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LITERATURE REVIEW ON THE IMPLEMENTATION OF THE 2013 CURRICULUM IN LEARNING MATHEMATICS IN ELEMENTARY SCHOOL

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ABSTRACT

The implementation of the 2013 curriculum in mathematics learning in Elementary Schools aims to enhance education quality by fostering critical thinking through a scientific approach and authentic assessment. However, its application faces challenges, particularly in integrating methods and media. This study examines the implementation of the 2013 Curriculum in mathematics learning at the Elementary School level through a literature study using a qualitative approach with content analysis of ten relevant articles. The findings reveal: (1) The primary obstacle is teacher readiness in preparing learning tools and conducting authentic assessments, compounded by unequal distribution of books and resources; (2) Teachers hold a strategic role in fostering active student involvement. While some still employ conventional methods, professional training is essential to help teachers adapt to interactive approaches tailored to students' needs; (3) The scientific approach, integration of technology, and application of ethnomathematics significantly improve learning quality. These elements encourage critical thinking, technology utilization, and contextual relevance, making mathematics more engaging and applicable; and (4) Authentic assessment offers a comprehensive evaluation of attitudes, knowledge, and skills but requires adequate support and training for effective implementation. Overall, the 2013 curriculum holds substantial potential to improve education quality if supported by teacher readiness, sufficient facilities, and ongoing training. Addressing these challenges can create more interactive, relevant, and meaningful learning experiences for students, supporting the achievement of national education goals.

Keywords: *Curriculum 2013, Learning, Mathematics*

INTRODUCTION

The implementation of the 2013 Curriculum in mathematics learning in elementary schools (SD) is a very relevant and important topic to study, considering that this curriculum is designed to improve the quality of education in Indonesia. The 2013 Curriculum aims to develop student competencies through a more contextual and active approach, and encourages students to think critically and creatively in solving mathematical problems faced in everyday life (Pramita et al., 2016)

Mathematics is one of the basic subjects that plays an important role in developing students' logical and analytical thinking skills. In the context of the 2013 Curriculum, mathematics learning does not only focus on mastering concepts and procedures, but also on applying mathematical knowledge in real situations. This is in line with the goals of national education which emphasize the importance of students' ability to apply knowledge in everyday life (Zafirah et al., 2023).

Since the implementation of the 2013 Curriculum, various changes in teaching and evaluation methods have been made. This curriculum introduces a scientific approach that involves steps such as observing, asking, trying, reasoning, and communicating. However, the implementation of this curriculum is not without challenges. Many teachers still have difficulty in implementing this approach effectively in the classroom, especially in integrating mathematics learning with other themes and implementing authentic assessments (Rahmawati. 2018). Based on the background that has been described, it is known that the implementation of the 2013 Curriculum in mathematics learning in elementary schools is an important effort to improve the quality of education. By reviewing the existing literature, this study is expected to contribute to the development of better and more effective learning practices, as well as support the achievement of national education goals. This study aims to examine the implementation of the 2013 Curriculum in mathematics learning in elementary schools through an in-depth literature study. By understanding how this curriculum is implemented in the field, it is hoped that effective strategies can be found that can help teachers overcome existing challenges. In addition, this study will also provide insight into how this curriculum contributes to improving students' mathematical abilities and its impact on learning outcomes.

METHOD

This study is classified as a literature study that aims to examine the implementation of the 2013 Curriculum in mathematics learning at the elementary school level. A qualitative approach is also used to provide in-depth insight into the implementation of the 2013 Curriculum in the mathematics learning process, including the challenges faced, scientific integration, technology, ethnomathematics to authentic assessment in the

mathematics learning process of the 2013 curriculum. The content analysis method is applied in this study to examine a number of scientific journals that are considered relevant. Through this study, the study is expected to contribute to the development of more effective and relevant mathematics learning strategies with the 2013 Curriculum (Zed, 2008).

