



## RME-Based Online Learning On The Fourth Class Student's Mathematics Learning Motivation

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### Abstrak

**Tujuan penelitian.** Penelitian ini bertujuan untuk menganalisis pengaruh pembelajaran daring berbasis Realistic Mathematics Education (RME) terhadap motivasi belajar siswa kelas IV sekolah dasar.

**Bahan dan Metode.** Penelitian ini menggunakan pendekatan kuantitatif berbasis survei. Populasi penelitian terdiri dari 840 siswa kelas IV dari sekolah dasar di Kabupaten Dukuntang. Sampel penelitian dipilih menggunakan metode sampling acak sederhana, menghasilkan 271 siswa sebagai responden. Data penelitian dikumpulkan melalui penyebaran kuesioner motivasi belajar yang telah tervalidasi dan pedoman wawancara untuk memperkuat temuan kuantitatif. Teknik analisis data meliputi analisis deskriptif dan inferensial, termasuk uji normalitas dan linearitas serta analisis regresi, untuk menentukan pengaruh variabel pembelajaran daring berbasis RME terhadap motivasi belajar siswa.

**Hasil.** Hasil penelitian menunjukkan bahwa pembelajaran daring berbasis RME meningkatkan motivasi belajar siswa hingga 85% atau dalam kategori tinggi, menunjukkan bahwa pendekatan ini efektif dalam membantu siswa memahami materi matematika secara lebih kontekstual dan bermakna.

**Kesimpulan.** Pembelajaran daring berbasis RME direkomendasikan sebagai salah satu strategi untuk meningkatkan motivasi belajar siswa di tingkat sekolah dasar.

**Kata kunci:** Pembelajaran Online, RME, Motivasi

### Abstract

**Study purpose.** This study aims to analyze the effect of online learning based on Realistic Mathematics Education (RME) on the motivation to learn among fourth-grade elementary school students.

**Materials and Methods.** This study uses a quantitative, survey-based approach. The study population consisted of 840 fourth-grade students from elementary schools in the Dukuntang District. The research sample was selected using simple random sampling, yielding 271 students as respondents. Research data were collected through the distribution of a validated learning motivation questionnaire and interview guidelines to reinforce quantitative findings. Data analysis techniques included descriptive and inferential analyses, including normality and linearity tests and regression analyses, to determine the effects of RME-based online learning variables on student learning motivation.

**Results.** The results showed that RME-based online learning increased student motivation by up to 85% which is considered high, indicating that this approach is effective in helping students understand mathematical material in a more contextual and meaningful way.

**Conclusion.** Thus, RME-based online learning is recommended as one strategy to increase student motivation for learning at the elementary school level.

**Keyword:** Learning Online, RME, Motivation

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## Introduction

Learning is also an activity that not only transfers a message, but also a reciprocal interaction that was done by teacher and student (Mahtuum et al., 2020). Therefore students not just knowing, but also can understand the learning material. The learning process should be interesting and challenging for students to think about solving a problem and relate it to everyday life and can make students understand learning better.

Learning mathematics is one of the lessons that cannot be separated in daily life (Putri & Kurnia, 2017). Related to daily life learning mathematics can make students easier to understand mathematics (Siswono, 2018). So mathematics that is related to daily life is easier for students to understand.

Mathematics is a discipline that is related to the process of thinking in reasoning (Maulana, 2018). Nastution (Isrok'atun., 2018) stated that Mathematics is a science to obtain concepts with a rational and reasonable way of thinking. Mathematics is closely related to a thinking process that is structured in stages, so this becomes a problem if someone studying mathematics but does not comprehend the previous concepts so that they will assume that mathematics is difficult (Surya, et al., 2020).

Mathematics is a crucial thing in daily life, especially in education.

In our daily life, we often apply mathematics concepts. However, not everyone realizes what they do is a mathematical concept. Just as someone is making a selection where the data is carried out as well as applying mathematical concepts in daily life, but everyone does not understand if this is the application of mathematics in daily life.

