



Students' creative thinking skill through realistic mathematics education on straight-line equation

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Abstract

The Indonesian students' creative thinking skill is low. One alternative to improve students' creative thinking skills is to implement realistic mathematics education. This study aimed to determine the difference in the average score of the creative thinking skills of students taught through realistic mathematics education, and students taught through the expository method on the straight-line equation topic. This study is experimental research with a post-test-only control in a class of eight-grade in one of the junior high schools in Aceh, Indonesia. The sample in this study was 30 students in the control group and 32 students in the experimental group. The instrument was a creative thinking test. The data were analyzed using a t-test. Based on the analysis, the average score of the creative thinking skill of students taught through realistic mathematics education was better than those taught through the expository method on the straight-line equation topic. Teachers are expected to guide students to solve challenging real problems to develop their creativity.

Keywords: creative thinking skill; realistic mathematics education; straight-line equation

How to cite: Johar, R., Maisela, A., & Suhartati. (2023). Students' creative thinking skill through realistic mathematics education on straight-line equation. *Jurnal Elemen*, 9(2), 334-350. <https://doi.org/10.29408/jel.v9i2.7697>

Received: 5 January 2023 | Revised: 1 February 2023

Accepted: 6 March 2023 | Published: 11 July 2023



Introduction

Creative thinking skills are needed to deal with rapidly changing world situations. Creative thinking skills play a role in everyday life (Coughlan, 2007), such as work, school, art, and problem-solving (Ismunandar et al., 2020). Creative thinking skills are also part of the skills that must be possessed during learning at school. It follows the Law of the Republic of Indonesia Number 20 of 2003 concerning the National Education System, which states that one of the goals of the National Education System is to be creative people. Therefore, developing students' creative thinking skills during the learning process is necessary.

Creative thinking can provide different ideas to solve a problem (Hadar & Tirosh, 2019; Putri et al., 2020; Syafrizal et al., 2022). Creative thinking skill is the skill of solving problems with more than one solution, and students think with fluency, flexibility, elaboration, and originality in their answers (Marliani, 2015); to think original and reflective and produce complex products (Siswono, 2007; Zubaidah et al., 2017). It was concluded that creative thinking skill is a skill that can produce various solutions in solving a problem.

The product of creative thinking is creativity. Students are expected to be able to foster mathematical creative thinking skills by solving various forms of mathematical problems (Akgul & Kahveci, 2016).

Students with good creative thinking skills are expected to use their ideas to solve a mathematical problem in a different, correct, and precise way. According to Kwon et al. (2006), creative thinking skill is a high-level skill or ability possessed by someone to think of something new. Creativity is the skill to produce new or original works (Sriraman, 2004), while mathematical creative thinking skill is the skill to relate thinking skills to produce new ideas or thinking in solving mathematical problems (Putri et al., 2020). Several indicators can measure a person's creative thinking skills. According to Sumarmo et al. (2012), there are four indicators of creative thinking skill, namely 1) Fluency, namely the ability to generate many ideas, answers, ways, or suggestions for solving a problem presented; 2) Flexibility, namely the ability to see a problem from different points of view; 3) Originality is the ability to put forward a new or unique way of solving a problem; and 4) Elaboration is the ability to add something from other ideas.

Furthermore, Munandar (Sumarmo et al., 2012) describes the characteristics of the four components of creative thinking skills. Fluency characteristics include a) Triggering lots of ideas, lots of answers, lots of problem-solving, and lots of questions smoothly; b) Providing many ways or suggestions for doing things; c) Always thinking of more than one answer. The characteristics of flexibility include: a) Generate ideas, answers, or varied questions, can see a problem from that point of view differently; b) Looking for many alternatives or different directions; c) being Capable of changing the approach or method of thinking. Among the characteristics of originality are: a) Being able to give birth to expressions that are new and unique; b) Thinking of which way it is not customary to reveal oneself; c) Able to make combinations of the unusual of the parts or elements. The characteristics of elaboration include: a) Being able to enrich and develop an idea or product; b) Adding or detailing the details of an object, idea, or situation to be more interesting.

