

# Analysis Journal of Habits of Mind Through the Realistic Mathematics Education (RME) Approach in Improving Reasoning Ability

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**Abstrak.** *The purpose of this study was to determine: (1) The tendency of the habits of mind towards reasoning abilities, (2) the effect of Realistic Mathematics Education (RME) in improving reasoning abilities, and (3) the advantages and disadvantages of Realistic Mathematics Education (RME). This study uses a qualitative descriptive research with a literature study method in the Digital Library of the State University of Medan. The data analysis technique used is the data analysis technique of Miles and Huberman, which consists of the stages of data collection, data reduction, data presentation, and drawing conclusions. The results of the analysis obtained are: (1) Habits of mind affect reasoning ability with an average effect size value of 1.131687 in the high category. (2) Realistic Mathematics Education (RME) has an effect on reasoning ability with an average effect size value of 1,572938 in the very high category. (3) The advantages of the RME approach are that students are more active in building their own knowledge, the learning process becomes more interesting because it uses real experiences / problems in everyday life that occur around them, and students are given the opportunity to think, argue mathematically on solving problems. which are given. Meanwhile, the advantages of the RME approach are that in the learning process the smarter group dominates than the less intelligent group, the low level of teacher ability results in misconceptions about the material, the use of time in the RME approach process is quite long and the search for questions related to the RME approach. the hard one. (Jurnal Fibonacci, 02(2): 12-28, 2021)*

Kata Kunci: Habits of Mind, Realistic Mathematics Education (RME) approach, Reasoning Ability

## Introduction

Mathematics is known as an abstract science, whose main characteristics are logical, critical, systematic, and consistent thinking patterns. Mathematics is a very important basic science. Therefore, the number of hours of mathematics lessons is more than other subjects and mathematics is also taught at all levels of education, from elementary school to tertiary level. Mathematics is also the subject most often used in solving other subjects.

The importance of mathematical reasoning skills greatly affects the mathematics learning process they follow. Because students who have good reasoning skills will easily understand mathematics material and vice versa students with low mathematical reasoning abilities will find it difficult to understand mathematics material. Mathematical reasoning skills are very important abilities that students must have in solving mathematical problems. This is because every mathematical problem must be solved by a reasoning process, and reasoning can be understood and trained by solving math problems. Teachers can assess students'

reasoning abilities by observing how students solve math problems. Through various student answers, the teacher can differentiate or classify students' answers, in order to obtain an overview of the extent to which students' reasoning abilities solve math problems. In reality in the field, students' mathematical reasoning abilities still lacking, this is in line with the research report of Priatna (2003) argued that the quality of students' mathematical reasoning abilities was still lacking, which is around 49% of the ideal score.

One of the important affective aspects for students to have is the habit of thinking. Costa & Kallick (2008) named intelligent behavior with the term habits of mind. Habit is a process of behaving and acting repeatedly until it is settled and automatically carried out. There are sixteen categories of Habits of Mind, namely surviving or never giving up; set conscience; listens to other people's opinions with empathy; flexible thinking; think about thinking; try to work carefully and precisely; asking questions and posing problems; using past experiences to form new knowledge; think and communicate clearly

and accurately; collect various data with various senses; creating, imagining, innovating; responds with admiration; take responsibility for the risks involved; humorous; dependency thinking; open to further learning (Costa, 2012). This shows that Habits of Mind can be seen and observed through the learning process experienced by students.

Efforts that can be made include improving the learning process through selecting the learning model used. Learning models that can be applied by teachers to create learning objectives and can have a good influence on mathematical reasoning, one of which is the Realistic Mathematics Education (RME) learning model. Realistic Mathematics Education (RME) is a teaching and learning theory in mathematics education. Realistic Mathematics Education (RME) was first developed in the Netherlands in 1971 by the Freudenthal Institute. The use of the word realistic comes from the Dutch, *zich realiseren* which means to imagine (Wijaya, 2012). This means that students are expected to be able to imagine learning mathematics in real situations. Subject matter needs to be linked to everyday life. By working on mathematical problems that can be imagined by students in everyday life (realistic mathematics), students build concepts and understandings with instincts, instincts, reasoning power, from known concepts. They form their own structure of mathematical knowledge with the help of the teacher by discussing possible alternative answers.

Therefore, based on the descriptions that have been described, researchers are interested in conducting research on mathematics learning with the title "Analysis of Habits of Mind through Realistic Mathematics Education (RME) Approach in Improving Reasoning Ability".

## Literature Review

### 1. Reasoning Ability

The ability is the capacity of an individual to perform various tasks in a job. The capacity they get will increase according to the experience they gain. Reasoning is a thought process to draw new conclusions in the form of knowledge based on previously proven statements. In order for the conclusion of reasoning to be accepted logically, we must be able to think about the consequences of each answer used.

Mathematics learning is related to reasoning abilities. Without reasoning, one cannot study mathematics well. The Ministry of National Education states that mathematics material and mathematical reasoning are two

things that are closely related and cannot be separated, because mathematics material is understood through reasoning and reasoning is understood and trained through learning mathematics (Mikrayanti, 2016).

Measurement of students' mathematical reasoning abilities can be seen through indicators. The indicator of mathematical reasoning ability is a measure to determine the extent to which students can understand and master mathematical reasoning. Based on the document of Dirjen Dikdasmen Regulation No.506 / C / Kep / PP / 2004, the reasoning indicators that must be achieved by students include:

- (1) submitting allegations;
- (2) perform mathematical manipulation;
- (3) draw conclusions, compile evidence, provide reasons or evidence for the correctness of the solution;
- (4) draw conclusions from the statement;
- (5) checking the validity of an argument; and
- (6) determine the pattern or nature of mathematical symptoms to make generalizations (Hendriana et al, 2017).

### 2. Habits of Mind

Habit is a process of behaving and acting repeatedly until it is settled and automatically carried out (Soeyono & Sholikah, 2013).