*Realistic mathematics education* is mathematics learning defined as a product, but mathematics is a process or activity (Gravemeijer, 2018). Learning that uses realistic mathematics education begins with providing connections or problems related to realism as a starting point. *Realistic mathematics education* is also learning that is directed to certain contexts in providing an understanding to students regarding the material being taught so that teachers have an important role to facilitate students in presenting that context during the learning process (Bunga, N., Isroka'atun., 2018). In learning, students are not directly given a context but through the context that has been presented students can find and build their knowledge so that learning will be more meaningful if the learning can grow student learning motivation.

Learning motivation is a supporting factor to inspire learning arouse the spirit of learning contained in students and can support the learning process to take place effectively (Sya'bania et al., 2020). Motivation has an important role, if motivation is low, then learning potential will decrease (Yanti, 2020). If motivation is low, students will have difficulty understanding the learning material, so that in the learning process they must foster student learning motivation so learning objectives can be achieved properly (Suharni & Purwanti, 2019).

Student learning motivation is influenced by two extrinsic factors and intrinsic factors (Susanto, 2012: 109). Extrinsic factors include the environment, parental attention, curriculum,

teachers, media, infrastructure, facilities, and administration, while intrinsic factors include attitudes, talents, interests, intelligence, and cognitive abilities (Putri & Kurnia, 2017). One of the factors that can affect learning motivation is interesting learning (Maharani et al., 2017). During online learning, students were less engaged. This resulted in low student motivation. This finding aligns with the opinion of Suharni (Suharni & Purwanti, 2019), who stated that low motivation was due to an uninteresting learning process. While motivation plays an important role in the learning process, low motivation is associated with lower student learning outcomes (Yanti, 2020).

Online learning of fourth-grade mathematics makes it difficult for students to understand the material provided by the school. Problems that arise during online learning include students not understanding the material presented, and online learning making students less enthusiastic and less focused on learning. Based on this, RME-based online learning can be a solution to overcome these problems. RME plays an effective role in helping students understand mathematical concepts through realistic and meaningful events in everyday life (Dewi, 2020). In addition, RME can help teachers design interesting learning activities, involve students in learning, and increase interaction between teachers and students through technology (Ananda, 2018). RME allows students to learn mathematical concepts through realistic contexts and real-life situations, enabling them to relate the concepts to their experiences (Susandi & Widyawati, 2022).

Learning with the RME model has advantages, including increased student motivation. In addition, Hasan (Nurhasana, 2021) stated that online learning with the RME model is suitable for students who have intrinsic motivation. RME-based online learning provides more effective and efficient learning opportunities for students (Rismaratri & Nuryadi, 2018). Therefore, online learning using the RME approach can make it easier for students to relate learning concepts or materials to their own experiences. Thus, RME learning can increase student motivation to learn by relating learning materials to real life, increasing student confidence, motivating students during learning, and fostering student curiosity.

Motivating in learning mathematics is very influential in the teaching and learning process (Rohmah, 2021). Mathematics is a subject that is considered difficult by most students so that motivating students before the lesson is conducted plays an important role in the process of teaching and learning activities (Cahyani et al., 2020). Usually, teachers will pay more attention to students who have difficulty in receiving mathematics lessons (Helaluddin & Syawal, 2018). Another way the teacher can be used is to give more assignments to that student as an exercise for the student to understand mathematics (Rahmad, 2021). Therefore the student will get more excited to study because of the thirst to understand mathematics.

Based on the explanation above, produce an outlook that the ability of mathematical connections to learning motivation. Therefore, research is conducted entitled "RME-Based Online Learning towards fourth-grader Students' Learning Motivation". RME-based online learning can increase student motivation to learn by allowing students to engage with mathematics through real-life situations (Setyaningsih et al., 2021). RME-based online learning can also help students better understand the material related to the mathematical concepts being taught (Cahyaningsih & Nahdi, 2020). Therefore, RME-based online learning plays an important role in increasing student learning motivation and providing alternative solutions in distance learning.