RESEARCH RESULT

This study focuses on identifying ten main articles that discuss the implementation of the 2013 Curriculum in mathematics learning in elementary schools, as shown in Table 1.1. The articles reveal various approaches in implementing the principles of the 2013 Curriculum, including thematic and scientific-based learning, as well as teaching strategies that support the development of student competencies. Each article provides in-depth insights into the role of teachers, the methods applied, the challenges faced in the learning process, and the impact of the implementation of the 2013 Curriculum on student learning outcomes.

Through an in-depth analysis of the ten articles, this study provides a strong foundation for understanding the complexity and significance of the implementation of the 2013 Curriculum in mathematics learning in elementary schools. By identifying elements that influence the effectiveness of the implementation of the 2013 Curriculum, this study is expected to contribute to the development of more effective and relevant learning strategies. In addition, the results of this study can also be a reference for improving the quality of mathematics education in elementary schools, so that they can support students in building logical, critical, and creative thinking skills according to the demands of the curriculum.

Table 1. Identification of literature

Title and Researchers	Annotation
Jusar et. al. (2022). Penerapaan Kurikulum 2013 Pada Pembelajaran Matematika Di Sekolah Dasar. *Primary: Jurnal Pendidikan Guru Sekolah Dasar*, *11*(6), 2007-2019.	The implementation of the 2013 Curriculum in mathematics learning in Elementary Schools shows dynamics involving students, teachers, and government policies, with a focus on the development of syllabus, lesson plans, and implementation of learning that includes introduction, core activities, and closing. Although planning, implementation, and evaluation of learning have been carried out according to curriculum standards, obstacles such as book distribution and teacher understanding in making student worksheets are still challenges. Meta-analysis research on ten journals shows that this implementation generally goes well, although improvements are needed in socialization and teacher training.

Title and Researchers	Annotation
Suyitno, A. (2013). Mengembangkan kemampuan guru matematika dalam menyusun soal bermuatan literasi matematika sebagai wujud implementasi kurikulum 2013. *AKSIOMA: Jurnal Matematika dan Pendidikan Matematika*, Vol. 4. No. 2.	The 2013 curriculum in elementary school mathematics learning emphasizes a scientific approach that involves the stages of observing, asking, collecting information, reasoning, and communicating. One of the main focuses is the development of mathematical literacy, which was previously improved through the Bermutu program. Teachers are expected to be able to compile questions based on mathematical literacy to support students' skills in international events such as PISA and TIMSS. To support the success of this curriculum, universities that produce mathematics teachers need to prepare prospective educators with competencies in mathematical literacy, in line with the demands of competency tests for mathematics teachers through Teacher Professional Education and Training.
Sibuea & Sukma (2021). Analisis langkah-langkah pendekatan saintifik pada pembelajaran tematik terpadu di sekolah dasar menurut para ahli. *Journal of Basic Education Studies*, *4*(1), 2344-2358.	The implementation of the 2013 Curriculum in elementary school mathematics learning through a scientific approach is very effective because it places students as the center of learning (student-centered). This approach involves steps such as observing, asking, collecting information, associating, and communicating, which stimulate critical thinking skills and increase learning activities. In addition to making students more active and daring to express their opinions, this method also supports integrated thematic learning and helps students understand the material deeply and last a long time in their memory.
Bahtiar. (2019). Persepsi Pelaksanaan Kurikulum 2013 Sekolah Dasar. *Pendas: Jurnal Ilmiah Pendidikan Dasar*, *4*(2), 174-184.	The implementation of the 2013 Curriculum in mathematics learning in elementary schools faces obstacles such as lack of teacher readiness, confusion in authentic assessment, limited material in student books, and students' lack of understanding of the thematic learning system. Efforts to resolve this are carried out through workshops, seminars, provision of supporting books, and utilization of other learning resources. Nevertheless, this curriculum provides significant benefits, such as increasing students' enthusiasm for learning, developing critical thinking, creating a comfortable classroom atmosphere, and helping teachers understand students' abilities holistically and teach various themes efficiently.
Bintoro & Zuliana (2015). Penerapan interactive	The implementation of the 2013 Curriculum in elementary school mathematics learning through