According to Costa & Kallick (2007), some criteria for Habits of Mind are as follows

#### 1. Persistence

Persevere in the task until it's finished, stay focused. Look for ways to achieve your goals when stuck and don't give up.

#### 2. Manage time impulsively

Take time to think before you act, be calm, and thoughtful.

#### 3. Listening with empathy and understanding to understand others

Devote mental energy to other people's thoughts and ideas, Seeks to understand other people's viewpoints and emotions

#### 4. Think Flexible

By looking at other ways, a person will be able to change perspectives, generate alternatives, and consider options

#### 5. Metacognition

With metacognition, a person will know about himself. Able to be aware of his own thoughts, strategies, feelings and actions and their influence on others.

#### 6. Strive for accuracy

In doing an assignment, someone will double-check the answers, always do their best, set high standards, check and re-examine the answers.

7. Apply past knowledge

Able to use what has been learned, access previous knowledge, transfer knowledge outside the situation in which he learned to solve the problems at hand.

8. Questioning and posing problems

Being able to question how someone knows. Having a questioning attitude, knowing what data is needed and developing a questioning strategy to generate that data. Found a problem to solve

9. Think and communicate clearly and accurately

Strive for accurate communication in both written and oral form, avoiding generalizations, deletions and exaggerations.

10. Collect data through all sensitivities

Able to pay attention to the surrounding environment, collect data through all senses. taste, touch, smell, hearing and sight

11. Creating, imagining & innovating

Able to try different ways, generate new ideas, fluency, and originality.

12. Respond with astonishment

Find amazing things around him, and be attracted by phenomena and beauty.

13. Responsible

Dare to try challenging things and try new things constantly.

14. Find humor

Laughing a little, finding strange and unexpected things. Be able to laugh at yourself.

15. Think interdependently

Cooperate and be able to work and learn from others in reciprocal situations and work in teams.

16. Be open to continuous learning

Learn from experience, have humility and want to admit when you don't know, and refuse to be complacent.

### 3. Realistic Mathematics Learning Approach

Realistic Mathematics Education (RME) is a teaching and learning theory in mathematics education that was first introduced and developed by the Freudenthal Institute in the Netherlands. This theory has been adopted by a large number of countries all over the world

such as England, Germany, Denmark, Spain, Portugal, South Africa, Brazil, USA, Japan, and Malaysia (de Lange, 1996).

The present form of RME is mostly determined by Freudenthal's view on mathematics (Freudenthal, 1991). Two of his important points of views are mathematics must be connected to reality and mathematics as human activity. First, mathematics must be close to children and be relevant to every day life situations. However, the word 'realistic', refers not just to the connection with the real-world, but also refers to problem situations which real in students' mind. For the problems to be presented to the students this means that the context can be a real-world but this is not always necessary. De Lange (1996) stated that problem situations can also be seen as applications or modeling.

Second, the idea of mathematics as a human activity is stressed. Mathematics education organized as a process of guided reinvention, where students can experience a similar process compared to the process by which mathematics was invented. The meaning of invention is steps in learning processes while the meaning of guided is the instructional environment of the learning process.

In line with Koeno Gravemeijer's opinion above, Frans Moerlands describes this realistic type in the idea of an iceberg floating in the middle of the sea. In the iceberg model, there are four levels of activity, namely (1) mathematical environment orientation, (2) teaching aids model, (3) building stone and (4) formal mathematics.

In Shoimin (2016) Realistic Mathematics Education uses two components of mathematics in the mathematics learning process, namely horizontal mathematics and vertical mathematics, as follows:

1. Horizontal Mathematics

Horizontal mathematics is the process of solving contextual problems from the real world into mathematical problems so that they can be solved, students try to solve real world problems in their own way.

2. Vertical Mathematics

Vertical Mathematics is a mathematical process at the stage of using symbols, symbols, general principles. In vertical mathematics, students try to construct general procedures that can be used to solve similar problems directly without the help of context.

### **A. Characteristics of Realistics Mathematics Education (RME)**

The combinations of the three Van Hiele's levels, Freudenthal's didactical phenomenology and Treffers' progressive mathematization result in the following five basic characteristics of realistic mathematics education:

- (1) Phenomenological exploration or the use of contexts
- (2) The use of models or bridging by vertical instruments
- (3) The use of students own productions and constructions
- (4) The interactive character of the teaching process or interactivity
- (5) The intertwining of various learning strands or units

### **B. Steps of Realistic Mathematics Education (RME) Approach**

- Step 1: Understand contextual issues
- Step 2: Describe the contextual problem
- Step 3: Resolve contextual problems
- Step 4: Compare and discuss answers.
- Step 5: Summing up

### **C. Advantages and Disadvantages of Realistic Mathematics Learning**

According to Swarsono Hadi (Ardianto et al, 2016) the advantages of learning realistic mathematics include:

- a. Provide a clear understanding to students about the relationship between mathematics and everyday life and about the usefulness of mathematics in general for humans.
- b. Mathematics is a field of study that can be constructed and developed by students and by others not only by those who are called mathematicians.
- c. The method of solving a problem or problem does not have to be single, and it does not have to be the same between one person and another.
- d. Learning mathematics, the learning process is the main thing and to learn mathematics, people must go through the process themselves and find mathematical concepts themselves with the help of teachers so that learning is more meaningful.

While some of the disadvantages of realistic learning, namely:

- a. Searching for contextual problems is not very easy for every math topic students need to study.
- b. Realistic mathematics assessment and learning is more complex than conventional learning.
- c. Selection of teaching aids must be careful so that it can help students' thinking processes.

### **4. Literature Study**

Literature study is a series of activities relating to methods of collecting library data, reading and taking notes and processing research materials (Mestika, 2004).

In the khatibah (2011) there are four steps of literature research, namely: First, preparing equipment, equipment in library research, only pencils or pens and note paper.

