IMPLEMENTATION OF THE USE OF THE REALISTIC MATHEMATICS EDUCATION (RME) LEARNING MODEL ON HIGH SCHOOL STUDENT LEARNING OUTCOMES IN THE INDEPENDENT CURRICULUM

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ABSTRAK

Penelitian ini bertujuan untuk mengkaji pengaruh implementasi model *Realistic Mathematics Education* (RME) terhadap hasil belajar siswa SMA dalam kurikulum merdeka dan untuk mengetahui apa dampaknya terhadap kemampuan siswa dalam memahami konsep matematika. Metode pengumpulan data yang digunakan dalam penelitian ini adalah metode studi pustaka dan studi literatur dengan menganalisis berbagai sumber Pustaka terkait penerapan model pembelajaran *Realistic Mathematics Education* (RME). Berdasarkan hasil kajian beberapa literatur, hasil dari penelitian ini menunjukkan bahwa model pembelajaran *Realistic Mathematics Education* (RME) memiliki hasil positif dan terbukti dapat meningkatkan hasil belajar siswa SMA. karakteristik model pembelajaran *Realistic Mathematics Education* (RME) memiliki fokus pembelajaran yang berpusat pada siswa, penggunaan metode yang beragam, serta evaluasi pemebalajaran yang konprehensif sehingga sejalan dengan implementasi kurikulum mereka. Implikasi dari penelitian ini adalah perlunya penerapan model pembelajaran *Realistic Mathematics Education* (RME) secara meluas di seluruh sekolah khususnya dalam konteks implementasi kurikulum Merdeka.

Kata kunci : Model pembelajaran Realistic Mathematics Education (RME), Hasil belajar, Kurikulum merdeka, Sekolah Menengah Atas.

ABSTRACT

This research aims to examine the effect of implementing the Realistic Mathematics Education (RME) model on the learning outcomes of high school students in the independent curriculum and to find out what impact it has on students' ability to understand mathematical concepts..

The data collection method used in this research is the library study method and literature study by analyzing various library sources related to the application of the Realistic Mathematics Education (RME) learning model. Based on the results of a review of several literatures, the results of this research show that the Realistic Mathematics Education (RME) learning model has positive results and is proven to improve high school students' learning outcomes. The characteristics of the Realistic Mathematics Education (RME) learning model are that it has a student-centered learning focus, uses a variety of methods, and comprehensive learning evaluation so that it is in line with the implementation of their curriculum. The implication of this research is the need for widespread implementation of the Realistic Mathematics Education (RME) learning model in all schools, especially in the context of implementing the Merdeka curriculum.
Keywords : *Realistic Mathematics Education (RME) learning model, Learning outcomes, Independent curriculum, High School.*

INTRODUCTION

Education is a process in order to influence students to adapt as well as possible to the environment. It will thus bring about a change within him that will enable him to function strongly in the life of society. (Fauzan, 2022). Education in Indonesia has used a lot of curriculum changes. Curriculum used today is an independent curriculum. According to the Ministry of Education, the Merdeka Curriculum is a curriculum with diverse intra-curricular learning in which content will be more optimal so that students have enough time to deepen concepts and strengthen competences. Teachers have the ability to choose a variety of teaching devices so that learning can be adapted to the learning needs and interests of the students. The Merdeka curriculum gives the educators the opportunity to create quality learning that suits the needs and learning environment of the learners.

One area in education that applies an independent curriculum is mathematics. Mathematics is the queen or mother of all sciences. It is meant that mathematics is as the source of other sciences. Mathematics is a discipline that clearly relies on thought processes considered very well to be taught to pupils. The goal of mathematical learning is to prepare the student mentally and intellectually as a livelihood, in mathematics also the student obtains the certification systematically. (Muthia et al., 2018). So educators are expected to be able to apply mathematical concepts into everyday life.The development of effective and efficient mathematical education has been a major focus in efforts to improve student learning outcomes. In the era of independent curricula, the integration of science data and religious studies has become crucial to understanding and addressing the challenges faced in the learning process. Realistic Mathematics Education (RME) focuses on the use of relevant and problem-based contexts to enhance students' ability to understand mathematical concepts.Realistic mathematics education is a mathematic learning model in school mathematica oriented towards the application of math in everyday life. RME combines what math is, how students learn math and how math should be taught (Hadi 2017). The Realistical Mathematic Education Approach emphasizes how students rediscover concepts in math through problems that are realistic for students (Ja'far's, Sunardi, and K 2014).