Based on the above description, the primary issue in this study is the low motivation of elementary school students to learn mathematics in online learning, which is attributed to limited interaction, the abstract presentation of material, and a lack of connection between the learning material and students' real-life experiences. This condition requires a learning approach that can accommodate the characteristics of elementary school students who are still in the concrete thinking stage, so that online learning not only focuses on delivering material

but also fosters students' motivation to learn. Therefore, this study aims to analyze the effect of Realistic Mathematics Education (RME)-based online learning on the motivation of fourth-grade elementary school students to learn mathematics. The uniqueness of this study lies in the application of the RME approach in the context of online learning at the elementary school level, which has been more commonly applied in face-to-face learning settings. This study is expected to contribute theoretically to the development of RME-based mathematics learning studies and practically as a reference for teachers and schools in designing online learning that is more contextual, interesting, and oriented towards increasing student learning motivation.

## **Materials and Methods**

### ***Populasi dan Sampel***

This research was conducted in Dukuntang sub-district with a population of 4<sup>th</sup>-grade elementary school students total number is 840 students. The research sample was taken using a random sampling technique which is 271 students.

### ***Organisasi penelitian***

The research method used is quantitative research the type of survey (Cross-Sectional Survey Design), which will explain the conditions and practices in learning as it is based on the facts that occur in the field (Sugiyono, 2019). To measure the RME-based online learning on motivation the researcher used instruments in the form of questionnaires and interviews related to students' mathematical connections to data processing materials. A research instrument is a tool to collect research data so that a problem that has been formulated can be solved based on the data that has been collected including the types of test and non-test instruments (Sugiyono, 2019). This study uses a quantitative approach with a correlational survey design that aims to determine the relationship and contribution of Realistic Mathematics Education (RME)-based online learning to the mathematics learning motivation of fourth-grade elementary school students. A survey design was chosen because this study did not provide special treatment as in experimental studies, but rather collected data based on students' perceptions and learning experiences after participating in RME-based online learning. Therefore, this study focused on the relationship between variables and the extent to which RME-based online learning contributed to students' learning motivation, without interpreting the relationship as a direct cause-and-effect relationship.

### ***Instrument***

The instruments are questionnaires and interview guidelines used to measure RME based online learning towards students' motivation. To obtain the valid data, validity and reliability tests were conducted using SPSS 22. The reliability of the instrument is calculated by the alpha coefficient formula. The data can be said to be valid if the value of  $r_{count} > r_{table}$ . Based on the results of the calculation of  $r_{table}$  of 0.127 so that the 20 questions in the questionnaire on the motivation to learn mathematics are said to be valid. The reliability test can be said to be reliable if the alpha value is  $> 0.60$  then it is reliable. From the statistical test results for the Cronbach Alpha value questionnaire  $0.947 > 0.60$ , then the results of the questionnaire are declared reliable.

### ***Analisis Statistik***

Data analysis in this research used descriptive analysis, inferential analysis determines the regression test, normality test, and linearity test. In this research, two data processing techniques were used, they are quantitative data processing and qualitative data processing. Quantitative data processing is data processing that is expressed in the form of numbers, such as when processing RME-based online learning on student learning motivation, the scores

obtained by students and the results of distributing questionnaires will be processed quantitatively. Meanwhile, qualitative data is a process data in descriptive, result off questionnaire and interview that has been obtained will be described descriptively. Then there will be inferential analysis to determine regression test, normality test, and linearity test.

Inferential data analysis was conducted to examine the relationship and contribution of RME-based online learning to students' learning motivation. Before the main analysis was conducted, the data was first tested through prerequisite analysis tests, namely normality and linearity tests. The normality test results showed that the student learning motivation data was normally distributed, as indicated by a significance value greater than 0.05. Furthermore, the linearity test results showed that the relationship between RME-based online learning and student learning motivation was linear, with a significance value for deviation from linearity greater than 0.05, thus meeting the requirements for further analysis.

After all prerequisites were met, simple regression analysis was used to determine the contribution of RME-based online learning to student learning motivation. The regression analysis results showed a positive and significant relationship between RME-based online learning and student mathematics learning motivation, as indicated by a significance value of less than 0.05. A positive regression coefficient indicates that the better the implementation of RME-based online learning, the higher the students' learning motivation. In addition, the coefficient of determination value shows that RME-based online learning contributes significantly to the variation in students' learning motivation, while other variations are influenced by factors other than the variables studied.

