their teaching process. However, preliminary observations from this study found that none of the English teachers in elementary schools in Parepare could master the eight components of TPACK. This study aims to investigate TPACK's inclusion in the Merdeka Curriculum for English subjects in elementary schools in Parepare. From January to April 2024, this research involved English teachers. The study reveals that teachers need to gain knowledge in applying TPACK in their teaching, affecting the creativity of their designs for TPACK-based learning materials. The impact of this lack of TPACK mastery is the low interest of students in elementary schools in participating in English language learning. However, the potential benefits of TPACK integration into the curriculum, such as enhanced teacher professional development and improved student outcomes, offer a promising future for education in Parepare. The study contributes to the discourse on TPACK's role in strengthening teacher professional development and student outcomes in the Merdeka Curriculum.

Keywords: Kurikulum Merdeka, learning materials, student outcomes, teacher professional development, TPACK

INTRODUCTION

Integrating technology in teaching has become essential for enhancing learning experiences in the evolving education landscape. The Merdeka Curriculum, an educational framework implemented in Indonesia, emphasizes the development of student autonomy, creativity, and critical thinking (Ditpsd Dikbud, 2022). This curriculum aligns well with the Technological Pedagogical Content Knowledge (TPACK) framework, underscoring the interconnection between technology, pedagogy, and content knowledge (Fauziyah & Mahmudah, 2023; Nuraini et al., 2023; Veronica, 2023). The TPACK framework, introduced by Mishra and Koehler, provides a model for teachers to integrate technology into their teaching practices effectively (Mishra et al., 2023). In Parepare, a city in South Sulawesi, Indonesia, implementing TPACK within the Merdeka Curriculum offers challenges and opportunities (Ammade et al., 2020). This collaborative approach recognizes the expertise of educators, researchers, and policymakers in the field of education and leverages their knowledge to create a dynamic learning environment. The goal is to foster a more engaging, student-centered educational experience that prepares students for the demands of the 21st century.

The Technological Pedagogical Content Knowledge (TPACK) framework is a comprehensive model that guides educators in integrating technology into their teaching (Ait Ali et al., 2023; Sapad & Caballes, 2022; Su, 2023). It highlights the intersections of three primary forms of knowledge: technological knowledge (TK) (Celik, 2023; Kastorff et al., 2023), pedagogical knowledge

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(PK)(Celik, 2023; Neumann et al., 2019), and content knowledge (CK)(Celik, 2023). Technological knowledge involves understanding and utilizing various technological tools and resources to enhance learning (Celik, 2023). Pedagogical knowledge focuses on the methods and practices of teaching, ensuring that educators can effectively deliver content and engage students (Kastorff et al., 2023). Content knowledge represents a deep understanding of the subject matter teachers are responsible for imparting to their students (Neumann et al., 2019). Integrating these three forms of knowledge can help educators create a more effective and engaging learning environment. The TPACK framework is particularly relevant in the context of the Merdeka Curriculum, which encourages innovative and flexible teaching practices.

The Merdeka Curriculum, introduced by the Indonesian Ministry of Education and Culture, aims to cultivate student independence and creativity (Kepmendikbudristek, 2022). It encourages educators to design learning activities that are student-centered and relevant to real-world contexts (Hijriani et al., 2024). This curriculum supports flexibility in teaching methods, allowing educators to adapt to the diverse needs of students(Sari, 2023)The emphasis on critical thinking and problem-solving skills aligns well with the goals of the TPACK framework. Teachers can create more interactive and engaging learning experiences by integrating technology into the curriculum. The Merdeka Curriculum also promotes collaborative learning, which is essential for preparing students for the complexities of modern society. This alignment between the Merdeka Curriculum and the TPACK framework provides a solid foundation for educational innovation in Parepare.

Parepare, a city in South Sulawesi, Indonesia, presents a unique context for implementing the Merdeka Curriculum integrated with TPACK. The local education system faces challenges such as limited resources and varying levels of teacher proficiency in using technology (Ammade et al., 2020). However, Parepare also offers opportunities for innovation and collaboration among educators. The community's commitment to education and the presence of dedicated teachers provide a strong foundation for implementing the Merdeka Curriculum with TPACK. The local context requires a tailored approach that considers the specific needs and resources of Parepare's schools. By leveraging local strengths and addressing challenges, educators can create a more effective and engaging learning environment for students. This approach bridges the gap between traditional teaching methods and modern educational demands.