The scope of this research covers the implementation of the Realistic Mathematics Education (RME) model in the independent high school curriculum and its impact on student learning outcomes. Previous research has shown that RME can improve student mathematics learning outputs, but there are still some weaknesses and limitations in its implementation. A literature review suggests that the RME has been used in some previous studies to improve students' mathematical learning output. However, there are also some shortcomings and constraints in implementation, such as the limited resources and the limited ability of teachers to develop relevant contexts.

The novelty of this research lies in the attempt to improve the learning outcomes of high school students through the implementation of the Realistic Mathematics Education (RME) model in an independent curriculum. The research issue is how the Realist Mathematical Education model can improve high school student learning outputs in an autonomous curricular and what impact it has on students' ability to understand mathematical concepts. Thus, this research is expected to contribute to the development of more effective and efficient mathematical education in education in this independent curriculum.

The method used in this research is a type of qualitative descriptive research with a literary study approach. Activities are carried out systematically to collect, process, and summarize data using specific methods/techniques in order to find answers to problems faced. (Dits Prasanti, 2018). The study of literature is a method used to gather data or sources related to the topics raised in a research (Habsy, 2017). Literature studies in this research are carried out by studying concepts and theories used based on available literature, including articles published in scientific journals that contain theories relevant to research problems. The research objects are Realistic Mathematics Education (RME) and an independent curriculum. The subject of this research is a high school student.

The data collection tool for this research is the collection and search of journals that are available on some electronic media such as the internet and digital liberary. The keywords used for searching journals and relevant books in this literary study are "RME" and "independent curriculum". The data collection tools in this article are the journalism available at the National Library, Micrisift

Academic, and google scholar or Google Cendekia.The data collection technique in this study uses the study of literature. This technique involves examining books, literature, notes, and reports that are relevant to the problem to be solved. In the process of editing, researchers read and understand the content of relevant literary sources. The process of organizing involves organizing the information found so that it can be used effectively in research. The finding process involves searching for relevant sources of literature using keywords, subjects, and quotes. Content analysis is the process of choosing, comparing, combining, and sorting different concepts relevant to the subject of research in order to reach accurate and accurate conclusions. In the context of Realistic Mathematics Education (RME) research, this analysis enables researchers to understand the content of information in greater depth and obtain more accurate results in the Implementation of Realist Mathematical Education in High School.

DISCUSSION

The Realistic Mathematic Education Learning Model (RME) is a model of mathematical learning approach that emphasizes understanding mathematics concepts through real and contextual experiences for students. The theory is based on the idea that students can more easily understand and apply mathematic concepts if they can connect them with situations and objects they know and experience in everyday life. Implementation of the use of the RME Learning Model in the Mathematics Freedom Curriculum in High Schools aims to enhance students' understanding of Mathematical concepts and their ability to solve mathematically problems creatively. Using the RME approach, students are invited to connect mathematics with their daily lives through relevant real-life situations. One of the advantages of the RME Learning Model is the ability to develop critical thinking skills of students. In the learning process of Realistic Mathematic Education (RME), students are given the opportunity to think critically and analyze the mathematical situations faced. They're invited to ask questions, formulate problems, and find creative solutions. It allows students to develop logical and analytical thinking skills.

Implementation of Realistic Mathematic Education (RME) in the Merdeka curriculum can improve students' learning outcomes in mathematics. RME is a

mathematical learning approach that focuses on the use of real and contextual problems to build understanding of mathematic concepts.

Research conducted by Ilma Nurfadilah, et al, 2021, shows that the use of RME approaches in student mathematical problem solving skills is better than using scientific.

Another study conducted by Febriyanti, Dkk, 2019, showed that the application of the Realistic Mathematic Education model can improve mathematics learning outcomes, especially in students of grade IV SD GMIM IV Tomohon. This study produced mathematical teaching materials based on the approach of the Realist Mathematics Education on the material of linear equations of two variables that are practical, valid, and have potential effects so that the teaching material can make students think logically in mathematic learning.

In general, the RME theory developed by Hans Freudenthal consists of five characteristics, namely: (1) the use of real contexts as a reflection point for learning mathematics, (2) use of models that emphasize informal solutions before using formal methods or formulas, (3) associating topics with each other in math, (4) use of interactive methods in mathematical learning, and (5) appreciation of the variety of answers and contributions of students.