Based on this description, the main problem in this study is the low level of elementary school students' motivation to learn mathematics in online learning, which is caused by limited interaction, abstract presentation of material, and a lack of connection between the learning material and students' real experiences. This condition requires a learning approach that can accommodate the characteristics of elementary school students who are still in the concrete thinking stage, so that online learning does not only focus on delivering material but is also able to foster students' learning motivation. Therefore, this study aims to analyze the effect of Realistic Mathematics Education (RME)-based online learning on the mathematics learning motivation of fourth-grade elementary school students. The uniqueness of this study lies in the application of the RME approach in the context of online learning at the elementary school level, which has been more widely applied in face-to-face learning. This study is expected to contribute theoretically to the development of RME-based mathematics learning studies and practically as a reference for teachers and schools in designing online learning that is more contextual, interesting, and oriented towards increasing student learning motivation.

## **Results and Discussion**

Based on the interview related to online learning the result shows that students' learning motivation was low during online learning. It can be proved that students were not enthusiastic during online learning. Even some students did not do their assignments during online learning. Therefore, learning based on realistic mathematics education can increase students' learning motivation. Thus learning is associated with realistic mathematics education so that students can easily understand learning and can increase students' learning motivation. Based on the results of the questionnaire distributed to students, it was stated that 85% of online learning based on realistic mathematics education could increase students' learning motivation. This is proven when online learning is associated with RME, students become more enthusiastic in participating learning process.

**Table 1.** Recapitulation of Response Questionnaires to Online Learning Using RME

No Item	Statement	Kind	Response			
			SA	A	D	SD
1	I am happy to study mathematic today.	Positive	70 42% 11	90 54% 21	5 3% 110	2 1% 30
2	There are a lot of things that I do not like in the lesson.	Negative	6% 2	12% 75	65% 85	17% 5
3	Mathematic in this time is more complicated than the previous that is usually done.	Negative	1% 40	45% 70	51% 50	3% 7
4	Material that has been given is easier to understand than the last material.	Positive	24% 15	42% 65	30% 80	4% 7
5	I do not find any difference between today's lesson and the regular mathematic lesson.	Negative	9% 15	39% 65	48% 80	4% 7

Table 1 shows that most students gave positive responses towards studying using the RME approach. This condition is supported by student responses to statement number 2 which states that there are many things that students like in RME-based learning. Most students also think that RME-based learning is different from regular online learning. This thing caused because students attend lessons related to their daily life, so they feel the enthusiasm and are happy to attend RME based online learning. Enthusiasm and happiness can be seen when students do learning activities based on the RME steps, which leads to the (re)discovery of the mathematical concept being studied. Furthermore, when the lesson was occur unconsciously students found out what they were studying give advantages for their daily life.

The use of the RME model in online learning actively involves students in the mathematics learning process through everyday life methods (Wijaya et al., 2021). In the RME model, teachers act as facilitators in learning. Teachers not only guide and require students to understand mathematical material, but also help students correct their independent learning activities (Susandi & Widyawati, 2022). Thus, the use of the RME model in online learning can increase student motivation to learn.

Measurement of student learning motivation in this study is guided by indicators according to Makmun (2012) which states that to measure motivation, 8 indicators are used, including (1) activity duration, (2) activity frequency, (3) activity persistence, (4) persistence, tenacity and ability to face obstacles and difficulties, (5) dedication and sacrifice to achieve goals, (6) level of aspirations to be achieved with the activities carried out, (7) achievements or outputs achieved from the activities carried out, and (8) Directions attitude towards the target activity. From 8 indicators above were made into 20 statements in the form questionnaire and given to 167 students.

Questionnaire data processing is done by using the technique of the percentage from students' answers according to each indicator of learning motivation and the average is drawn from the whole to get the interval of student motivation. The questionnaire result of learning motivation in this research is as follow:

