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# IMPROVING STUDENT LEARNING: MATHEMATICAL REASONING ABILITY THROUGH A REALISTIC MATHEMATIC EDUCATION

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## Abstract

This research is motivated by the problem, not the maximum level of students' mathematical reasoning abilities. The purpose of this study was to determine the improvement of students' reasoning abilities with realistic mathematics education. This type of research is a quasi-experimental study. The instrument used is a test item consisting of a test of mathematical reasoning ability and an attitude scale given to students. In this study, data were obtained to see the increase in students' reasoning abilities with realistic mathematics education in mathematics learning and to see student responses to learning using realistic mathematics education which were analyzed by processing test results data, namely testing homogeneity, testing hypotheses, and testing average differences. mean in both groups using t-test. The conclusion obtained in this study is that in the group of students whose learning using a realistic mathematics education the average score of students increased by 41.1%, while the increase in the average score of the group of students whose learning was conventional was only 17.3%. The number of students who scored above 60% in the group of students whose learning using a realistic mathematics education in the final test had reached 88.65%, while in the group of students whose learning was conventional it only reached 45.79%, meaning that the achievement of the group of students who studied with realistic mathematics education increases significantly when compared to the group of students who learn conventionally.

**Keywords**: Mathematical reasoning ability; realistic mathematic education; student learning.

## *Abstrak*

*Penelitian ini dilatarbelakangi oleh permasalahan terkait belum maksimalnya tingkat kemampuan penalaran matematis siswa. Tujuan penelitian ini adalah untuk mengetahui peningkatan kemampuan penalaran siswa dengan pendidikan matematika realistik dalam pembelajaran matematika. Jenis penelitian ini adalah kuasi eksperimen. Instrumen yang digunakan adalah soal tes terdiri dari tes kemampuan penalaran matematis dan skala sikap yang diberikan kepada siswa. Dalam penelitian ini, data diperoleh untuk melihat peningkatan kemampuan penalaran siswa dengan pendidikan matematika realistik dalam pembelajaran matematika dan untuk melihat respon siswa terhadap pembelajaran matematika menggunakan pendidikan matematika realistik yang dianalisis dengan pengolahan data hasil tes yaitu menguji homogenitas, uji hipotesis, dan menguji perbedaan rata-rata pada kedua kelompok dengan menggunakan uji-t. Kesimpulan yang diperoleh dalam penelitian ini adalah pada kelompok siswa yang pembelajarannya dengan pendekatan matematika realistik skor rata-rata siswa meningkat sebesar 41,1% , sedangkan peningkatan rata-rata skor kelompok siswa yang pembelajarannya konvensional hanya sebesar 17,3%. Jumlah siswa yang memperoleh skor di atas 60% di kelompok siswa yang pembelajarannya dengan pendekatan matematika realistik pada tes akhir telah mencapai 88,65%, sedangkan pada kelompok siswa yang pembelajarannya konvensional hanya mencapai 45,79%, artinya pencapaian pada kelompok siswa yang pembelajarannya dengan pendekatan matematika realistik menigkat signifikan jika dibandingkan dengan kelompok siswa yang pembelajarannya konvensional.*

**Kata kunci**: Kemampuan penalaran matematis; pembelajaran siswa; pendekatan matematika realistik.

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## INTRODUCTION

Mathematics learning in schools must run effectively to improve students' mathematical thinking skills (Harrison, 2013). These include using reasoning on patterns and properties, performing mathematical manipulations in making generalizations, compiling evidence, or explaining mathematical ideas and statements (Greiff et al., 2015; Misrom et al., 2020; Muñez et al., 2022). From the importance of mathematical thinking in the learning that is carried out, if mathematics learning can take place effectively, students will have the ability to think logically, scientifically, creatively, innovatively, and ready to do problem solving in everyday life (Meng et al., 2020; Raub et al., 2015; Zohar & Dori, 2009). Higher-order mathematical thinking includes constructing conjectures, making analogies and generalizations, logical reasoning, problem solving, communication, and mathematical connections (Alrawili et al., 2020; Barak et al., 2017; Prahani et al., 2020). From several mathematical thinking abilities, reasoning ability is an aspect of higher order thinking skills studied in this study.