Title and Researchers	Annotation
multimedia berbasis kurikulum 2013 ditinjau dari kecerdasan intrapersonal siswa pada pembelajaran Matematika SD. *Kreano, Jurnal Matematika Kreatif-Inovatif*, *6*(2), 121-126.	the use of interactive multimedia has proven to be more effective in improving learning achievement compared to conventional learning. Research shows that students with high intrapersonal intelligence achieve better achievement than students with medium or low intrapersonal intelligence. In addition, there is a positive interaction between learning methods and levels of intrapersonal intelligence, where the effectiveness of multimedia-based learning remains consistent at all levels of students' intrapersonal intelligence.
Richardo, R. (2017). Peran Ethnomatematika Dalam Penerapan Pembelajaran Matematika Pada Kurikulum 2013. *Literasi: Jurnal Ilmu Pendidikan*, *7*(2), 118-125.	The implementation of the 2013 Curriculum in elementary school mathematics learning can be strengthened through ethnomathematics, which helps students construct mathematical concepts based on knowledge from their own environment. Ethnomathematics creates a learning atmosphere that is fun, motivating, and free from the stigma that mathematics is difficult. In addition, this approach supports the development of affective competencies, such as respect, nationalism, and pride in the nation's culture, and is in line with the implementation of the scientific approach expected in the 2013 Curriculum.
Krissandi & Rusmawan (2015). Kendala guru sekolah dasar dalam implementasi Kurikulum 2013. *Cakrawala pendidikan*, (3), 82440.	The implementation of the 2013 Curriculum in mathematics learning in elementary schools faces various obstacles originating from the government, institutions, teachers, parents, and students. Government obstacles include problems with book distribution, assessment, teacher administration, time management, and curriculum socialization. At the institutional level, the lack of facilities and infrastructure and teacher rotation are challenges. Teachers face difficulties in creating learning media, understanding the curriculum, and mastering technology. Meanwhile, parents and students experience difficulties in adapting to thematic learning and understanding report cards.
Ningsi dkk (2024). Identifikasi Tantangan dan Strategi dalam Implementasi Kurikulum Merdeka pada Tingkat Sekolah Dasar. *Ideguru: Jurnal Karya Ilmiah Guru, 9*(2),	The implementation of the 2013 Curriculum in mathematics learning in elementary schools aims to improve the quality of education by providing flexibility for teachers and schools in designing adaptive learning. However, the challenges faced include teacher readiness in compiling learning tools, understanding technology, limited facilities

Title and Researchers	Annotation
678-682.	and infrastructure, and relevant assessment methods. To overcome this, effective strategies include intensive training, active participation in the Teacher Working Group (KKG), and regular evaluation of teacher involvement in professional activities to improve their abilities in implementing the curriculum.
Cahyadi & Purwandari (2014). Penilaian Autentik Mata Pelajaran Matematika Kurikulum 2013 Guru Kelas IV Kota Semarang. *Malih Peddas (Majalah Ilmiah Pendidikan Dasar)*, *4*(2), 35-42	The implementation of the 2013 Curriculum in mathematics learning in elementary schools has brought significant changes to the assessment system, with a focus on authentic assessments that include aspects of attitude, knowledge, and skills. Based on research, the majority of teachers in several elementary schools in Semarang have succeeded in compiling authentic assessment instruments that are in accordance with the characteristics of the 2013 Curriculum, with a level of conformity reaching 85.2%. This shows the ability of teachers to adapt and implement an assessment system that supports curriculum objectives.
Endayanti & Rahmawati (2019). Analisis Pembelajaran Matematika dalam Kurikulum 2013 Revisi pada Kelas IV Sekolah Dasar. *Jurnal Penelitian Guru Sekolah Dasar*, *7*(1), 2601-2612.	The implementation of the 2013 Curriculum in mathematics learning in elementary schools has brought significant changes to the assessment system, with a focus on authentic assessments that include aspects of attitude, knowledge, and skills. Based on research, the majority of teachers in several elementary schools in Semarang have succeeded in compiling authentic assessment instruments that are in accordance with the characteristics of the 2013 Curriculum, with a level of conformity reaching 85.2%. This shows the ability of teachers to adapt and implement an assessment system that supports curriculum objectives.