**Table 2.** Questionnaires result of Learning Motivation

Indicator	Statement	Result %
Duration	Mathematics lesson took a very long time (-)	58%
	I study mathematics at home for 3 hours every day (+)	33%
Frecuency	I cannot do mathematics questions (-)	15%
	I always practice mathematics outside the class (+)	23%
Persistence	I do mathematics assignments according to what the lecturer has explained (+)	34%
	I always do mathematics assignments correctly (+)	8%
	I am happy if I get a mathematics assignment (+)	3%
	I always do the assignment given by the lecturer by myself (+)	21%
	I always cheat if there is a school assignment (+)	8%
Fortitude and Tenacity	I ask teacher or friends if I do not understand the material (-)	33%
	I never ask to the lecture even if I do not understand the material (-)	68%
	I can solve the problem if the lecture gave me a question (+)	
Devotion and sacrifice	I always save my money to buy mathematics books (+)	9%
	I never buy mathematics book (-)	3%
Aspiration	I am not sure if mathematics has advantages for myself (+)	52%
	By continuing to study mathematics, I can easily learn other subjects (-)	3%
Achievement	I got compliment because my mathematic score is good (+)	10%
	I study mathematic hard but do not get a rank in class (-)	9%
Attitude	I attend mathematics lessons with all my heart (+)	55%
Direction	I cannot attend mathematics lessons with all my heart (-)	33%
		72%

Based on the result of the research that RME based online learning is more significant compare to regular lessons. The results of this research are reinforced by the results of research by (Sertiawarni, 2019) and (Bunga, N., Isroka'atun., 2018) which show that learning mathematics using the RME approach is significantly better than conventional learning in increasing student motivation. However, the results of this study contradict the results of research by (Juliya, 2021) and (Putri & Kurnia, 2017) which showed that learning mathematics using conventional methods was significantly better than learning using RME in increasing students' learning motivation. This is because researchers do not provide equal opportunities to students to increase their learning motivation and learning mathematics using the RME approach (in this study) is too focused on increasing student motivation. This is supported by one of the principles of the RME approach, namely intertwining which focuses students on being able to relate mathematical concepts (Sembiring, 2019).

Learning motivation acts as a driving force in a person as a whole that can generate intentions to encourage students to carry out learning activities so that they can achieve the goals desired by these students (Cahyani et al., 2020). Tokan & Imakulata (2019), learning motivation is one of the factors for the realization of good learning outcomes, because it makes students tend to get learning outcomes by learning objectives.

Most students do not like learning mathematics so that student's motivation to learn is very low. Especially now that learning is done online which is not directly seen by every student

when learning is carried out, even most students don't even turn on the camera when learning was carried out and there are still students who must be given a stimulus first to follow the lesson well. At this time, learning is carried out virtually, which is one of the causes of the lack of motivation to learn in students (Yanti, 2021). Students can be said to have learning motivation if they are active in the learning process by paying attention to the teaching and learning process and enthusiastic participating in the learning process and can apply the learning both for themselves and sharing with others.

It was concluded that the learning motivation of each student was different because it depended on the students themselves and the environment around them. Motivation must involve processes that provide energy, provide direction and maintain behavior to be able to follow the learning process well (Handayani, 2020). Andriani & Rasto (2019), motivation is a change in energy in a person's personality which is characterized by the emergence of affective (feelings) and reactions to achieve goals. The emergence of motivation is marked by an energy change in a person that can be realized or not. Motivation plays an important role in students carrying out the learning process so that students can solve the problems experienced by students in the learning process, even students must also have a strong passion and a sense of optimism that they can achieve learning goals well. So it can be concluded that learning motivation is a combination of motivational and learning components that are closely related to each other and cannot be separated so that with learning motivation students can understand the lesson well.

This is reinforced by the results of interviews conducted with students who stated that "mathematical lesson is difficult to learn because it is hard to understand the formula and difficult to remember the formula". Based on this opinion, it can happen because learning mathematics is abstract learning while someone in understanding learning uses objects or concrete things. Therefore, RME-based learning plays an important role in growing students' learning motivation because RME-based learning is associated with math topics as well or with other topics and is even always associated with concrete objects so that students or students can understand mathematics easily (Kusumah, 2019). Learning motivation can grow when someone understands learning, therefore by having the ability to have mathematical connections, learning motivation will grow because learning using mathematical connections is closely related to someone's daily life. Therefore, if RME-based learning will be easy to understand so that learning mathematics will be considered easy and no longer said to be difficult to learn and hard to understand the formula (Palinussa, 2018). Therefore, to create mathematics lesson that is connected to various things so that learning objectives can be achieved properly, especially in learning mathematics.