Reasoning is broadly divided into two parts, namely deductive reasoning and inductive reasoning (Wahyu Hidayat et al., 2022; Lestary et al., 2019; Novianda et al., 2021). Inductive reasoning is defined as "… drawing general or specific conclusions based on observed data. The truth value in inductive reasoning can be true or false" (Abidin et al., 2021; Hacatrjana, 2022; N. W. Utami & Nurlaelah, 2021). Reasoning abilities include higher order thinking skills that require students to be able to observe patterns, regularities, facts, and construct appropriate conjecture models to be used in drawing conclusions and solving problems (Gerber et al., 2001; W. Hidayat et al., 2018). Mathematical reasoning skills also train students to be able to use analogies as an effort to solve problems using other observed data (Khasawneh et al., 2022).

Meanwhile, deductive reasoning is drawing conclusions based on agreed rules. The truth value in deductive reasoning is absolutely true or false and not both together (Nurjanah et al., 2020). Thus, deductive reasoning is a process that trains students to be able to decipher arithmetic well, and demonstrate numeracy skills in solving mathematical problems (Pahrudin et al., 2020).

Through preliminary observations made, it can be seen that students' mathematical reasoning, especially in mathematics, is still not optimal. For several reasons, including the learning education applied by the teacher, the social environment, geography, culture, stages of student development, students' initial abilities, interests, family background, and so on. So that in fact the reasoning ability of students is still not optimal. In the school environment, some teachers are still less creative and innovative in growing students' mathematical reasoning (Rifandi, 2017; Vebrian et al., 2021). This can be seen from the lack of meaningful learning activities carried out by some teachers.

There are so many things that teachers can do to make math lessons more attractive to students' interest and mathematical reasoning (Conway et al., 2019; Danişman & Erginer, 2017; M. Lestari et al., 2022; P. Lestari et al., 2021; Sari et al., 2020). Among them are through various learning approaches that can be used, namely the realistic mathematical education.

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Several studies related to realistic mathematics education state that a realistic education can encourage students to understand the subject matter more realistically or not abstractly so that it is easy to understand (Dwi Kurino & Cahyaningsih, 2020; Ferreira & De Buriasco, 2015). It can also stimulate students' interest in learning mathematical concepts that seem monotonous and abstract because realistic mathematics education are very closely related to problems that occur in everyday life (Siregar, Mujib, et al., 2020; Siregar & Prabawanto, 2021; Syafriafdi et al., 2019; Yang & Wu, 2010). So that it can make mathematics learning more real or not and help most students understand the topic that has been given by the teacher in a fun and not abstract impression (Siregar, Karnasih, et al., 2020; Wahyuni & Rejeki, 2022). The basis for the development of Realistic Mathematics Education (RME) is that mathematics is a form of human activity that can be constructed and implemented in human activities (Rahman & Setyaningsih, 2022). The realistic mathematics education has the following characteristics: (1) students think actively, (2) the context and teaching topics are directly related to the school environment and students, (3) the teacher's role is active in designing teaching topics and classroom activities (Mega et al., 2021). However, from these studies, no one has examined specifically related to increasing mathematical reasoning abilities using a realistic mathematical education to social arithmetic topic. Even though based on research that has been done by previous researchers that Realistic education is a learning education that begins with contextual problems to direct students in understanding a mathematical concept so that the concept of the Realistic Approach explains that in learning mathematics, students must be active and develop ideas through real things first before entering abstract things must be done by students themselves. , the teacher is only a facilitator (Farida et al., 2022; Siregar et al., 2022).

In connection with this, the process of learning mathematics in the classroom should be changed to improve students' own understanding (Van den Heuvel-Panhuizen & Drijvers, 2020). What the teacher must do is how to encourage students to think, ask questions, solve problems, express ideas, discuss ideas and even find something new (Palinussa, 2013). However, in reality students are not much involved in constructing their knowledge, only receiving information that is conveyed in the same direction from the teacher. This phenomenon is a trigger for the weakening of students' mathematical reasoning, which will ultimately have an impact on students' mathematical reasoning abilities to be low. Furthermore, mathematics is still considered a difficult, abstract, and unpleasant subject by many students. So that it can make mathematics learning more real or not seem abstract. In this case, a realistic mathematical education helps most students understand the topic that has been given by the teacher in a fun and not abstract impression (Saleh et al., 2018). Therefore, it is necessary to use realistic mathematics education to improve mathematical reasoning abilities in social arithmetic topic.