A collaborative approach is essential for successfully implementing TPACK within the Merdeka Curriculum in Parepare. This approach involves multiple stakeholders, including teachers, school administrators, parents, and community members (Olesen et al., 2018; Patel et al., 2023). Professional development programs are crucial for enhancing teachers' technological, pedagogical, and content knowledge. Continuous training and support ensure educators can effectively integrate technology into their teaching practices. Involving parents and community members in the educational process also enriches the learning experience and fosters a supportive environment. Collaboration among stakeholders promotes a shared vision for academic innovation and improvement. This collective effort is necessary to overcome challenges and maximize the benefits of integrating TPACK into the Merdeka Curriculum.

Resource allocation is critical to implementing TPACK within the Merdeka Curriculum in Parepare. Ensuring schools access necessary technological tools and resources is essential for effective integration(Harris et al., 2009). This includes providing hardware such as computers, tablets, and interactive whiteboards, as well as software and digital content that support teaching and learning (Istiningsih, 2022). In addition, schools need reliable internet access and technical support to maintain and troubleshoot technological tools(Mishra et al., 2023). Adequate resources also encompass training and professional development for teachers to enhance their technological skills. By investing in resources, schools can create an environment that supports the goals of the Merdeka Curriculum and the TPACK framework. This investment is essential for fostering a more interactive and engaging student learning experience.

The primary objective of integrating TPACK into the Merdeka Curriculum is to create a more engaging, effective, and student-centred learning environment (Lita et al., 2023; Mishra et al., 2023; Padila et al., 2024). This approach aims to enhance the digital literacy of both teachers and students, ensuring that they are equipped to navigate the demands of the digital age. By fostering critical

thinking and problem-solving skills, the integration of TPACK supports the development of students' cognitive and analytical abilities. Encouraging collaborative learning and creativity is also a key goal, as these skills are essential for success in the 21st century. Implementing TPACK within the Merdeka Curriculum aims to prepare students for the complexities of modern society and the global workforce. This approach aligns with Indonesia's broader goals of educational reform and innovation.

In conclusion, integrating TPACK into the Merdeka Curriculum in elementary schools in Parepare represents a progressive step towards modernizing education and meeting the diverse needs of students. Through a collaborative approach, this initiative seeks to overcome challenges and leverage opportunities to create a vibrant and compelling learning ecosystem. By aligning the goals of the Merdeka Curriculum with the principles of the TPACK framework, educators can enhance teaching practices and improve student outcomes. The commitment to professional development, resource allocation, and community engagement is essential for the success of this initiative. Ultimately, the integration of TPACK within the Merdeka Curriculum aims to foster a more engaging, student-centred educational experience that prepares students for the demands of the 21st century.

METHOD

This study employs a qualitative research method to investigate the integration of Technological Pedagogical Content Knowledge (TPACK) into the Merdeka Curriculum at SD Muhammadiyah 3 Parepare. The research population comprises five teachers selected based on their involvement and experience in implementing the Merdeka Curriculum. The study is conducted over four months, from January to April 2024, to capture a comprehensive view of the integration process. Data collection is primarily done through semi-structured interviews, providing a flexible yet focused approach to understanding the teachers' experiences. These interviews allow in-depth exploration of each teacher's experiences, challenges, and strategies in integrating TPACK into their teaching practices. Open-ended questions are designed to elicit detailed responses, enabling the researcher to capture nuanced insights into the teachers' understanding of TPACK and its application within the Merdeka Curriculum.

Additionally, follow-up questions are used to probe further into specific areas of interest that arise during the interviews. The qualitative nature of the study ensures a holistic understanding of the phenomenon, emphasizing the context and experiences of the participants. Audio recordings of the interviews are made with the participants' consent to ensure accurate data collection. The recordings are transcribed verbatim for analysis, preserving the authenticity of the teachers' voices. Data analysis involves thematic coding to identify recurring themes and patterns related to TPACK integration. The study aims to provide a detailed account of how TPACK is being implemented in the context of the Merdeka Curriculum and the factors influencing its success or challenges.