Creative thinking is one skill that needs more attention in learning mathematics (Ismunandar et al., 2020). So far, teachers have only prioritized logic and calculating skills, so creative thinking is considered unimportant in learning activities (Saefudin, 2012). Even though one of the essential tasks of a mathematics teacher is to pay attention to the development of student creative thinking skill (Nadjafikhah et al., 2012), thus currently, in mathematics learning, student creative thinking skill is not maximized. Chrysmawati et al. (2017) found that students could only solve problems in one way or method exemplified by the teacher. Students rarely use many ways to solve mathematical problems. Due to the presentation of mathematical materials as finished, ready-to-use, and abstract products that are taught mechanistically (Sembiring et al., 2008), students' creative thinking skills are low. In addition, (Noer, 2011) found that the low student creative thinking skill is also caused by learning that has been taking place in class so far, where students are immediately given definitions and examples of routine questions without being linked first to problems in everyday life.

Indonesian students must improve their creative thinking skills (Sari & Afriansyah, 2022). Based on the PISA results, Indonesian students' creative thinking skill is deficient (Surmilasari et al., 2022). It follows information obtained from the mathematics teacher from one junior high school in Banda Aceh, Indonesia, on August 8th, 2022. It is difficult for students to remember mathematical formulas, especially on the straight-line equation topic. Information obtained also reveals that in learning mathematics, teachers teach by explaining the material, presenting various examples of problems, and then giving students exercises. It makes students passive during the learning process class, leading them to be less creative.

Several strategies can develop students' creative thinking skills when solving mathematical problems, one of which is the learning approach applied in class (Maulidia, 2018). Learning is expected not only to focus on the teacher, but students must also be involved in learning because the best way to teach mathematics is to give students meaningful experiences by solving the problems in their everyday lives (Laurens et al., 2018). Students must be allowed to solve open problems (Nadjafikhah et al., 2012). Open problems can be in the form of everyday life problems experienced by students or imagined by students.

According to Freudenthal (1991), mathematics is a human activity. Mathematics should be related to reality, close to students, and imaginable in students' minds. Making something real in one's mind in Dutch is "zich REALISERen." It is the basis for the emergence of Realistic Mathematics Education (Van den Heuvel-Panhuizen, 2005). Learning mathematics by linking students' real situations is expected to make learning more meaningful and increase student creativity. Such learning is often referred to as Realistic Mathematics Education (RME). Students are expected to be able to develop creative thinking skills through the application of the RME approach. Siswono (2007) states that one of the learning approaches that can develop creativity is RME.

RME was initiated in 1970 in the Netherlands and developed in 1971. According to Gravemeijer (1994), the RME has three main principles: guided reinvention and progressive mathematization, didactical phenomenology, and self-developed models. The guided reinvention principle means that students are allowed to discover for themselves or be discoverers of an existing concept so they can feel its meaning and usefulness. The didactic

phenomenology principle means that the phenomenon context in the RME approach is a didactical problem that originates from the real world and is close to students so that students can easily imagine these problems. Self-developed model principle students solve real problems based on their initial understanding; therefore, they can create and build their models from their experience and understanding, then find the strategies to solve the problem. [Treffers \(1987\)](#) formulated five characteristics of the RME, namely: 1) The use of context, namely starting learning mathematics by presenting real problems; 2) The use of models, namely students are guided to create their models or strategies in solving problems; 3) The use of student contributions, that is a significant contribution during the implementation of learning is expected to come from students; 4) Interactivity, namely students can interact with each other, exchange information, and communicate the results of their work to others, and 5) Intertwinment, namely mathematical concepts presented concerning other concepts.