## RESEARCH METHODS

This research is a quasi-experimental study to examine the improvement of students' mathematical reasoning abilities through a realistic

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mathematical education. This research was conducted on two groups of students, namely the experimental group and the control group (Sugiyono, 2012). The experimental group is a group of students who learn social arithmetic with a realistic mathematical education, while the control group is a group of students who learn social arithmetic using conventional methods. The design used in this study is the Nonequivalent Control Group Design which involves two groups of students. The research design is presented in Figure 1 with "O" is pretest and posttest of mathematical reasoning ability and "X" is learning by using realistic mathematics education.

| | | |
|---|---|---|
| O | X | O |
| O | | O |

Figure 1. Research design Control Group Design (Sugiyono, 2013)

Based on Figure 1, it can be seen that the research design involved two groups of subjects, namely the experimental group which was given the treatment and the control group. This research was conducted in two groups, namely the experimental group which studied using a realistic mathematical education learning approach and the control group which studied using conventional learning.

In general, the steps in this study were to determine group members first by random or random then giving a stimulus (learning with realistic mathematics education) and the last stage by giving post-test questions, while for the comparison class (control class) the first step was to determine the group then gives post-test questions without any stimulus being given (conventional learning). This research was conducted in one of the public junior high schools in Deli Serdang Regency, namely in class VII One-Roof Public Middle School 2, Deli Serdang Regency, North Sumatra Province in semester II which was conducted 5 times face-to-face in class on social arithmetic topic. The reason the researcher chose this topic is because in everyday life we often find the use of social arithmetic concepts that are used to solve problems in life so that it requires good knowledge of this topic and this topic is also being studied during research. The number of samples in this study were 70 students consisting of 35 students as the experimental class and 35 people as the control class. Sampling using total sampling technique, namely the entire population is used as a sample. The researcher took a sample of class VII A as a class experiment on the grounds that there were problems regarding the need to improve students' reasoning abilities and learning outcomes and VII B as a class control for class comparisons.

In this study, several data collection instruments were used, namely test questions and student attitude scales. In this study, the test questions consisted of tests of mathematical reasoning abilities. While the attitude scale given to students aims to find out students' opinions on learning with a realistic mathematical education. With a Likert scale, the variables to be measured are translated into variable indicators. Then the indicator is used as a starting point for compiling instrument items in the form of statements. In the preparation of the mathematical ability test questions, the validity of the content was tested, then the test questions were tested on class VII students who had received the topic to be tested for further testing of

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reliability, validity, Difficulty Index, and Distinguishing Power of the test questions.

The stages or steps taken in the research procedure are the preparation stage, the implementation stage, and the data analysis stage. The data obtained from the test results and attitude scale questionnaire were then analyzed to be able to interpret the research results. The steps of data analysis were carried out including processing the test result data, namely testing homogeneity, testing hypotheses, and testing the average difference in the two groups using the t-test.

## RESULTS AND DISCUSSION

The data processed and analyzed were the results of pretest, posttest, and normalized gain for each mathematical reasoning ability. The results of the average pretest, posttest, and normalized gain for each mathematical reasoning ability are presented in Table 1.

Table 1. Average results of pretest, posttest, and normalized gain reasoning ability

| Mathematical Thinking Ability | N | | Learning Mathematical Realistic Education | | | Conventional Learning | | |
|---|---|---|---|---|---|---|---|---|
| | | | Pretest | Post test | Gain | Pretest | Post test | Gain |
| Reasoning Ability | 35 | $\bar{x}$ | 8,89 (34,3%) | 19,58 (75,4%) | 0,64 | 9,41 (36,3%) | 13,92 (53,6%) | 0,61 |
| | | S | 3,68 | 3,48 | | 3,44 | 4,17 | |
| | | L | 5,63% | 88,65% | | 5,63% | 45,79% | |

The classification used by researchers to interpret the data on the percentage of the average score and the percentage of the number of students who scored above 60% is presented on Table 2.