Based on table 1., it is known that the implementation of the 2013 Curriculum in mathematics learning in Elementary Schools, highlights the role of teachers as facilitators who encourage students to actively learn even though many still use the lecture method. There are various obstacles in the implementation, such as book distribution and teacher understanding, as well as difficulties in creating learning media. The scientific approach is applied with steps that stimulate students' critical thinking skills, while the use of interactive multimedia has proven to be more effective in improving learning achievement. Ethnomathematics is also proposed as a way to help students

construct mathematical concepts from their environmental knowledge. In addition, authentic assessment is the focus of the assessment system, and teacher readiness in compiling learning tools and understanding technology is a challenge that requires intensive training. Routine evaluation and increased socialization and teacher training are needed to support better curriculum implementation.

DISCUSSION

The results of the study indicate that the implementation of the 2013 Curriculum in mathematics learning in Elementary Schools faces various challenges, including teacher readiness, book distribution, and difficulties in adaptation by students and parents to thematic learning. Teachers are expected to be facilitators who support a scientific approach to develop students' critical thinking skills and mathematical literacy, although teaching practices are still predominantly using traditional methods. Innovations such as interactive multimedia, ethnomathematics, and authentic assessments help create more effective learning, but teachers' limited understanding of technology requires intensive training. Regular evaluation and improvement are needed to ensure the success of curriculum implementation.

Constraints in the Implementation of the 2013 Curriculum

One of the main constraints in the implementation of the 2013 Curriculum is the uneven distribution of books, especially in remote areas. The lack of availability of books hinders students and teachers from accessing learning materials that are in accordance with the curriculum. Marwan et al. (2024) stated that the inefficient distribution of books in several areas causes disparities in the quality of education between urban and rural areas. This condition indicates the need for improvements in the management of the distribution of teaching materials, such as the implementation of a more integrated logistics system and strict supervision, so that all students can enjoy equal educational facilities.

Another constraint is the limited understanding of teachers regarding the philosophy and implementation of the 2013 Curriculum. Many teachers find it difficult to adapt to the new approach applied in this curriculum, especially related to scientific methods that require more complex learning planning and implementation. According to Listiani & Kusuma (2017), routine training that is practical and contextual is needed so that teachers can understand how to integrate a scientific approach into learning. Local needs-based training is also important to ensure relevance to the situations and challenges faced by teachers in the field.

In addition, the lack of relevant learning media is also a significant obstacle in the implementation of the 2013 Curriculum. Inadequate learning media makes it difficult for students to understand abstract material, such as

mathematics and science concepts. Paseleng & Arfiyani (2015) stated that the use of innovative learning media, such as interactive multimedia and visual aids, can increase student engagement in the learning process. Therefore, the government and schools need to provide appropriate learning media and train teachers in using them to create more effective and interesting learning.

The readiness of mathematics teachers in compiling learning tools in accordance with the 2013 Curriculum is a crucial aspect in the successful implementation of this curriculum. Teachers are required to be able to design learning tools based on a scientific approach that combines cognitive, affective, and psychomotor aspects. However, limited understanding of educational technology is a common obstacle. According to Sanusi et al. (2023), hands-on practice-based training that includes the use of technology and a scientific approach can help teachers improve their competence. This also emphasizes the importance of training designed according to the specific needs of teachers in the field.