Second, compiling a working bibliography, a work bibliography is a record of the main source material that will be used for research purposes. Most binliographical sources come from library collections that are on display or not.

Third, managing the time, in terms of managing this time, depending on the person who takes advantage of the available time, it can be planning how many hours a day, one month, it's up to the person concerned to use the time.

Fourth, reading and making research notes, meaning that what is needed in the research can be recorded, so as not to get confused in the sea of books of so many types and forms.

### **5. Effect Size**

Effect size is a measure of the magnitude of the effect or the influence of another variable, the magnitude of the difference and the relationship that is independent of the influence of the sample size (Olejnik, 2003). The related variables are usually in the form of response variables or called independent variables and outcome variables or dependent variables. Effect size can also be said as a measure of the meaningfulness of research results at a practical level (Huck, 2007).

The calculation of the effect size (defined by "d" as the difference between the two

means divided by the standard deviation of the data) can be done in the following way:

$$d = \frac{\bar{x}_1 - \bar{x}_2}{s}$$

With,

$$s = \sqrt{\frac{(n_1-1)s_1^2 + (n_2-1)s_2^2}{n_1 + n_2 - 2}}$$

The results of the effect size calculation are interpreted using the classification suggested by Cohen (1988), namely:

**Table 2.1** Effect size clarification based on the average (mean)

Category	D
Very small	$0,01 \leq d < 0,20$
Small	$0,20 \leq d < 0,50$
Medium	$0,50 \leq d < 1,20$
High	$0,80 \leq d < 1,20$
Very High	$1,20 \leq d$

## Research Methodology

**Location and time of research.** This research will be carried out at the Digital Library of Medan State University. Apart from the library, this research was also carried out at the campus, at the researcher's house and in various places that had literature and information sources that were in accordance with the research topic. This research began in the even semester of A.Y 2020/2021 to collect data, process data, analyze data, and make conclusions from the problems in the study.

**Type of research.** This type of research uses descriptive qualitative analytical methods.

**Method of research.** The research method used in this research is the literature study method, namely by searching, reading, understanding and analyzing various literature related to the research topic being carried out.

**Source of data.** In this study, researchers used secondary data because researchers found it difficult to find primary data sources, researchers used existing sources and were aware that this research was very important. Secondary data is data that is already available, so we just search and collect.

**Data collection technique.** Data collection in this study was carried out by document analysis (literature). The research data source obtained ten research articles that can be analyzed with the theme of habits of mind and the RME approach in improving reasoning abilities, for the period 2014-2021, the research was at the national level

indexed and accredited by the RISTEKDIKTI Sinta.

Based on the collection of research articles, the following are the results of data collection:

Table 3.1 Scientific Article Grouping

Num	Data Collection Criteria	Data Grouping	Number of Article Findings
1.	Publication Year	2014	1
		2015	1
		2016	-
		2017	7
		2018	6
		2019	4
		2020	-
		2021	1
2.	Accreditation of Sinta Ristekdikti	Sinta 1	-
		Sinta 2	3
		Sinta 3	7
		Sinta 4	8
		Sinta 5	1
		International	1

**Instrument of Research.** According to Sugiyono (2017) In qualitative research, the main instrument is the researcher himself (human instrument) that functions to determine the focus of research, select information as a data source, assess data quality, analyze data, interpret data and make conclusions on the findings.

**Procedure of research.** The procedure in this research is to answer the problem formulation. To answer the first problem formulation, namely How the habits of mind tendency towards reasoning ability are explained in the following steps:

1. The first step is to collect information from several relevant sources such as journals, theses and theses relating to the influence of habits of mind on students' reasoning abilities.
2. To analyze the results of the habits of mind implementation on students' reasoning abilities.
3. To describe the results of students' reasoning abilities with habits of mind.
4. To conclude how habits of mind affect students' reasoning abilities

Furthermore, to answer the second problem formulation, how is the trend of Realistics Mathematics Education (RME) learning in improving the reasoning abilities described in the following steps:

1. The first step is to collect information from several relevant sources such as journals, theses and theses related to the effect of Realistic

Mathematics Education (RME) learning in improving students' reasoning abilities

2. Analyze the results of implementing Realistic Mathematics Education (RME) learning in improving students' reasoning abilities

3. Describe the improvement of reasoning skills after the implementation of Realistic Mathematics Education (RME) learning

4. Summing up how to improve reasoning skills after the implementation of Realistic Mathematics Education (RME) learning

Then to answer the third problem formulation, namely what are the advantages and disadvantages of Realistic Mathematics Education (RME) learning described in the following steps:

1. The first step is to collect information from several relevant sources such as journals, theses and theses related to Realistic Mathematics Education (RME) learning for students.

2. Analyze the advantages and disadvantages of Realistic Mathematics Education (RME) learning for students.

3. To conclude the advantages and disadvantages of Realistic Mathematics Education (RME) learning for students.

**Data Analysis Technique.** Miles and Huberman (1992) describe the process of analyzing qualitative research data consisting of three activities that occur simultaneously, namely data reduction, data display, and make conclusions/verification. Data reduction, data display, and make conclusion activities are a series of analysis activities that follow one another or an interactive cycle process.

1. Data Reduction

Data reduction is a selection process, focusing on simplifying, abstraction, and transforming data that arise from written data into multiple documents / data. The data can be quite a lot, requiring careful and detailed records. For this reason, the data that is summarized and selected is data that includes all three variables, namely Habits of Mind, Realistic Mathematics Education, and reasoning abilities.

2. Present the data

In this stage, the researcher presents the data in the form of a description based on the aspects studied based on the research formula. In this process, data relating to the research objectives are presented, namely those concerning the influence of habits of mind on students' reasoning abilities, the effect of increasing reasoning skills after the implementation of Realistic Mathematics Education (RME) learning, and the advantages

and disadvantages of learning Realistic Mathematics Education (RME) towards students.