Table 2. Data interpretation

| Average Score | Category |
|---|---|
| $\bar{x} < 40\%$ | Very bad |
| $40\% \leq \bar{x} < 60\%$ | Bad |
| $60\% \leq \bar{x} < 70\%$ | Enough |
| $70\% \leq \bar{x} < 85\%$ | Good |
| $85\% \leq \bar{x} \leq 100\%$ | Very good |

Based on the data in the table 1, it can be seen that the achievement of the learning that has been carried out is by looking at the percentage of the number of students who get a score above 60%. For the achievement of the mathematical reasoning ability of students whose learning using the Realistic Mathematical Education on the final test has reached 88.65%, this is included in the very good criteria, meanwhile in the class whose learning using the conventional method is only 45.79% which is classified as the criteria bad. The initial ability of students' mathematical reasoning is very low, in the experimental and control classes students only get an average score below 40%.

### *Analysis of the Preliminary Test of Mathematical Reasoning Ability*

The reasoning ability pretest score is the score obtained before the learning is given, both the experimental class and the control class. The students' score data from the pretest (initial test) mathematical reasoning ability were normally distributed and the two groups had the same variance or called homogeneous.

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After testing the normality and homogeneity of variance, then the difference between the two groups whose learning is using the Realistic Mathematical Education is carried out and the class whose learning is conventional. Because in the initial test the data is normally distributed and the variance is the same, then the Independent Sample t-test is used. The results of the pretest differences in the average mathematical reasoning ability are presented in Table 3.

Table 3. Test of differences in average pretest of mathematical reasoning ability

| | | t-tes for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | 95% confidence Interval of the Difference | |
| | | t | df. | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Reasoning Pretest | Equal variances assumed | - .616 | 68 | .540 | -.51429 | .83501 | -2.18 | 1.15 |
| | Equal variances not assumed | - .616 | 67.7 | .540 | -.51429 | .83501 | -2.18 | 1.15 |

Based on the data in the Table 3, shows that the probability value of sig.(2-tailed) = 0.540 is greater than α = 0.05. This means that the null hypothesis (H0) is accepted and shows that there is no difference between the initial mathematical reasoning abilities of the two groups.

### *Final Test Analysis of Mathematical Reasoning Ability*

For the post-test score of mathematical reasoning ability is the score obtained after learning is given, both the experimental class and the control class. Based on the results of the study, it was obtained that the posttest score data (final test) of mathematical reasoning abilities were normally distributed and the two groups had the same variance or called homogeneous.

After testing the normality and homogeneity of variance, the difference between the two average posttest results of mathematical reasoning abilities was carried out between the group of students whose learning was using the Realistic Mathematical Education and the group of students whose learning was conventional. The results of the difference test results in the average posttest mathematical reasoning ability are presented in Table 4.

Table 4. Test of differences in average results of posttest reasoning ability

| | | t-tes for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | 95% confidence Interval of the Difference | |
| | | t | df. | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Reasoning Posttest | Equal variances assumed | 6.3 | 68.0 | .000 | 2.8 | .4 | 1.9 | 3.7 |
| | Equal variances not assumed | 6.3 | 65.9 | .000 | 2.8 | .4 | 1.9 | 3.7 |

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Based on the data in the table 3, it can be seen that the probability value of $\frac{1}{2}$ sig.(2-tailed) = 0.000 is smaller than α = 0.05. This means that the null hypothesis (H0) is rejected and shows that there is a difference between the final mathematical reasoning ability of the group of students whose learning is using a realistic mathematics education and the group of students whose learning is conventional.

***Normalized Gain Analysis Mathematical Reasoning Ability***

To find out the comparison of the increase in the mathematical thinking ability that was tested between the experimental class and the control class, normalized gain was calculated, namely by analyzing the difference between the posttest score and the pretest score of each test of mathematical thinking ability tested in this case the mathematical reasoning ability test. The results of the descriptive statistical test of the normalized gain are presented in Table 5.

Table 5. Descriptive statistics of normalized gain

| Class | Mathematical Reasoning Ability | | | |
|---|---|---|---|---|
| | $X_{min}$ | $X_{max}$ | $\bar{x}$ | S |
| Realistic Mathematics Education Learning | 0,29 | 1,00 | 0,64 | 0,17 |
| Conventional Learning | 0,00 | 0,60 | 0,28 | 0,16 |

Based on the data in the table 3, shows that testing, if the probability value of the P value (sig.) is greater than α = 0.05, then $H_0$ is accepted. To find out whether or not there is an average difference in the pretest scores of the two groups, a statistical analysis of the difference in the two averages was performed, but first, normality and homogeneity tests were performed. Based on the research results obtained normalized gain data for mathematical reasoning ability normally distributed and both groups have the same variance or called homogeneous.