Learning mathematics with the RME approach makes students active in learning mathematics and can reinvention mathematical concepts in their way ([Imanisa & Effendi, 2022](#)). A study by [Fajriah and Asiskawati \(2015\)](#) revealed that the creative skills of grade IX students of *SMP Negeri 1 Banjarmasin* using the RME approach were in the high category. A study by [Anggraini and Zulkardi \(2020\)](#) also revealed that the creative skills of grade VIII students of *SMP Negeri 15 Palembang* using the RME approach were in the creative category, with a percentage of 69.23%. Many studies have examined the relationship between the RME approach and creative thinking skills. However, student creative thinking skill on the straight-line equation topic that links the concepts of speed, distance, and time through the RME approach has yet to be studied. This study aimed to determine the difference in the average score of the creative thinking skill of students taught through a realistic mathematics education better than students taught through an expository method on the straight-line equations topic.

Methods

This study used a quantitative approach using experimental research with a post-test-only control design. The population in this study was all students in grade 8 from one school in Banda Aceh, Indonesia. From the nine classes of eight-grade, two classes were selected, namely, class VIII-2 with 30 students of 17 female students and 13 male students as the control group who were taught through the expository method and class VIII-3 with 32 students of 15 female students and 17 students male as the experimental group who were taught through RME approach. They were 14-15 years old.

The control group teacher implemented the expository method by explaining the material, presenting various examples of problems, and then giving students exercises. In the experimental group, learning activities to develop student's creative thinking skills were designed in four meetings, namely two meetings for 3 x 40 minutes each and two for 2 x 40 minutes each. The lesson plans and students' worksheet was adapted from documents developed by the Research Centre of Realistic Mathematics Education Universitas Syiah Kuala in 2020.

The first meeting was about finding the formula of a line's slope (gradient) through two points. The teacher started the lesson by presenting several pictures of the roof. Students choose

the roof on which the rain falls faster. Students are also asked to choose which roof has a greater slope. Then students were also asked to determine which stairs were the most tiring to go up; which road had the most significant and negligible steepness from traffic signs; and which position of the wood had the most significant, most minor, and the same slope. Students discuss the slope of each line segment. Finally, students conclude the formula of the slope of a line through two points.

The second meeting is about finding the characteristics of the slope of a line. The teacher presented pictures of people hiking up and down the mountain and walking in different road conditions. Students are asked to choose which picture of the road requires the least and the most energy. Then students work in groups to choose two points on each line segment and determine the slope of the line segment. Then students draw some line segments in Autograph and investigate the type of slope. Finally, students summarize the type of slope: negative, positive, zero, and undefined slope.

The third meeting is about investigating the relationship of the slope of a line in the speed-distance-time graph. The teacher shows pictures of people hiking up a mountain, being on the mountain, and hiking down the mountain. Then students interpret the travel chart in each picture based on their opinions. Students solve the problems presented in the worksheet, namely writing a story about a car trip based on the graph, writing down which car returned home, choosing the right story based on the graph, writing a story about Tom's trip, writing Tom's travel speed in each section, writing the slope of each line segment in the picture, and write the relationship between the speed and the slope of the line.

The fourth meeting is to find the formula of the straight-line equation. The teacher presented a picture of employees' basic salary and overtime salary. Then students were asked to determine each employee's salary per month, draw the pair of points obtained and write the total salary earned in a general form and determine the slope of the line. Furthermore, students solve problems related to the speed and slope of the line and construct the formula of a straight-line equation.

The three RME principles by [Gravemeijer \(1994\)](#), guided reinvention and progressive mathematization, didactical phenomenology, and self-developed models, were carried out during learning. Students engage in some activities to construct mathematical knowledge through emergent models, namely real situations, models of, a model for, and formal knowledge. In this experiment, the first meeting was begun by asking students to choose a roof on which the rain falls faster. This activity is a "real situation" for students because students have experienced this problem. In the 'model of,' students are asked to use their strategy to find the meaning of slope on the traffic sign of the road and the slope of a sketch of stairs. In the 'model for,' students are asked to investigate the slope of the various line segments presented on the Cartesian diagram. In the last level, namely formal knowledge, students are expected to find the formula of the slope of a line segment through two points. The first meeting activities' iceberg is presented in Figure 1.