3. Conclusion / Verification

Conclusions are drawn in stages, beginning with temporary conclusions. But with the addition of data then the data verification is done by studying the existing data . To strengthen the decision made, the researcher also asked for consideration with the parties related to this research. After that was done, the researcher made the final decision.

**RESULT AND DISCUSSION**

**Result of Research**

**1. Data Collection**

In this study, researchers set the search area for journal articles that have been internationally accredited and Sinta (Science and Technology Index). The journals taken must have the following aspects:

- a. Journal published year 2014-2021
- b. Location in Indonesia
- c. The research method used is Experiment
- d. Research objectives are relevant to the research topic

From the search results, the researchers found 20 journals relevant to the research topic. The journals are as follows:

**Table 1** List of Research Sources

N u m .	Author (Year)	Title	Sinta	Vari a b l e / C o d e
1.	Lusiana Fauziah Indriani, Anik Yuliani, and Asep Ikin Sugandi (2018)	Analisis Kemampuan Penalaran Matematis dan Habits of Mind Siswa SMP dalam Materi Segiempat dan Segitiga	S4	1AC
2.	Gelar Dwirahayu, Dedek Kustiawati, and Imania Bidari (2018)	Pengaruh Habits of Mind terhadap Kemampuan Generalisasi Matematis	S4	2AC
3.	Kalimatusadiah, Runisah, and Wiwit Damayanti Lestari (2019)	Model <i>Problem Based Learning</i> Berbasis Strategi <i>Mathematical Habits of Mind</i> Berbantuan Multimedia Interaktif untuk Meningkatkan Kemampuan Penalaran Matematis Siswa SMP	S4	3 AC
4.	G. Dwirahayu, D. Kustiawati,	Corresponding Habits of Mind and	Inter natio	4AC

	and I. Bidari (2017)	Mathematical Ability	Journal (IOP Publishing)				
5	Asep Ikin Sugandi, Martin Bernard, and Linda (2021)	Pendekatan Metakognitif Terhadap Kemampuan Penalaran Matematik Siswa Ditinjau Dari Habits Of Minds	S3	5AC			
6	Farida, Hartatiana, and Watcharin Joemsittiprase rt (2019)	The Use of Realistic Mathematics Education (RME) in Improving Mathematical Analogical Ability and Habits of Mind	S2	6AC			
7.	Desi Gusnarsi, Citra Utami, and RikaWahyuni (2017)	Pengaruh Model Pembelajaran Realistic Mathematics Education (RME) terhadap Kemampuan Penalaran Matematis Siswa pada Materi Lingkaran Kelas VIII	S4	1BC			
8.	Afrida and Saleh Haji (2017)	Pengaruh Pendekatan Matematika Realistik terhadap Kemampuan Penalaran dan Kemampuan Pemahaman Konsep Matematika di Kelas VIII SMPN 1 Selupu Rejang Kabupaten Rejang Lebong	S4	2BC			
9.	Ida Nuraida (2018)	Penerapan Pembelajaran Matematika Realistik untuk Meningkatkan Kemampuan Adaptive Reasoning Siswa	S3	3BC			
10	Aji Wibowo (2017)	Pengaruh Pendekatan Pembelajaran Matematika Realistik dan Sainifik terhadap Prestasi Belajar, Kemampuan Penalaran Matematis dan Minat Belajar	S2	4BC			
11	Rindi Antika, Reno Ardila, and Luvy Silvyana (2019)	Pendekatan Pendidikan Matematika Realistik Untuk Meningkatkan Kemampuan Penalaran Matematis Siswa SMP dan Kemampuan Percaya	S3	5BC			
		Diri					
12	Mahendro Santoso Raharjo, Erwin Azhar, and Ayu Faradillah (2018)	Pengaruh Model Pembelajaran Realistic Mathematics Education (RME) terhadap Kemampuan Penalaran Matematis Siswa	S3	6BC			
13	Imelda Simorangkir (2019)	Pengaruh Pendekatan Matematika Realistik terhadap Kemampuan Penalaran Matematis dalam Pembelajaran Matematika	S3	7BC			
14	Reni Iriyanti, Saleh Haji, and Zamzaili (2017)	Kemampuan Pemahaman Konsep dan Penalaran Adaptif pada Siswa Kelas VIII SMP Negeri 2 Lubukliggau yang Diajar melalui Pendekatan Pembelajaran Matematika Realistik dengan Tipe <i>Structure Dyadic Method</i>	S4	8BC			
15	Nur Amaliyah Harahap (2018)	Efektivitas Penggunaan Pendekatan RME ( <i>Realistic Mathematic Education</i> ) terhadap Kemampuan Penalaran Matematis Siswa di Kelas XI SMA Negeri 7 Padang Sidimpunan	S5	9BC			
16	Isyatul Fauziah, Scolastika Mariani, and Isnarto (2017)	Kemampuan Penalaran Geometris Siswa pada Pembelajaran RME dengan Penekanan Handso on Activity Berdasarkan Aktivitas Belajar	S4	10BC			
17	N. Hartriani, R.B. Veronica (2015)	Keefektifan Model Pembelajaran <i>Two Stay Two Stray</i> Berbasis <i>Realistic Mathematics Education</i> terhadap Kemampuan Penalaran Matematik	S3	11BC			
18	Gemi Susanti and Ahmad Rustam (2018)	The Effectiveness of Learning Models Realistic Mathematics Education and Problem Based Learning Toward Mathematical Reasoning Skills at Students of Junior	S3	12BC			

		High School		
19	Silvia Dani, Heni Pujiastuti, and Ria Sudiana (2017)	Pendekatan <i>Realistic Mathematics Education</i> Untuk Meningkatkan Kemampuan Generalisasi Matematis Siswa	S4	13BC
20	Ahmad Zaini and Marsigit (2014)	Perbandingan Keefektifan Pembelajaran Matematika dengan Pendekatan Matematika Realistik dan Konvensional Ditinjau dari Kemampuan Penalaran dan Komunikasi Matematik Siswa	S2	14BC