Teacher working groups (KKG) are a strategic forum for teachers to share experiences and find solutions to various challenges in implementing the curriculum. This forum allows teachers to exchange information about innovative learning methods, learning media, and learning evaluation. Nursiniah & Sesrita (2023) stated that KKG also plays a role in increasing teacher confidence in implementing the 2013 Curriculum. With the support of fellow teachers, technical and conceptual challenges can be overcome collaboratively, thereby improving the quality of learning in the classroom.

In addition to teacher readiness, adaptation constraints are also a significant challenge in implementing the 2013 Curriculum, especially in thematic learning and new evaluation systems such as descriptive report cards. Many students and parents find it difficult to understand this evaluation format, which is different from the previous assessment system. According to Mulyasa (2021), intensive and consistent socialization is needed so that parents have an adequate understanding of these changes. With a better understanding, parents can accompany their children in facing thematic learning and new evaluation systems.

The Role of Teachers in the Implementation of the 2013 Curriculum

The role of teachers as facilitators is one of the main keys in the implementation of the 2013 Curriculum. In this approach, teachers are expected to be able to create a learning environment that motivates students to actively explore, discuss, and find independent solutions to learning problems. This concept is in accordance with the constructivist view, which emphasizes that knowledge is obtained through experience and active interaction of students with their environment (Piaget, 2005). However, the implementation of this role requires special competence from teachers in designing activity-based and collaborative learning. This emphasizes the importance of teacher

professional development to support them in understanding the philosophy of the 2013 Curriculum in depth.

Unfortunately, many teachers still rely on conventional lecture and assignment methods. This condition can hinder the objectives of the curriculum that are oriented towards developing students' critical thinking skills. Research by Musfah (2012) states that intensive and ongoing training can improve teachers' abilities in carrying out their role as facilitators. Teachers who have undergone training tend to be more creative in designing interactive learning that actively involves students. Therefore, the government needs to ensure structured and relevant training, accompanied by an evaluation of its success, to improve the quality of the implementation of the 2013 Curriculum. Support from schools, such as the provision of learning media and technology facilities, is an important factor in maximizing the role of teachers. According to Setiadi (2016), the successful implementation of the 2013 Curriculum requires synergy between teachers, schools, and the government. With this collaboration, teachers are not only equipped with adequate pedagogical skills but are also supported in creating relevant and interesting learning for students. This support not only strengthens the role of teachers as facilitators, but also helps students develop critical and independent thinking skills.

Integration of Science, Technology, and Ethnomathematics in Mathematics Learning in the 2013 Curriculum

The 2013 Curriculum establishes a scientific approach as the main foundation in the learning process, including the stages of observing, asking, collecting information, reasoning, and communicating. This approach aims to form students who are critical, analytical, and able to solve problems systematically. The scientific stages help students understand concepts in depth through structured and interactive learning experiences. This approach is in line with the theory of constructivism learning which emphasizes that knowledge is built through experience and interaction with the environment (Piaget, 2005).

In addition, mathematical literacy is one of the main focuses of the 2013 Curriculum, which aims to improve students' ability to understand, interpret, and solve mathematical problems. The OECD (2013) emphasizes that mathematical literacy is an important skill to face the challenges of 21st century life. In the context of elementary school learning, this ability not only helps students understand abstract concepts but also prepares them to apply mathematics in everyday life, such as time and financial management.

The use of interactive multimedia, such as GeoGebra applications and animated videos, has proven to be more effective in improving student understanding than conventional methods. The results of the literature review show that this technology helps students understand abstract concepts in a

more visual and interesting way, thereby increasing learning interest and academic outcomes. According to Mayer (2002), interactive learning media supports cognitive processing by combining visual and audio elements that are in accordance with multimedia principles. Therefore, the integration of technology in mathematics learning supports the objectives of the 2013 Curriculum in creating meaningful and relevant learning.

Furthermore, the application of ethnomathematics in mathematics learning in elementary schools is a relevant innovation in the context of Indonesian culture. Through this approach, students are invited to construct mathematical concepts based on local knowledge derived from the environment. D'Ambrosio (1985) stated that ethnomathematics connects mathematics with culture, thus creating a more enjoyable learning atmosphere and building students' cultural identity. In practice, ethnomathematics not only supports cognitive understanding, but also develops affective competencies such as respect for local culture and nationalism, which are in line with the objectives of the 2013 Curriculum.