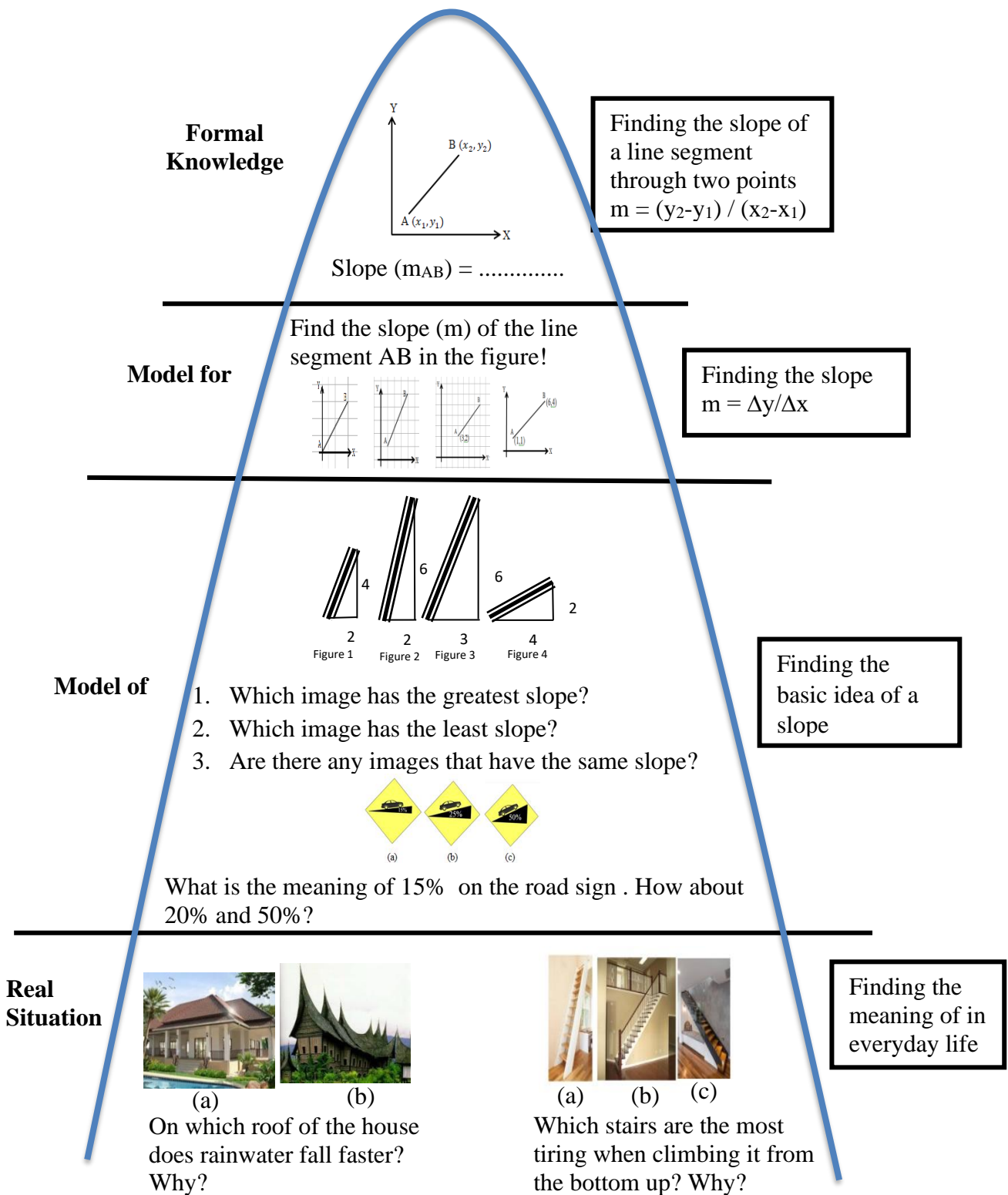
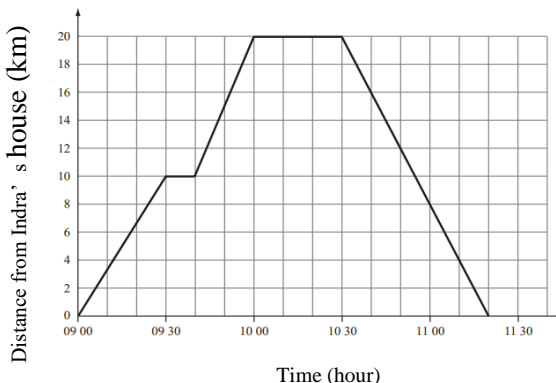
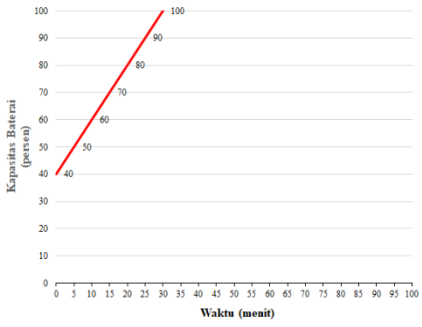