## 2. Data Reduction

### Effect of Habits of Mind on Reasoning Ability

Table 2 Summary of the Analysis of the Effect of Habits of Mind on Reasoning Ability

N	Code of	Title	Result of Research	Result of Analisis
1	1AC	Analisis Kemampuan Penalaran Matematis dan <i>Habits Of Mind</i> Siswa SMP Dalam Materi Segiempat Dan Segitiga	1. Of the 5 questions of reasoning ability given, it is known that students have difficulty working on reasoning ability questions, the highest score achieved by students is in the category of estimating answers and solution processes by 58% and the lowest score is in the category of using patterns and relationships to analyze mathematical situations draw analogies and generalizations by 15%. 2. From the results of the habits of mind questionnaire given, the results look good. The highest category that can be obtained by students is in the category of creating, imagining, innovating by 83% and the lowest	1. Of the 6 journals analyzed, 4 journals show that habits of Mind affect students' learning abilities.  2. 2 of 6 journals analyzed show that habits of mind and the learning approaches do not affect the reasoning ability.

			score is in the continuous learning category of 60%. 3. There is an association between habits of mind on students' reasoning abilities, this is evident from students who have good habits of mind will have good reasoning abilities as well.	3. The highest achievement of the Habits of Mind indicator is found in the indicators of creating, imagining, innovating, and thinking. The lowest score is found on indicators utilizing the senses, thinking flexibly, and using past knowledge to new situations.
2	2AC	Habits of mind terhadap kemampuan generalisasi matematis	1. The highest percentage of class observations and worksheets is in the thinking category, which are 97% and 54%, respectively. 2. Correlation Significance Test Results X (habits of mind) and Y (generalization ability) show a fairly strong correlation coefficient (R) of 0.652 and has a positive type of relationship. So it can be concluded that there is a strong positive relationship between habits of mind and students' mathematical generalization abilities. The magnitude of this influence can be seen in the value of the coefficient of determination (R <sup>2</sup> ), which is 0.425 (42.5%).	
3	3AC	Model <i>problem based learning</i> berbasis strategi <i>mathematical habits of mind</i> berbantuan multimedia interaktif untuk meningkatkan kemampuan penalaran matematis siswa SMP	1. Students who get learning using Problem Based Learning Model Based on Mathematical Habits of Mind Strategy assisted by Interactive Multimedia get an average N-Gain value of 0.821 in the high category, higher than students who use conventional methods of 0.575 in the medium category. 2. Since $t_{count} = 8.29 > 2.00 = t_{table}$ , then accept $H_a$ and reject $H_o$ . This means that the increase in students'	



			mathematical reasoning abilities between those who get the Problem Based Learning model based on the Mathematical Habits of Mind Strategy assisted by Interactive Multimedia is better than students with conventional learning models.				as the mathematical reasoning ability of students with moderate habits of mind is better than those with low habits of mind. 3. The sign value for interaction is 0.776, this indicates that there is no interaction between the metacognitive approach and habits of mind on mathematical reasoning abilities.	
4	4AC	Corresponding Habits of Mind and Mathematical Ability	1. Researcher observe students activity for three indicator, while questionnaire and students worksheet for four indicator. Hasilnya observasi aktivitas dikelas dan observasi lembar kerja mencapai skor tertinggi di kategori yang sama yaitu thinking of thinking, sedangkan pada questionnaire skor tertinggi terletak pada kategori persisting. 2. The conclusion is correlation between habits of mind and mathematical ability is described as linear regression $Y = (-86.165) + 2.116x$ , with the influence of habits of mind to the mathematical ability was 40.9%.					
5	5AC	Pendekatan Metakognitif Terhadap Kemampuan Penalaran Matematik Siswa Ditinjau Dari Habits Of Minds	1. The mathematical reasoning ability of students who are taught with a metacognitive approach is better than the conventional approach, this is evident from the average value with a metacognitive approach that is greater than the conventional approach ( $11.53 > 8.07$ ) 2. The mathematical reasoning ability of students with high habits of mind is better than those with moderate and low habits of mind, as well					
6	6AC	The Use of Realistic Mathematics Education (RME) in Improving Mathematical Analogical Ability and Habits of Mind					1. There are differences in mathematical analogical abilities between the class that was taught using Realistic Mathematics Education (RME) and class that was taught using expository learning. 2. There are differences in mathematical analogical abilities of students who have high, medium, low habits of mind taught using Realistic Mathematics Education Learning (RME). 3. There is no interaction between the use of Realistic Mathematics Education Learning (RME) on the habits of mind and students' mathematical analogical abilities.	

### The Effect of Realistic Mathematics Education (RME) Approach on Reasoning Ability

**Table 3** Summary of the Analysis of the Effect of Realistic Mathematics Education (RME) on Reasoning Ability

N u m.	Cod e of Arti cle	Title	Result of Research	Result of Analysi s
1	1BC	Pengaruh Model Pembelajaran <i>Realistic Mathematics Education</i> (RME)	1. There are differences in the improvement of students' mathematical reasoning abilities. This can be seen in the	1. Of the 10 journals analyzed, there are 9 journals which conclude