Through a scientific approach, technology integration, and ethnomathematics in the 2013 Curriculum create a more relevant and enjoyable mathematics learning model. This implementation is expected to continue to develop to create a generation that is ready to face global challenges without losing cultural identity.

Authentic Assessment in Elementary School Mathematics Learning as Part of the 2013 Curriculum

Authentic assessment is a strategic element in elementary school mathematics learning (SD) carried by the 2013 Curriculum. This approach is designed to evaluate aspects of attitude, knowledge, and skills as a whole, providing a comprehensive picture of student development. In the context of mathematics, authentic assessment allows teachers to understand the extent to which students can apply the concepts learned to real situations. As explained by Domenech et al. (2015), authentic assessment assesses students' abilities by involving them in tasks that reflect real-world challenges, making learning more meaningful and relevant.

In practice, authentic assessment in elementary school mathematics learning can be in the form of problem-based projects, portfolios, or simulations of solving everyday problems. For example, students can be asked to calculate the material needed to make a floor pattern or determine a budget in a simple shopping context. This approach is in line with the constructivist learning theory by Vygotsky (1978), which emphasizes that learning occurs when students actively construct knowledge through experience. Thus, authentic assessment not only improves critical thinking skills but also trains students to connect abstract concepts with everyday life.

In addition to cognitive aspects, authentic assessment also develops students' attitude and skill competencies. For example, when working in

groups to complete a math project, students learn to collaborate, respect friends' opinions, and show responsibility. This assessment supports the achievement of affective competencies which are one of the main focuses of the 2013 Curriculum. According to Gulikers et al. (2004), authentic assessment provides an in-depth learning experience and helps students understand the importance of social skills in academic and real-life contexts.

Another advantage of authentic assessment is its ability to provide meaningful feedback to students. By using tools such as assessment rubrics or reflections, teachers can provide a clear picture of students' strengths and areas of development. This is in line with the view of Delandshere & Petrosky (1998), which states that authentic assessment measures not only the final results but also the student's learning process. This approach allows students to reflect on their progress and be motivated to learn better.

In elementary school mathematics learning, authentic assessment contributes significantly to the achievement of students' holistic competencies. By integrating attitudes, knowledge, and skills, this approach helps shape students who are not only academically intelligent but also skilled in facing real-world challenges. The implementation of authentic assessment is expected to continue to develop to create more relevant, enjoyable, and meaningful mathematics learning.

CONCLUSION

Based on the results of the research and discussion, the following conclusions can be outlined regarding the implementation of the 2013 Curriculum in mathematics learning in elementary schools.

1. The main obstacle lies in the readiness of teachers in compiling learning tools and implementing authentic assessments, coupled with the uneven distribution of books and learning resources. These factors hinder the effectiveness of the implementation of the 2013 curriculum.
2. The role of teachers is very strategic in encouraging active student involvement. Although there are teachers who still use conventional methods, professional training has proven important to help them adapt to interactive approaches that are appropriate to student characteristics.
3. The scientific approach, use of technology, and application of ethnomathematics can improve the quality of mathematics learning. These three elements help students think critically, utilize technology, and connect mathematical concepts with life contexts, making learning more interesting and relevant.
4. Authentic assessment as an integral part of the 2013 curriculum provides a comprehensive picture of student abilities, but its

implementation still requires support and training for teachers. With better understanding and skills, teachers can carry out this assessment effectively to support educational goals.

Overall, the implementation of the 2013 Curriculum in mathematics learning in elementary schools has great potential to improve the quality of education if supported by teacher readiness, provision of adequate facilities, and ongoing training. By overcoming various challenges in its implementation, this curriculum is expected to be able to create more relevant, interactive, and meaningful learning for students, while supporting the achievement of national education goals.

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