The Application of Realistic Mathematics Education (RME) aims to enhance students' understanding of mathematical concepts by connecting them to real-life contexts and emphasizing the mathematics of human activity. This approach is designed to improve student mathematical reasoning, communication skills, and student learning outcomes especially in environments where traditional methods may not be effective. (Laurens, 2017). The use of RME in the Merdeka curriculum allows teachers to develop curricula that are more contextual and relevant to student life. Thus, students can more easily understand mathematical concepts and apply them in real-world situations, thereby enhancing their ability to think critically and communicate.

Implementing Realistic Mathematics Education (RME) in Merdeka's curriculum can also help teachers develop students' creative thinking and communication skills. Using Realistical Mathematic Education (RME), teachers

can help students develop their creative thinking skills by providing an opportunity to solve complex problems that require a variety of strategies. Moreover, Realist Mathematical Education can also assist teachers in developing students' communication skills by asking students to present their work in front of the classroom and respond to other work.

Based on the implementation literature study, Realistic Mathematic Education (RME) has been implemented in the last few years. (1) Development of the Mathematical Module based on the Approach to Realist Mathematics Education (RME): The RME-based mathematical module has been developed for the multiple material and number factor of students in the fourth grade of Elementary School. The module is designed to help students understand mathematics concepts in greater depth and build better problem-solving skills. (2) Implementation of RME in Madrasah Ibtidaiyah Nurul Islam 01 Balungkulon Jember: Research carried out by Ulil Maziyatin Nafisyah showed that the implementation of the RME at Madrasas Ibdaiyah Islam Nurul 01 Balongkulon jember can improve student learning outcomes. The research also found that measures for effective implementation of RME included the use of real-world problems, the utilization of models that emphasize informal solutions, and the application of interactive methods. (3) Development of RME Curriculum: Development of the RME curriculum in Indonesia has been done by submitting the idea of a PMRI-based educational framework (Pendidikan Matematika Realistik Indonesia). This framework becomes the rule in the framework that should be followed by the developers of the RME curriculum.

From the RME implementation data it can be seen that the implementation of RME in the Merdeka Curriculum in Indonesia has been carried out in various ways, including the development of mathematical modules based on RME, implementation RME at the Madrasah Ibtidaiyah Nurul Islam 01 Balungkulon Jember, development of the curriculum, the use of context in RME.

In a study conducted by Rahmi Purwitangrum and Rully Charitas Indra Rahmana, the results of the study showed that the use of Realistic Mathematics Education (RME) can improve students' ability to understand mathematical

concepts and apply them in real situations. The study also demonstrated that Realistical Mathematic Education can help teachers in developing the ability to think creatively and communicate students. However, in other researches mentioned the application of Realist Mathematical Education in the mathematics curriculum there are several constraints: (1) Lack of knowledge of teachers (2) lack of use of context (3) lack of ability of students in critical thinking (4) lack of students connectivity (5) lack of student independence.

Based on the literature studies of several journals relevant to the themes of the implementation of Realistic Mathematics Education (RME) in the mathematics curriculum in high school, it is able to improve mathematical computational thinking, learning outcomes, communication and problem solving skills, mathematic connectivity skills, and learning effectiveness. Realistic Mathematics Education (RME) helps students build mathematical knowledge through the use of relevant examples and enables students to participate actively in the learning process.

Implementation of the Realistic Mathematical Education Learning Model (RME) in the Mathematics Freedom Curriculum in High School has a number of significant implications for students' learning outcomes. (2) Improving Mathematical Learning Outcomes: Research by Nurnaningki Syamsi (2021) shows that the use of Realistic Mathematics Education (RME) can improve student mathematics learning outcomes. RME allows students to be more active in building mathematical knowledge by using relevant examples and enables students to participate in the learning process. (3) Enhanced Mathematical Communication and Problem Solving Skills: Research by Pardede (2019) found that using Realistic Mathematics Education (RME) can improve students' mathematical communication and problem solving skills. RME helps students build critical and analytical thinking skills through the use of relevant examples and enables students to participate in the learning process. (4) Enhanced Mathematic Connection Skill: The Research by the Division (2016) found the use that Realistical Mathematica Education (RME) may enhance student mathematics connectivity skills. (5) Improved Learning Effectiveness: Research by Zulkardi et al. (2020) found that the

use of Realistic Mathematics Education (RME) can improve the effectiveness of learning mathematics.