		<p>terhadap Kemampuan Penalaran Matematis Siswa pada Materi Lingkaran Kelas VIII</p>	<p>experimental class that uses the RME approach, obtaining a pretest result of 31.6 increasing to 65.3 so that an n-gain value of 0.51 is obtained in the medium category. Meanwhile, for the control class using the conventional learning model, the pretest results were 30.5 which increased to 47.2 so that the n-gain value of 0.25 was obtained in the low category.</p> <p>2. A t-test was conducted which obtained the results of <math>t_{count} &gt; t_{table}</math> (<math>5.67 &gt; 2.00</math>) which means that there is a significant difference between the students' mathematical reasoning abilities and the Realistic Mathematics Education (RME) learning model and conventional learning.</p> <p>3. Calculations using the effect size were also carried out, the effect size value was 1.76 with a high category so that it was concluded that there was an effect of the Realistic Mathematics Education (RME) learning model on students' mathematical reasoning abilities.</p> <p>4. One of the advantages of the RME approach is the pleasant atmosphere in the learning process with the Realistic Mathematics Education (RME) approach, which results in increased student motivation and interest in learning mathematics.</p>	<p>that the RME approach has a positive influence on students' reasoning abilities</p> <p>2. RME approach supports students to be more active in thinking and arguing mathematically in class.</p> <p>3. The RME approach is a new thing for students so that it creates interest in learning and student learning outcomes also increase.</p>			<p>Pembelajaran Matematika Realistik dan Saintifik terhadap Prestasi Belajar, Kemampuan Penalaran Matematis dan Minat Belajar</p>	<p>mathematical reasoning abilities through the RME approach is marked by an increase in the average pretest result from 28.82 to 77.69.</p> <p>2. RME approach is effective towards learning achievement, mathematical reasoning ability and student interest in learning.</p> <p>3. The average result of reasoning ability using the RME approach (77.69) is higher than the scientific approach (71.30).</p> <p>4. In the RME approach, there are four steps that can improve mathematical reasoning skills, namely starting with contextual problems, doing horizontal math, doing vertical math, and doing reflection.</p>
3	5BC			<p>Pendekatan Pendidikan Matematika Realistik untuk Meningkatkan Kemampuan Penalaran Matematis Siswa SMP dan Kemampuan Percaya Diri</p>			<p>1. Classes with the RME approach have a good influence on students' reasoning abilities seen from the higher average results (65.74) than the class without treatment (63.52).</p>	
4	6BC			<p>Pengaruh Model Pembelajaran <i>Realistic Mathematics Education</i> (RME) terhadap Kemampuan Penalaran Matematis Siswa</p>			<p>1. The average score of the experimental class (62.121%) is higher than the average score of the control class (53.906%)</p> <p>2. <math>t_{count} &gt; t_{table}</math> (<math>4361 &gt; 1.669</math>), this indicates that there is an effect of Realistic Mathematics Education (RME) learning model on students'</p>	
2	4BC	<p>Pengaruh Pendekatan</p>	<p>1. The increase in students'</p>					

			<p>mathematical reasoning abilities.</p> <p>3. Of the 5 indicators of mathematical reasoning ability, the experimental class is 3 indicators superior to the control class.</p>
5	7BC	<p>Pengaruh Pendekatan Matematika Realistik terhadap Kemampuan Penalaran Matematis dalam Pembelajaran Matematika</p>	<p>1. The posttest average value of students' mathematical reasoning abilities in the experimental class is (75.31) higher than the average value in the control class whose learning uses conventional learning of (49.68).</p> <p>2. From the correlation analysis, the correlation coefficient (<math>r</math>) = 0.626 and the coefficient of determination (<math>r^2</math>) = 39%. so it can be concluded that the realistic mathematics approach has a strong enough relationship to students' mathematical reasoning abilities.</p> <p>3. Based on the calculation of the correlation significance test, obtained <math>t_{table} = 1.667</math> with <math>dk = n-2 = 62</math>. Thus <math>t_{count} &gt; t_{table}</math> (6.30 &gt; 1.667) then <math>H_0</math> is rejected and <math>H_a</math> is accepted, which means students' mathematical reasoning abilities can be influenced by the mathematical approach realistic.</p> <p>4. Students give a positive response to learning with the RME approach.</p>
6	8BC	<p>Kemampuan Pemahaman Konsep dan Penalaran Adaptif pada Siswa Kelas VIII SMP</p>	<p>1. The average value of adaptive reasoning in the experimental class is 49.88 while in the control class, the average value of adaptive reasoning is</p>
		<p>Negeri 2 Lubukliggau yang Diajar melalui Pendekatan Pembelajaran Matematika Realistik dengan Tipe <i>Structure Dyadic Method</i></p>	<p>25.75.</p> <p>2. The results of the ANOVA test on adaptive reasoning show the <math>F_{result}</math> of 32.457 while the <math>F_{table}</math> value of 3.90. Then the <math>F_{result}</math> value &gt; <math>F_{table}</math>, which means that there is a significant difference in the students' average scores before and after the treatment of Realistic Mathematics learning with the Structured Dyadic Methods type.</p> <p>3. The increase in reasoning ability after the pretest and posttest in the experimental class was 78.26%.</p>
7	9BC	<p>Efektivitas Penggunaan Pendekatan RME (<i>Realistic Mathematic Education</i>) terhadap Kemampuan Penalaran Matematis Siswa di Kelas XI SMA Negeri 7 Padang Sidempuan</p>	<p>1. On the observation sheet, the average use of the RME approach is 3.00 in the Good category, so it is said that the researcher carried out the RME approach well in accordance with the RME approach steps.</p> <p>2. The average pre-test score of students in reasoning ability using the RME approach was 66.78 in the moderate category, and the average score increased during the post-test to 85.83 in the very good category.</p> <p>3. Proven significant effectiveness between the use of the RME (Realistic Mathematic Education) approach to the mathematical reasoning ability of students in class XI SMA Negeri 7 Padangsidempuan. This can be seen from the significant value of <math>0.000 &lt; 0.05</math>.</p>
8	11BC	Keefektifan	<p>1. The average</p>