Figure 1. The iceberg of the first meeting learning design on the straight line equation topic

After four meetings implementing the RME approach on the straight-line equation topic, students answer a final test about creative thinking skills. This test has been validated by experts and practitioners and declared usable with minor revisions. The test contained four questions

based on indicators of creative thinking, as shown in Table 1. The indicators of creative thinking used in the test are fluency, flexibility, originality, and elaboration (Sumarmo et al., 2012).

Table 1. The questions of creative thinking skills

No.	Indicators of Creative Thinking	Questions
1	Fluency	Write at least three straight line equations in the form of $y = mx + c$ and specify the values of m and c !
2	Flexibility	Write at least three stories based on the following graph.
		
3	Originality	Look at the following graph. Ani is charging her mobile phone. The following picture is a graph of battery capacity (percent) and time (minutes) of charging Ani's mobile phone.
		
<ol style="list-style-type: none"> Determine the slope of the line in the picture in various ways. What does the number obtained in number 3a mean when it is associated with charging a mobile phone? 		
4	Elaboration	Based on the picture in question number 2: <ol style="list-style-type: none"> Determine the type of slope from each line cut in the picture, whether it is positive, negative, or undefined. Give your reason. Could there be an undefined slope on the graph of question number 2? Explain.

The score of creative thinking skills was analyzed using the t-test after fulfilling the prerequisites: standard and homogeneous distribution. The researcher used a rubric based on indicators of creative thinking skills, as shown in Table 2.

Table 2. Guidelines for scoring creative thinking skills

Aspects Measured	Student Response	Score
Fluency	Do not answer or provide irrelevant answers	0
	Give one correct answer	1
	Gives two answers that are close to the truth	2
	Give two correct answers or three answers that are closest to the truth	3
	Provide more than two relevant and correct answers	4
Flexibility	Do not answer or give wrong answers	0
	Give answers in only one way and correctly	1
	Gives an answer in two ways and less correct	2
	Give answers in two ways and are correct or in three ways but are not correct	3
	Give answers in more than two ways and correctly	4
Originality	Do not answer or give wrong answers	0
	Gives an answer in its own way but can't be understood	1
	Give answers in their own way, the calculation process is directed but the value is not correct	2
	Give an answer in its own way, but there is an error so it is wrong	3
	Give an answer in your own way with the right reasons and show something unique	4
Elaboration	No answer or give wrong answer	0
	Give an answer by not explaining broadly, and the result is wrong	1
	Give answers by explaining not extensively, but incomplete	2
	Give answers by explaining broadly but there are errors in explaining so that the conclusions are wrong	3
	Provides answers by explaining extensively the completion process and the results are correct	4

After examining student test results, the researcher determined student scores based on students' creative thinking abilities. The formula for determining the score is as follows:

$$\text{Score} = \frac{\text{gain score}}{\text{maximum score}} \times 100 \quad (1)$$

Results

The data in this study were obtained from the test scores of student's creative thinking skills on the straight-line equation topic. The following explanations are some examples of student answers referring to the indicators of creative thinking:

1. $y = mx + c$
 $y = 5x + 3$, $m = 5$ dan $c = 3$

2. $y = mx + c$
 $y = 2x + 3$, $m = 2$ dan $c = 3$

3. $y = mx + c$
 $y = 7x + 5$, $m = 7$ dan $c = 5$

Figure 2. Student answers for the fluency indicator

Based on Figure 2, it can be seen that the student answered the question correctly by writing three different straight-line equations in the form of $y = mx + c$ and writing the values of m and c following with what is requested in the question. The student answered the question by first writing the equation of the straight line, then writing the values of m and c according to the equation of the straight line written by the student. Thus the student's answers are in line with the fluency indicator.