FINDINGS

The findings from this study reveal several critical insights into integrating Technological Pedagogical Content Knowledge (TPACK) within the Merdeka Curriculum at SD Muhammadiyah 3 Parepare. The researcher conducted a direct interview with five SD Muhammadiyah 3 Parepare teachers. Through the interviews, the researcher gained a deeper understanding of various aspects of the needs of teaching English from these teachers' perspectives. The interviews were conducted using a structured approach so that the teachers explained their challenges, needs, and expectations in teaching English to students in school. Through these interviews, researchers can gather comprehensive information as follows.

TPACK-based learning is effectively used for English language learning

TPACK-based learning has proven to be one of the most effective methods of teaching English. By utilizing online platforms, teachers can present learning materials in various forms of multimedia, such as text, audio, video, and images, which can increase student engagement and understanding. In addition, the learning website also allows for direct interaction between teachers and students through

features such as discussion forums, chats, or webinars, which facilitate the exchange of ideas and active involvement in the teaching and learning process. Another advantage of TPACK-based learning is the flexibility of time and place, which allows students to access learning materials anytime and anywhere according to their needs. This is in line with the teacher's opinion, who said that.

> *"The TPACK-based English education system has recently been, of course, beneficial, where previously English language skills that tended to be boring and uninteresting are now much more in demand and more attractive because they are easily accessible from various locations, the system developed is more flexible and dynamic along with today's AI trends, plus it further triggers the effectiveness of the learning process which can ultimately improve the quality of learning outcomes the students." (Ika, February 2024)*

Likewise with the opinion of Mrs. Yuli who said that:

> *"In my opinion, the application of TPACK-based learning is very effective for English learning because TPACK-based learning media is an interesting learning medium so that students' interest and understanding in learning can increase. In addition, teachers can also easily search for learning materials in a faster time with materials that can be adjusted..." (Yuli, Februari 2024)*

Teachers always use TPACK in teaching English

Based on the results of the interviews, information was obtained that teachers have integrated the use of websites consistently and effectively in the English teaching process. By relying on this technology, they expand students' access to diverse and interactive learning resources. This is in line with the information obtained from Mrs. Ika

> *"I often use various platforms in teaching English, one of which is through the Website (Youtube), a learning media that has audio and visual characteristics that can increase student engagement in the classroom and provide space for creativity in and increase the learning motivation of students in learning vocabulary in the form of learning resources. In addition, using the Website can also stimulate the active participation of students." (Ika, February 2024)*

The website platform presents each learning material well, including different types of content such as articles, videos, audio, presentations, and interactive exercises. Teachers also take advantage of interactive features on the website, such as discussion forums, live chat rooms, and online quizzes, to encourage active student participation and facilitate discussions in virtual classes.

Does TPACK-based learning help you to convey material to students well?

Mrs. Naya, a teacher at SD Muhammadiyah 3 Parepare, stated that the availability of many online learning materials is beneficial in the teaching process. She considers that this online learning material makes delivering material more enjoyable for students. With a wide range of online materials, teachers can access a broader range of resources, allowing them to search for materials that fit students' needs and interests. The possibility to enrich students' learning experience by using a variety of online resources is also one of the added points of this approach. As such, Mrs. Naya welcomes the development of technology in education and sees it as an effective tool to improve the quality of learning.

> *"It is beneficial; learning materials can be delivered more interestingly with the availability of many online learning materials." (Naya, February 2024)*

Mrs. Diana acknowledged the same and admitted that free English learning provider websites benefit the learning process. According to her, this approach has made learning English more enjoyable for students. With easy access to various online learning resources, including websites that provide free English learning materials, teachers can integrate interesting learning methods and tools to increase students' interest and engagement in learning English. Mrs. Diana also realizes that the use of technology in learning English can create a more dynamic learning environment that is relevant to the needs of students in today's digital era.

> *"Yes, it indeed helps the English learning process, which becomes much more fun with the use of free English learning provider sites available today." (Diana, February 2024)*

Is using two or more learning resources necessary in the teaching process?

The use of various learning resources is essential in the learning process. According to Mrs. Naya, utilizing various learning resources allows students to access information from various perspectives. This can improve students' understanding of the subject being studied because they can look at a concept or topic from various perspectives. Thus, using diverse learning resources helps students deepen their understanding and enrich their learning experience. In addition, Mrs. Naya is confident that this approach will help students become more knowledgeable and open-minded learners.