		Model Pembelajaran <i>Two Stay Two Stray</i> Berbasis <i>Realistic Mathematics Education</i> terhadap Kemampuan Penalaran Matematik	<p>learning outcomes of students who use the RME-based <i>Two Stay Two Stray</i> learning model (75.87) are higher than those of students who use the expository learning model (72.05) on their mathematical reasoning abilities.</p> <p>2. Students are more interested in implementing the <i>Two Stay Two Stray</i> learning model based on RME.</p> <p>3. The results of the proportion test and the average similarity test (right side test) show that the RME-based <i>Two Stay Two Stray</i> learning model is effective on mathematical reasoning abilities on the surface area of prisms and pyramids.</p>
9	13BC	Pendekatan <i>Realistic Mathematics Education</i> untuk Meningkatkan Kemampuan Generalisasi Matematis Siswa	<p>1. The post test test score in the control class (5.68) is lower than the experimental class using the RME approach (7.31).</p> <p>2. In the one-sided test, <math>t_{count} &gt; t_{table}</math> (2.63 &gt; 2.3), so it can be concluded that the final average achievement of mathematical generalization abilities of experimental class students is better than the average final achievement of control class students' mathematical generalization abilities.</p> <p>3. The factors that cause the RME approach to have a positive influence on students' mathematical generalization abilities are because the principles in RME are guided</p>

			reinvention and self-developed models so that students can understand the concepts themselves in the material.
10	14BC	Perbandingan Keefektifan Pembelajaran Matematika dengan Pendekatan Matematika Realistik dan Konvensional Ditinjau dari Kemampuan Penalaran dan Komunikasi Matematik Siswa	<p>1. The average posttest score in the RME approach group (50.09) was higher than the conventional learning group (38.28).</p> <p>2. Based on the t-test, <math>t_{count} &lt; t_{table}</math> (-6.113 &lt; 2.039), with the conclusion that realistic mathematics learning is not effective in terms of reasoning ability.</p>

### 3. Data Presentation

#### Results of the Analysis of the Effect of Habits of Mind on Students' Reasoning Ability

Table 4. Calculation of Effect Size Data Source

Num.	Code of Article	Group of Experiment			Group of Control			Total SD	Effect size
		N	Mean	SD	N	Mean	SD		
1.	1AC	36	11.53	2.62	41	8.07	2.46	19,8507	0,282609
2.	2AC	38	68.41	8.26	38	40.71	9.3	30,9268	1,015625
3.	3AC	33	88.26	6.48	33	71.12	9.1	28,4265	2,181768
4.	4AC	38	59.73	8.3	38	40.72	9.1	30,2079	1,046747
Average of effect size								1,131687	

#### Results of Analysis of the Effect of Realistic Mathematics Education (RME) on Reasoning Ability

Table 5. Calculation of Effect Size Data Source

Num. of Article	Code	Group of Experiment			Group of Control			Total SD	Effect size
		N	Mean	SD	N	Mean	SD		
1.	1BC	27	65,3	7,6	27	47,2	4,7	23,1459	1,836182
2.	4BC	30	77,69	8,00	30	71,30	9,74	25,8962	2,377185
3.	5BC	35	65,74	17,2	30	63,52	11,7	26,3052	1,969952
4.	6BC	33	62,12	14,90	32	53,91	8,645	27,3579	1,654551
5.	7BC	32	75,31	12,24	32	32,34	19,42	27,6888	0,466615
6.	8BC	40	51,25	12,65	40	26,13	10,22	31,1571	0,510638
7.	9BC	23	85,83	4,053	23	66,78	6,452	20,5777	2,931712
8.	11BC	39	75,87	5,38	38	72,05	4,13	31,1061	2,183491

9.	13BC	32	7,31	2,2	32	5,69	2,68	13,3118	0,226115
Average of effect size								1,572938	

## Discussion

### 1. The Effect Habits of Mind on reasoning abilities

From the analysis that has been done, it is found that habits of mind have a positive effect on reasoning abilities. This can be seen from the increase in indicators and the average effect size in the journals studied. Some indicators of habits of mind related to reasoning abilities. Students who have the habit of 'persistent' mind become accustomed to demonstrating systematic methods for analyzing problems, accustomed to distinguish between ideas that are successful or which can be used and which are not, and accustomed to looking for various ways to solve tasks or problems.

Students with the habit of mind 'thinking of thinking' become accustomed to designing strategies to bring up the information needed to solve problems and are accustomed to describing the steps they use to solve problems. Students with habits of mind 'thinking flexibly' become accustomed to having many ideas and ideas about a matter, accustomed to changing points of view when receiving new information, and accustomed to using various problem solutions to solve the same problem. Students with the habit mind 'Using Past Knowledge to New Situation' are accustomed to using the knowledge they already have to understand new problems/situations, accustomed to connecting the knowledge they already have with new knowledge, accustomed to abstracting the meaning or meaning of an experience to solve new problems.

When viewed from the average value of the effect size obtained from the journals that have been obtained, it is 1.131687 and is included in the high category.

### 2. Effect of Realistic Mathematics Education (RME) Approach on Reasoning Ability

From the analysis conducted on the journals that have been obtained, the results show that the Realistic Mathematics Education (RME) Approach has a very high effect on Reasoning Ability. This can be seen from the development of indicators and the average

Effect Size. Of the ten journals analyzed, there is one journal which states that the Realistic Mathematics Education (RME) Approach is not effective for reasoning abilities.

This is in accordance with research conducted by Desi Gusnarsi (2017) which states that there are differences in the increase in reasoning ability students' mathematics using the Realistic Mathematics Education (RME) learning model and conventional learning models in class VIII circle material. This is evidenced by the N-gain test, the N-gain value is 0.51 in the moderate category in the experimental class and 0.25 in the low category in the control class. And with the t-test (independent) by comparing the values of  $t_{count}$  and  $t_{table}$  on the posttest results then obtained the value of  $t_{count} > t_{table}$  ( $5.67 > 2.00$ ).