A study from Gerhajun's study (2022) stated that the application of the Realistic Mathematics Education (RME) model to the Merdeka curriculum in high school could help students build a deeper and broader understanding of mathematics. In this model, students are given the opportunity to re-discover mathematical concepts with instructions from educators. This allows students to build models from a problem situation and then compile mathematics models to solve up to acquire formal mathematic knowledge. Thus, students can build a deeper and broader understanding of mathematics, as well as enhance numeration skills and critical thinking skills.

Furthermore, based on Syamsi's study (2021) on the influence of the learning model, Realistic Mathematics Education (RME) stated that the model can also help students in building creative thinking and critical thinking skills. In this model, students are given the opportunity to solve a variety of contextual problems given at the beginning of learning. This allows students to build a model from a problem situation and then compile a mathematical model to complete up to acquire formal knowledge of mathematics. Thus, students can build better creative thinking and critical thinking skills.

In some studies related to the implementation of the learning model of Realistic Mathematics Education (RME), the results show that the use of RME can improve student mathematics learning outcomes. For example, research conducted at Islamic University Riau found that using RME methods in mathematical teaching on the subjects of mathematic logic language can improve students' learning outcome. Furthermore, research carried out at the University of Education Indonesia also found that the realistic mathematically approach has a positive impact on student learning outputs, especially in the material of translation.

The impact of the application of the RME model on the learning outcomes of high school students in an independent curriculum is that they can more easily understand and apply mathematical concepts in real-world situations. The relevance of this research is that RME models can be an effective alternative in improving

high school student learning outputs in a self-curriculum, as well as can help students develop high-level thinking skills and better communication skills.

In synthesis, the results of the studies show that the impact of the Learning Model of Realistic Mathematics Education (RME) on the mathematical learning outcomes of students is significant and positive. The use of the Realist Mathematic Education can improve the learning outcome of students, especially in geometry and gradient materials. Therefore, the research results suggest that the application of the model of Realist mathematics education (RME) can improve high school students' learning outputs in an independent curriculum. The study found that students who learn with the Model of realistic mathematic education (R ME) have better ability to understand mathematically concepts and apply them in real-world situations. The results showed that the RME model can improve student learning output especially in the field of mathematica, as well as help students in building creative thinking in understanding mathematological concepts, and students' ability to think critically. However, some aspects of the application of Realistic Mathematic Education (RME) need to be developed such as (1) Use of realistic contexts, (2) Use of models that emphasize informal solutions before using formal methods or formulas, (3) Associate topics in mathematics, (4) Use of interactive methods in learning math, (5) Appreciate the variety of answers and students' contributions so that by taking these aspects into account, applications of Realist Mathematical Education (RME) can be developed to help students understand mathematical concepts more deeply and build better problem-solving, critical thinking, communication, and collaborative abilities to produce satisfactory learning outcomes.

CONCLUSION

The application of Realistic Mathematics Education (RME) in the mathematics freedom curriculum in high school has some significant implications for student learning outcomes. Based on the results of the research, RME can improve mathematical computational thinking skills, mathematic learning outputs, communication and problem-solving skills, the ability to connect mathematically, and learning effectiveness. RME helps students build knowledge of maths through

the use of relevant examples and enables students to participate actively in the learning process. However, some aspects of the application of Realistic Mathematic Education (RME) need to be developed such as (1) Use of realistic contexts, (2) Use of models that emphasize informal solutions before using formal methods or formulas, (3) Associate topics in mathematics, (4) Use of interactive methods in learning math, (5) Appreciate the variety of answers and students' contributions so that by taking these aspects into account, applications of Realist Mathematical Education (RME) can be developed to help students understand mathematical concepts more deeply and build better problem-solving, critical thinking, communication, and collaborative abilities to produce satisfactory learning outcomes.

This research is limited to the available data. Researchers can only rely on the data in the literature that has been published. This can limit the comprehensive understanding of the implementation of RME, especially if there are limitations in the quantity and variation of relevant literature, further research can be done for research that develops the RME curriculum with different penetration methods. In addition, research can also be done to find out how technology can be used to support RME implementation, such as the use of software, simulations, and online resources. Furthermore, other research may be carried out to develop a competence-based RME model, so that students can understand mathematical concepts in greater depth and build better problem-solving capabilities. In addition, research can also be conducted to find out how RME can be used in learning mathematics for students with special abilities, such as students with disabilities or students who have special needs. Further research can help in improving students' ability to understand mathematical concepts and apply them in real situations, as well as help in developing a more effective and efficient RME curriculum.

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