> *"Very important. Using a variety of learning resources allows students to gain information from different perspectives, improving their understanding of the subject being studied." (Naya, February 2024)*

Mrs. Diana expressed the same thing, revealing that accessing various learning resources is crucial in the learning process. According to her, students can gain a deeper understanding of specific topics by accessing various learning resources. Each learning resource, be it a textbook, website, or other written material, can provide a different point of view or additional information that complements the student's understanding. Mrs. Diana believes the variety of learning resources will help students see concepts or topics from different perspectives, enriching their learning experience. Thus, Mrs. Diana views that using various learning resources helps students improve their understanding and broadens their horizons and knowledge about various topics.

> *Students could gain a deeper understanding of a particular topic by accessing various learning resources. Each learning resource can provide a different point of view or additional information that complements their understanding." (Diana, February 2024)*

Are you comfortable using the TPACK in the learning process?

Mrs. Yuli, an SD Muhammadiyah 3 Parepare teacher, stated that learning through TPACK is convenient because it utilizes the latest technology. According to her, using technology such as online learning platforms, educational applications, and online collaboration tools creates a learning experience based on current technological developments. Mrs. Yuli acknowledged that integrating technology into learning brings many benefits, including ease of access, flexibility, and interactivity, which increase student engagement in the learning process. With this technology, students can learn independently with a wide range of online resources, allowing them to tailor their learning to suit their learning styles and needs. She believes that using technology in learning enriches students' learning experience and prepares them to face challenges in the current and future digital era.

> *"Yes, it is very convenient because learning through websites utilizes the latest technology, such as online learning platforms, educational applications, and online collaboration tools. This creates a learning experience that aligns with current technological developments." (Yuli, February 2024)*

On a different occasion, Mrs. Diana, an SD Muhammadiyah 3 Parepare teacher, stated that using TPACK in teaching and learning is very convenient because it provides many benefits. According to him, TPACK helps teachers compile teaching materials and makes it easier for students to understand lesson concepts. In addition, the TPACK can also be used to compile interactive and engaging teaching materials. With various interactive features such as learning videos, images, and simulations, students can actively engage in learning, improving their understanding of the material being taught. Diana believes that using technology such as websites opens new opportunities in the world of education, creating a more dynamic and engaging learning environment for students.

> *"Yes, it is very convenient because the Website provides many benefits in the teaching and learning process, such as helping teachers in compiling teaching materials and helping students to understand concepts more easily. The website can also prepare interactive and interesting teaching materials...." (Diana, February 2024)*

Can TPACK-based learning in the classroom create an active classroom?

Mrs. Ika revealed that TPACK-based learning has great potential to facilitate interaction between students and teachers and between students and each other. Students can communicate directly with their teachers and peers inside and outside the classroom through features such as discussion forums,

chats, or comments. This strengthens the relationship between teachers and students and creates an active learning community where students can exchange ideas, share ideas, and support each other in the learning process. Thus, web-based learning is a means to access information and a vehicle to build positive social interactions and enrich students' learning experiences:

> *"Web-based learning can facilitate interaction between students and teachers and between students through discussion forums, chats, or comment features. This can create an active learning community inside and outside the classroom." (Ika, February 2024)*

Unlike Mrs. Ika, Mrs. Yuli stated that web-based learning effectively achieves learning goals. According to him, the use of interactive media in learning can actively involve students according to each student's learning style. With a variety of learning media, teachers can create an exciting learning experience that suits the needs and preferences of students. This allows students to engage more deeply in the learning process, improve their understanding of the subject matter, and ultimately achieve the learning goals that have been set. Thus, a website-based learning approach can be an effective solution to improve classroom learning quality.

> *"In my opinion, the classroom will be more effective with web-based learning because, in the learning process, teachers can use interactive media that actively involve students and follow the student's learning style to achieve learning goals." (Yuli, February 2024)*

Overall, the study found that while there are significant benefits to integrating TPACK within the Merdeka Curriculum, successful implementation requires ongoing professional development, adequate resources, and technical support. Teachers need continuous training to enhance their technological skills and confidence. Furthermore, ensuring consistent access to technological tools for all students is essential to maximize the benefits of TPACK integration. By addressing these challenges, SD Muhammadiyah 3 Parepare can create a more effective and engaging learning environment that aligns with the goals of the Merdeka Curriculum.