After testing the normality and homogeneity of variance, the test of the difference between the two averages between the experimental group and the control group was then carried out for normalized gain of mathematical reasoning ability.

For mathematical reasoning ability, because the gain is normalized normally distributed and the variance is the same, then the Independent Sample t-test was used. The test criteria is to accept Ho if the value of sig.(2-tailed) > $\propto$ with $\propto$ = 0.05. The hypotheses tested are as follows:

$H_o$: Improving the mathematical reasoning ability of students whose learning with the Realistic Mathematical Education is not better than the group of students whose learning is conventional

$H_a$: Improving the mathematical reasoning ability of students whose learning with the Realistic Mathematical Education is better than the group of students whose learning is conventional

The results of the test for the difference in the average gain of normalized students' reasoning abilities are presented in Table 6.

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Table 6. Test of Differences in Average Gain Normalized Students' Reasoning Ability

| | | t-tes for Equality of Means | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | 95% confidence Interval of the Difference | |
| | | t | df. | Sig. (2-tailed) | Mean Difference | Std. Error Difference | Lower | Upper |
| Reasoning Gain | Equal variances assumed | 9.00 | 68.0 | .000 | .359 | .040 | .279 | .439 |
| | Equal variances not assumed | 9.00 | 67.5 | .000 | .359 | .040 | .279 | .439 |

Based on the data in the Table 6, it can be seen that the probability value of $\frac{1}{2}$ sig.(2-tailed) = 0.000 is smaller than $\propto$. This means that the null hypothesis (H0) is rejected and shows that the increase in the mathematical reasoning ability of students whose learning is using the Realistic Mathematical Education is better than the group of students whose learning is conventional.

In the group of students whose learning is using the Realistic Mathematical Education, the number of students who experience an increase in their reasoning ability above the normalized gain score of 0.50 is 80%. Meanwhile, in the group of students who studied using conventional methods, the number of students who obtained a normalized gain score on their reasoning abilities above 0.50 was only 11.43%. The results of the proportion of students with an n-gain value above 0.50 are presented in table 7.

Table 7. Percentage of number of students with n-gain scores above 0.50

| **Student Group** | **Percentage of Number of Students with N-Gain Score above 0.50** |
|---|---|
| | Reasoning Ability |
| Realistic Mathematics Education Learning | 80% |
| Conventional Learning | 11,43% |

Based on the data in the Table 7, shows that in the group of students whose learning uses Realistic Mathematical Education, the number of students who experience an increase in their reasoning abilities above a normalized gain score of 0.50 is 80%. Whereas in the group of students whose learning used conventional methods, the number of students who obtained a normal gain score on their reasoning abilities above 0.50 was only 11.43%. This shows that learning using the Realistic Mathematical Education approach in the results of this study is better than learning using conventional methods.

The results of data analysis in this study provide information that students whose learning with the Realistic Mathematical Education have increased their mathematical reasoning abilities significantly. This is in accordance with the characteristics of the realistic mathematical education which include (1) the use of contextual problems, in

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which context selection is based on student experience (2) modeling, (3) student activity, in which students are given the opportunity to discuss, express ideas and solutions in their respective groups. -respectively; (4) interactivity, where there is interaction between teachers in directing the difficulties experienced by students in solving problems; and (5) linkage (Hasibuan et al., 2019; Sitorus & Masrayati, 2016). This can lead to various positive interactions.

The results of the data analysis in this study provide information that students who use a realistic mathematical education have a significant increase in their mathematical reasoning abilities. Learning with a realistic mathematics education provides broad opportunities for students to rediscover ideas, concepts, and principles, or mathematical models through realistic contextual problem solving with the help of a teacher or friends. This knowledge acquisition step indirectly trains students to prohibit scientific and logical reasoning and drawing conclusions. This is in accordance with the statement that learning a realistic education to mathematics can train and develop students' thinking skills and activities, due to discussion of solutions to the problems they find (which are usually different, both the method of finding and the results), so that students can find their own knowledge of mathematics. with problem solving and discussion.