A simple regression analysis was conducted to determine the relationship and contribution of Realistic Mathematics Education (RME)-based online learning to the mathematics learning motivation of fourth-grade students. The results of the regression analysis are presented in the following table.

**Table 3.** Results of the Regression Test of RME-based Online Learning on Learning Motivation

Independent Variable	$\beta$ (Beta)	Sig.	R <sup>2</sup>
RME-based Online Learning	0,45	0,000	0,32

Based on Table 1, the regression coefficient ( $\beta$ ) value is positive, indicating that RME-based online learning has a positive relationship with student learning motivation. The significance value (Sig.) of 0.000 ( $< 0.05$ ) indicates that the relationship is statistically significant. Meanwhile, the coefficient of determination ( $R^2$ ) value shows that RME-based online learning contributes significantly to the variation in student learning motivation, while



the rest is influenced by factors other than the research variables. Positive items were scored sequentially from the highest to the lowest value, with measurements referring to Table 4.

**Table 4.** The measurement of student learning motivation

Score	Description
4	Strongly Agree
3	Agree
2	Disagree
1	Strongly Disagree

The measurement of student learning motivation was carried out using a questionnaire consisting of positive and negative statements. This technique was used to maintain the consistency of the score meaning, so that a higher score still represented a higher level of learning motivation.

The main findings of this study indicate that RME-based online learning has a positive and significant relationship with fourth-grade students' motivation to learn mathematics. The positive regression coefficient value confirms that the better the application of RME principles in online learning, the higher the students' motivation to learn (Jannah et al., 2021). This finding is reinforced by the coefficient of determination value, which shows that RME-based online learning contributes significantly to increasing learning motivation, even though there are other factors that also influence student motivation. The focus of this study's findings lies in the increase in student active engagement during learning. Students show greater enthusiasm when mathematics material is presented in contexts that are close to their daily lives. This indicates that the RME approach is able to bridge the limitations of online learning, which is often abstract and less interactive, especially for elementary school students who are still in the concrete thinking stage (Tamur et al., 2020). In addition, the results of the study also show that RME-based online learning helps students understand the material more meaningfully, thereby encouraging perseverance and the desire to complete learning tasks. Thus, online learning is no longer perceived as a passive activity, but rather as a contextual and challenging learning process. These findings confirm that the success of online learning is not only determined by the media or technology used, but also by pedagogical approaches that are appropriate to the characteristics of the learners.

## Conclusion

Based on research and discussion on RME-based online learning and learning motivation, this approach yields an average motivation score of 85%, which falls in the high category. These findings show that most students can understand the material more easily when learning is linked to real-life contexts, especially since elementary school students are still in the concrete operational stage of cognitive development. Therefore, online learning designs need to be carefully planned to attract students' attention and support the achievement of learning objectives. Learning conditions conducted entirely online often lead to low motivation, so appropriate strategies are needed; one is the use of realistic contexts, as in the RME approach. Students are motivated to learn when they are actively involved, pay attention to the learning process, and show enthusiasm and the ability to apply the material. With a motivation achievement of 85%, student motivation during learning was relatively high.

This study has several limitations that need to be considered. First, the research design used is a correlational survey, so the findings of this study only show the relationship and contribution between variables, not a direct cause-and-effect relationship. Second, the research data was obtained through a questionnaire based on student perceptions, allowing for subjectivity in the answers. Third, the scope of the study was limited to fourth-grade students

in a specific region, so the results cannot be generalized to different contexts or levels of education. The practical implication of this study for elementary school teachers is the importance of designing online learning that is not only oriented towards delivering material but also pays attention to pedagogical approaches that are appropriate to the developmental characteristics of students. Teachers are advised to integrate RME principles into mathematics learning, such as the use of real contexts, problems that are close to students' lives, and activities that encourage active engagement. Thus, online learning can be more meaningful and able to optimally increase students' motivation to learn.

Based on the findings and limitations of this study, further research is recommended to use experimental or quasi-experimental designs to test the effects of RME-based online learning in greater depth. In addition, further research can expand the variables studied, such as learning outcomes, critical thinking skills, or attitudes toward mathematics, and involve research subjects from more diverse levels and regions in order to obtain more comprehensive results.

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