1. Syakira jalan-jalan dari rumahnya pada pukul 09.00. Dalam waktu 30 menit ia menempuh jarak 10 km. Lalu ia berhenti selama 10 menit untuk istirahat, lalu berjalan-jalan lagi selama 20 menit dengan jarak tempuh 10 km. Setelah itu ia berhenti di rumah saudaranya selama 30 menit, dan kembali lagi ke rumahnya dalam waktu 50 menit.

2. Beni dan teman-temannya pergi ke kebun binatang dengan naik bus. Mereka berangkat dari pukul 09.00. Dalam waktu 30 menit mereka sudah menempuh jarak 10 km. Lalu mereka berhenti di suatu taman selama 10 menit. Setelah itu, mereka melanjutkan perjalanan selama 20 menit dan menempuh jarak 10 km, sehingga sampai di kebun binatang. Mereka berhenti selama 30 menit. Setelah berjalan-jalan di kebun binatang, mereka pulang selama 50 menit.

3. Kesyia pergi ke rumah pamannya pada pukul 09.00. Ia menempuh jarak 10 km dalam waktu 30 menit. Lalu ia berhenti untuk istirahat selama 10 menit. Setelah itu ia lanjut jalan dan menempuh jarak 10 km dalam waktu 20 menit dan sampai di rumah pamannya dia berhenti selama 30 menit. Setelah itu ia pulang lagi ke rumahnya dalam waktu 50 menit.

1. Syakira went for a walk from her house at 09.00. In 30 minutes, he covers a distance of 10 km, then he stops for 10 minutes to rest, then walks again for 20 minutes with a distance of 10 km. after that, he stopped at his brother's house for 30 minutes and returned to his house within 50 minutes.
2. Beni and his friends went to the zoo by bus. They depart from 09.00. Within 30 minutes, they had covered a distance of 10 km. Then they stopped at a park for 10 minutes. After that, they continued their journey for 20 minutes and traveled 10 km and arrived at the zoo. They stopped for 30 minutes. After walking around the zoo, they went home for 50 minutes.
3. Kesyia goes to her uncle's house at 09.00. he covers a distance of 10 km in 30 minutes, then he stops to rest for 10 minutes. After that he continued walking and covered a distance of 10 km in 20 minutes, and arrived at his uncle's house he stopped for 30 minutes. After that he returned to his house within 50 minutes.

Figure 3. Stories made by the student based on the graph for the flexibility indicator

Based on Figure 3, the student correctly answered the question in several ways. In the test questions, students are asked to write at least three stories based on the graph presented. The student answered the question by telling events based on each straight line on the graph. Where, in each straight line, is the distance traveled and the time used in traveling that distance. Thus the student's answers are in line with the flexibility indicator.

a. $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{100 - 40}{30 - 0} = \frac{60}{30} = 2$
 b. Gradien = Semakin sedikit kemiringannya maka baterainya semakin sedikit terisi dan waktu yang diperlukan semakin banyak.
 Jika gradiennya 2, maka baterai akan terisi sebanyak 60% selama 30 menit. Kesimpulannya baterai naik sebanyak 2% selama 1 menit.

a. $m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{100 - 40}{30 - 0} = \frac{60}{30} = 2$
 b. Slope = the less the slope the less the battery is charged and the more time it takes.
 If the slope is 2, then the battery will be 60% charged for 30 minutes. In conclusion the battery increases by 2% for 1 minute.