In implementing learning with a realistic mathematics education, students feel more serious in conducting data analysis, this is because in learning a realistic mathematics education that has been given is a combination of constructivism and contextual approaches in the sense of providing opportunities for students to form (construct) their own understanding of ideas. and mathematical concepts, through solving real-world (contextual) problems that can be used in exploring social arithmetic topic given to students. Findings in the field included students feeling they had no time for jokes, making noise and activities that weren't useful, and other bad things. They are just engrossed in discussing with their group mates by taking turns analyzing the social arithmetic problems that have been given to them. Even without complete and detailed instructions from the teacher, students are able to divide tasks between group members, they try to change their energy to be able to explore various problems from the topic being studied.

Realistic mathematics education the belief is also that students have the potential to develop their own knowledge, and if given the opportunity they can develop their knowledge and understanding of mathematics. This makes students develop, expand, or improve the results of their work in order to find more complicated mathematical concepts or principles. Student activity in the realistic mathematics education is quite good, they do not express fatigue in learning, but feel happy and challenged. Students' curiosity also increases, this can be seen when they are very serious and not bored to answer the questions given. The mathematical reasoning abilities of students who were taught using a realistic mathematics learning approach in this study improved better when compared to the mathematical reasoning abilities of students who were taught conventional learning. This is because in learning a realistic education students can freely discuss and collaborate with

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other students, ask and respond to questions, and evaluate their work.

The results of data analysis in this study include providing information that the mathematical reasoning ability of students whose learning uses a realistic mathematical education increases more significantly when compared to students whose learning uses conventional models. In the group of students whose learning is using a realistic mathematics education, the average score of students increased by 41.1%, from an average pretest score of 34.3% to 75.4% in the average post-test score. Meanwhile, the increase in the average score of the group of students whose learning was conventional was only 17.3%, from an average pretest score of 36.3% to 53.6% on an average post-test score. The number of students who scored above 60% in the group of students whose learning with a realistic mathematics education in the final test had reached 88.65%, while in the group of students whose learning was conventional only reached 45.79%, meaning that the achievement of the group of students whose learning was realistic mathematics education is very good when compared to groups of students whose learning is conventional.

In general, students who receive learning with a realistic mathematics education have a positive tendency towards mathematical reasoning abilities. For example, checking the validity of an argument with the meaning of re-examining a step to a conclusion that has been done by students. The enthusiasm of students is seen when faced with real-world problems, because maybe all this time learning has always been faced with problems in mathematical and abstract concepts (Nur et al., 2021; C. Utami & Nirawati, 2018). So that with the application of learning with a realistic mathematical education, students respond positively, to questions of mathematical reasoning ability, the average percentage of students' positive attitudes reaches 79%. This shows a fairly positive attitude because it is above 50%. This provides information that the achievement of the group of students who study realistic mathematics education is very good when compared to the group of students who study conventionally.

Students get the opportunity to develop their own knowledge, so that in the process of working on problems they feel more confident. With the help of a realistic mathematics education it turns out that students are more challenged to try to solve problems from the real world in their own way, and using their own language and symbols, they are very enthusiastic in making plans to solve problems, then implementing these plans. Students are better trained to do scientific things in solving problems given by the teacher. The conditions of the students in this study are in accordance with the statement that by learning a realistic mathematics education the atmosphere of the learning process becomes more exciting, can develop individual and group talents or skills, and gives students freedom to learn and think individually, thus making students more understanding and active in discussing with group members to discover concepts and reason (Hasibuan et al., 2019; Sitorus & Masrayati, 2016; C. Utami & Nirawati, 2018). Students are increasingly aware of the benefits of mathematics after studying mathematical reasoning questions, because mathematical reasoning questions relate directly to real life and in real everyday life, so that learning is

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felt more contextually. Students are very aware of the importance of mastering mathematics as a provision in living their lives in the future.

## CONCLUSION AND SUGGESTION

The achievement and improvement of students' mathematical reasoning abilities who learn using a realistic mathematics education is significantly better than the mathematical reasoning abilities of students who learn using conventional methods.

After getting learning with a realistic mathematics education, students show a positive attitude towards mathematics lessons, towards learning models with realistic mathematics education, towards mathematical reasoning problems. Students' attitudes are known from their high interest, motivation, activity during learning, and understanding of the importance of mastering mathematics.

Learning using realistic mathematics education is carried out very well for the purpose of training students to act scientifically, logically, and creatively in obtaining data and information for use in mathematical reasoning abilities. Therefore, it is expected that realistic mathematics education is also carried out by research on other mathematical abilities. Finally, it is also hoped that future researchers can improve the quality of learning.

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