Based on the average effect size of the ten journals analyzed, a score of 1,572938 can be obtained in the very high category. This means that the Realistic Mathematics Education (RME) approach has a very high effect on reasoning abilities.

### 3. Advantages and Disadvantages of Realistic Mathematics Education (RME)

Based on the research findings in the selected journal as a data source, there are advantages of using it in its application in the classroom. However, several studies in journals reveal the obstacles experienced by researchers while conducting research. These constraints after being reviewed again are some of the weaknesses of contextual learning from the related literature. Some of the advantages and disadvantages of contextual learning are as follows:

#### *Advantages of Realistic Mathematics Education (RME)*

Based on the findings of research in journals regarding the application of Realistic Mathematics Education (RME) in the classroom, several advantages of the model were found. In nine studies that discuss the RME Approach to students' reasoning abilities, it is stated that the RME approach is a constructivist learning model where the principles of constructivist learning include:

(1) knowledge is built by students themselves, both personally and socially, (2) knowledge cannot be transferred from the teacher to students, except only with the student's own activity to reason, (3) active students construct continuously. From the constructivist principle, it is known that the RME approach learning can make students build their own knowledge so that their achievement and reasoning abilities can increase.

Eight out of ten researches that have been analyzed also say that the RME approach has advantages, namely learning mathematics to be more interesting, relevant, meaningful, not too formal and abstract. This happens because learning is associated with students' real lives and experiences so that students are more enthusiastic and interested in learning mathematics and consider mathematics important because it is useful in students' real lives.

In addition, the RME approach emphasizes learning by doing. Students find learning ideas and concepts by exploring real experiences that are around them and facilitating solving mathematical problems without using standard solutions. So that students do not have to solve mathematical problems using standard formulas that already exist, but students can find their own way or formula as a result of their findings. It is also discussed in the seven journals that have been analyzed.

All the research that has been analyzed also says that the Realistic Mathematics Education (RME) approach uses context as a starting point for learning mathematics. The teacher presents real problems in everyday life as a starting material for learning. This is what causes students to become the center of learning and makes students more active in thinking and arguing mathematically in learning. This is in accordance with research conducted by Ahmad Zaini (2017) which says that students become active in constructing their own knowledge freely in terms of making models as a representation of mathematical concepts. In finding solutions from a context, students are given the

opportunity to think, argue mathematically, and provide reasons for their solutions.

According to research conducted by Nur Amaliyah (2018), it is proven that the Realistic Mathematics Education (RME) approach provides a clear understanding to students about everyday life and its usefulness for humans. The learning process is also constructed and developed by students themselves with the guidance of other parties who know better (eg teachers). Realistic Mathematics Education (RME) approach also gives students a clear understanding of how to solve a problem or problem, it does not have to be single and does not have to be the same from one another. This study is also in line with the seven studies that have been analyzed by researchers.

#### ***Disadvantages of Realistic Mathematics Education (RME)***

Besides the many advantages of the Realistic Mathematics Education (RME) approach, there are also disadvantages of the Realistic Mathematics Education (RME) approach. According to research conducted by Mahendro (2018) and 2 other studies on Realistic Mathematics Education (RME) approach, group discussions are still controlled by the smart group students, while the student group tends to be less passive. This happened in this study, but the teacher encouraged and motivated students who were still passive in their groups to work even though it was still a little so that there were no more students who just stayed silent in their groups.

In addition, two studies that discuss the RME approach, the low level of teacher knowledge results in misconceptions about the material. The teacher's role as a facilitator will make teachers have to broaden their horizons.

In Reni Iriyanti's research (2017) said that the Realistic Mathematics Education (RME) approach requires a relatively large amount of time, so in its implementation the teacher is expected to be able to make time as effective as possible. While it is not easy to change basic views on various things, for example

regarding students, teachers, and social roles or contextual issues, this change is a requirement for RME to be implemented.

Research conducted by Sivia Dani (2017) says that in the search for contextual questions that meet the requirements required in the Realistic Mathematics Education (RME) approach it is not always easy for every mathematical subject that students learn, especially because the questions This problem must be solved in various ways. In the Realistic Mathematics Education (RME) approach, it is not easy for teachers to encourage students to find various ways to solve problems or solve problems. Furthermore, it is not easy for teachers to provide assistance to students in order to rediscover the concepts or principles of mathematics being studied.

## Conclusion

1. Habits of mind affect reasoning abilities. This can be seen from the increase in indicators and the average effect size value. The effect size value obtained is 1.131687 and is included in the high category.
2. Realistic Mathematics Education (RME) has an effect on reasoning ability. This is evident from the increase in indicators and the average effect size value. The effect size value obtained is 1,572938 in the very high category.
3. The advantages of Realistic Mathematics Education (RME) found from the journal findings include:
  - a. It is a constructivist learning model, so that the learning process becomes student-centered. Knowledge is built by students themselves, with teacher supervision.
  - b. Make mathematics learning more interesting, relevant, meaningful, not too formal and abstract. So that students become interested and more enthusiastic in the learning process.
  - c. The RME approach emphasizes learning by doing. Where students find ideas and learning concepts by exploring real experiences that are around them.
  - d. The RME approach uses context as a starting point for learning mathematics, so that students can better understand learning.
  - e. Students are given the opportunity to think, argue mathematically, and provide reasons for their solutions. So that students do not have the same way of solving one another.
4. Weaknesses of Realistic Mathematics Education (RME) found from the journal findings, include:
  - a. The group discussion was still dominated by the smart group students, while the students group was less likely to be passive.
  - b. The low level of teacher knowledge results in misconceptions about the material. The teacher's role as a facilitator makes teachers have to broaden their horizons.
  - c. The application of the realistic Mathematics Education (RME) approach in the learning process requires a relatively large amount of time, so teachers must make time as efficient as possible.
  - d. In the search for contextual questions that meet the requirements required in the Realistic Mathematics Education (RME) approach, it is not always easy for every mathematical

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