Figure 4. Student answers for the originality indicator

Based on Figure 4, it can be seen that the student answered questions in their way correctly. In the test questions, students are asked to determine the slope of the line in the picture presented and write the meaning of the slope obtained. The student answered the question by determining the two points in the picture, then determining the slope values of the two points the straight line went through, and then writing the meaning of the slope values they obtained. Thus the student's answers are in line with the originality indicator.

a. - Garis dari jam 09.00 - 09.30 dan garis dari jam 09.40 - 10.00 adalah jenis gradien positif.
 - Garis pada jam 09.30 - 09.40 dan 10.00 - 10.30 adalah jenis gradien nol.
 - Garis pada jam 10.30 - 11.20 adalah jenis gradien negatif.
 b. - Tidak, karena untuk menempuh jarak membutuhkan waktu yang lama dan waktu terus berjalan.

a. The line from 09.00-09.30 and the line from 09.40-10.00 are positive slope types. The lines at 09.30-09.40 and 10.00-10.30 are zero slope types. The line at 10.30-11.20 is a negative slope type.
 b. No, because to cover the distance takes a long time and time goes on.

Figure 5. Student answers for the elaboration indicator

Based on Figure 5, it can be seen that the student answered the question uniquely and correctly. In the test questions, students are asked to determine the type of slope on the graph presented and write whether an undefined slope can occur with reasons related to one's journey. The student answered the question by writing the types of slopes for each straight line and writing whether an undefined slope might occur with their unique reasons. Thus the student's answers are in line with the elaboration indicator.

Based on the rubric in Table 2, the scores of students' answers were obtained. The results of the final test for students' creative thinking skills in the experimental and control classes are presented in Table 3.

Table 3. Score of students' creative thinking skills

Class	Number of Students	Average Score	Variant	Standard Deviation	Pooled Standard Deviation
VIII-2 (Control)	30	53	683.8454	26.1504	24.022
VIII-3 (Experimental)	32	65	477.1573	21.8439	
Total	62				

Before testing the hypothesis, a prerequisite test was carried out, namely the normality and homogeneity tests using SPSS. The results of the normality test for the experimental and control classes are presented in Table 4 .

Table 4. Results of normality test

Class	Kolmogorov-Smirnov ^a			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
Experimental class	.122	32	.200*	.939	32	.068
Control class	.135	30	.170	.940	30	.090

Based on Table 4, it was found that the significance values for the experimental and control classes were 0.200 and 0.170, respectively. Because the significance values in the experimental and control classes were more than 0.05, so the data were normally distributed. Furthermore, the results of the homogeneity test are presented in Table 5.

Table 5. Results of homogeneity test

	Levene Statistic	df1	df2	Sig.
Based on Mean	.787	1	60	.379
Based on Median	.575	1	60	.451
Based on Median and with adjusted df	.575	1	58.695	.451
Based on trimmed mean	.792	1	60	.377

Based on Table 5, it was found that the significance value was 0.379. With a significance value of more than 0.05, it was concluded that the data were homogeneous. Because the data for both classes were normally distributed and homogeneous, hypothesis testing was carried out. The hypotheses tested in this study, are:

$H_0: \mu_1 = \mu_2$ The average score of the creative thinking skill of students who were taught through realistic mathematics education is not better than students who weretaught through expository method on the straight line equation topic

$H_1: \mu_1 > \mu_2$ The average score of the creative thinking skill of students who were taught through realistic mathematics education is better than students who were taught through expository method on the straight line equation topic

Based on the calculation of

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}} \quad (2)$$

then $t = 1.97$ was obtained by using a level of significance of $\alpha = 0.05$ and degrees of freedom of $dk = n_1 + n_2 - 2 = (32 + 30 - 2) = 60$ which obtained $t_{table} = 1.67$. Because $t_{count} > t_{table}$, namely $1.97 > 1.67$ then H_0 is rejected. The results of the calculation were also compared to the results of SPSS. The results of hypothesis testing using SPSS are presented in Table 6.