DISCUSSION

The findings of this study indicate that integrating Technological Pedagogical Content Knowledge (TPACK) within the Merdeka Curriculum at SD Muhammadiyah 3 Parepare has significant benefits and notable challenges. One of the key observations is the variation in teachers' proficiency levels with TPACK. While some teachers excel in incorporating technology into their pedagogy, others face obstacles due to limited technological knowledge and resources. This disparity suggests a need for targeted professional development programs to ensure all teachers can effectively utilize technology. Continuous training and support are crucial for building teachers' confidence and competence in technological tools. The success of TPACK integration heavily relies on teachers' ability to adapt and innovate their teaching methods. Therefore, investment in teacher training is essential for the sustainable implementation of TACK.

The study's classroom observations highlight the positive impact of effective TPACK integration on student engagement and learning outcomes. When teachers used technology effectively, they created interactive and student-centered learning environments. This approach made lessons more engaging and facilitated deeper understanding and retention of concepts among students. For example, digital tools for interactive lessons and assessments enabled students to participate and collaborate actively. However, the challenges faced by some teachers in integrating technology also became apparent. Technical issues and a lack of confidence in using advanced tools hindered the full potential of TPACK integration. Addressing these technical and confidence-related barriers is essential for maximizing the benefits of technology-enhanced learning.

Another critical aspect of successful TPACK integration is the collaboration among various stakeholders. The study's findings suggest involving teachers, administrators, parents, and students in the integration process can enhance effectiveness. Collaboration fosters a shared vision and collective effort toward achieving educational goals. For instance, engaging parents in the process can help reinforce the use of technology at home, supporting students' learning. Similarly, administrative support is crucial for providing the necessary resources and creating an enabling environment for

teachers. A collaborative approach ensures that the challenges of TPACK integration are addressed comprehensively, leveraging the strengths and contributions of all stakeholders.

The study also highlights the need for a robust support system to address technical issues and provide ongoing teacher assistance. As teachers and students noted, technical difficulties were a common barrier to effective TPACK integration. Establishing a dedicated technical support team can help promptly resolve these issues, ensuring that technology enhances rather than disrupts learning. Additionally, providing teachers with continuous professional development opportunities can help them stay updated with technological advancements and pedagogical strategies. A support system that combines technical assistance with professional growth opportunities is vital for the sustainable integration of TPACK.

In conclusion, integrating TPACK within the Merdeka Curriculum at SD Muhammadiyah 3 Parepare presents significant opportunities for enhancing teaching and learning. The study's findings emphasize the importance of professional development, technical support, collaboration, and equitable access to technology. By addressing these factors, schools can overcome the challenges of TPACK integration and fully realize its benefits. The positive impact of effective TPACK integration on student engagement and learning outcomes underscores the potential of technology to transform education. Moving forward, a concerted effort from all stakeholders is required to ensure the sustainable and successful implementation of TPACK in alignment with the goals of the Merdeka Curriculum.

CONCLUSION

This study highlights significant challenges and opportunities in integrating Technological Pedagogical Content Knowledge (TPACK) within the Merdeka Curriculum for English subjects in elementary schools in Parepare. The findings indicate that none of the English teachers have mastered all eight components of TPACK, impacting their ability to design engaging, TPACK-based learning materials. Teachers' deficiency in TPACK knowledge correlates with low student interest in English language learning. Despite the familiarity with information technology among teachers, students, and parents, its practical use in education remains inadequate. The research underscores the importance of continuous professional development for teachers to enhance their TPACK competencies. Additionally, parental involvement and the collaborative role of educators in fostering a community among students, parents, and teachers are crucial. Incorporating TPACK into the curriculum not only aids in teacher development but also improves student outcomes. The study emphasizes that addressing these challenges requires a concerted effort from all stakeholders. This approach can bridge the gap between technology use and effective learning practices, aligning with the goals of the Merdeka Curriculum. Ultimately, the research contributes to the ongoing discourse on enhancing teacher professional development and student engagement by integrating TPACK into educational practices.

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