Table 6. Results of hypothesis testing

Independent Samples Test									
	Levene's Test for Equality of Variances		t-test for Equality of Means						
	F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
								Lower	Upper
Equal variances assumed	.787	.379	2.069	60	.043	12.958	6.264	.429	25.488
Equal variances not assumed			2.058	57.241	.044	12.958	6.296	.352	25.564

Based on Table 6, it was found that the sig value = 0.043. Because the sig value < 0.05 then H_0 is rejected. Therefore, it was concluded that the average score of the creative thinking skill of students who were taught through realistic mathematics education was better than students who were taught through expository method on the straight-line equation topic.

Discussion

The results showed that the average score of the creative thinking skill of students taught through realistic mathematics education was better than those taught through the expository method on the straight-line equation topic. It follows the results of the research by [Imanisa and Effendi \(2022\)](#), [Ismunandar et al. \(2020\)](#), [Ndiung et al. \(2019\)](#), and [Soraya et al. \(2018\)](#) that students whose learning uses the RME approach have an average of mathematical creative thinking skill higher than students whose learning uses conventional learning methods. Differences in the presentation of a topic in the learning cause it. Learning through a realistic mathematics approach makes students the main focus of learning activities, and students are

given accurate and open-ended problems related to the topic being studied, so students have the opportunity to solve problems with unspecified solutions, meaning that students may use any strategy according to their imagination. It is followed by what was stated by [Johar et al. \(2021\)](#), that learning by applying the RME approach starts with real problems; then, students find informal solutions to these real problems. The results of a study by [Dwipayana et al. \(2018\)](#) revealed that learning with the RME approach presents a variety of open problems to provide opportunities for students to convey as many answers/ideas as possible. The RME approach also gives freedom to students to develop their strategies so that they can solve problems with various strategies. It follows what was stated by [Johar and Hanum \(2016\)](#) that in the RME approach, students are given equal opportunities to build and reinvent mathematical ideas and concepts, so they have the freedom to develop various problem-solving strategies. Learning with the RME approach starts by presenting real problems ([Van den Heuvel-Panhuizen, 2003](#)), so students can solve problems uniquely. It means that students solve the problems presented based on their experiences. It follows [Fajriah and Asiskawati \(2015\)](#), who found that some students can form new or unique solutions from other concepts or experiences. In addition, students also understand the topic presented. It follows research conducted by [Fauziah et al. \(2017\)](#), namely that by using RME, students easily understand the topic and learn new things.

It is different from the case of the expository method. The expository method makes the teacher the center who dominates the teaching and learning process. Therefore, students only get material from the teacher and work on the distributed exercises. It is followed by what [Hibattulloh and Sofyan \(2014\)](#) stated: the expository method activity is the teacher explaining the topic and then providing examples of problem-solving. Students only gain knowledge from what the teacher conveys and are not allowed to manage information. The expository method provides few opportunities for students to develop creative thinking skills in solving problems ([Rosa & Pujiati, 2016](#)). Therefore, differences in the presentation of topics in the learning cause the experimental class to have better creative thinking skills than the control class. Students who are presented with learning topics linked to problems in everyday life and play active roles in solving open problems have the opportunity to improve their creativity.

Conclusion

The average score of the creativity of students taught through realistic mathematics education was better than those taught through the expository method on the straight-line equation topic. Therefore, a realistic mathematics education can be one approach to developing students' creativity. Teachers are expected to guide students to solve challenging real problems to develop their creativity.

There is a limitation of this study, namely, the topic taught is only sub-chapters. Therefore, it is hoped that future researchers can examine the application of realistic mathematics education to different topics.

Conflicts of Interest

The authors declare no conflict of interest regarding the publication of this manuscript. In addition, the ethical issues, including plagiarism, misconduct, data fabrication and/or falsification, double publication and/or submission, and redundancies, have been completed by the authors.

Funding Statement

This work received no special grant from any public, commercial, or not-for-profit funding agency.

Author Contributions

Rahmah Johar: Writing - review & editing, analysis, methodology, discussion, supervision and correspondence author; **Arta Maisela:** Conceptualization, collection data, analysis, writing - original draft, editing, and visualization; **Suhartati:** Validation and supervision.

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