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DEVELOPMENT OF INTERACTIVE TEACHING MATERIALS WITH RME-BASED ISPRING SUITE TO IMPROVE STUDENTS' CREATIVE THINKING SKILLS

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Abstract

With the use of the RME-based iSpring suite, this project creates interactive teaching resources to enhance students' capacity for creative thought. Students' low capacity for creative thought, low levels of desire, low levels of activity, and low levels of involvement in the learning process are the field's problems. In order to address these issues, interactive instructional resources were created. With the help of RME-based ispring suites, interactive teaching materials will be created that are valid, useful in the educational process, and will enhance students' capacity for creative thought. 4D (define, design, development, disseminate) is the development model that is employed. Pretest-poste instruments, student response questionnaires, and validation sheets are used in data gathering procedures. Analysis methods include the paired sample t-test, validity test, and practicality test, n-gain test. With a score of 3.41, the validity test results indicate that the product is already in the legitimate category. According to the analysis of the practicality test results, the produced product already has a score of 3.43, placing it in the extremely practical category. It is established by the paired sample t-test that capacity differences exist between pre- and post-use of interactive training resources. Moreover, improving pupils' capacity for creative thought is known to fall into the effective group based on the results of the n-gain test. In order for the RME-based iSpring suite of interactive teaching resources to be generally appropriate for use in the learning process.

Keywords: teaching, interactive, ispring suite, creative thinking

1. Introduction

The development of technology that occurs today is very fast, all sectors of activity are competing to apply, utilizing the development of technology. Currently, the field of education has implemented these technological developments both as pre-learning, implementation of learning, post-learning and or what is often referred to as a learning management system (LMS) (Putrawangsa & Hasanah, 2018). The use of technology in fact can increase the effectiveness of activities. Technology in education increases the efficiency and attractiveness of its use. This is in accordance with the opinion of (Supianti, 2018) the need for education for technology is caused by efforts to increase effectiveness and efficiency in achieving educational goals. The development of technology can be used for the teaching and learning process in the classroom, currently many can be used in the learning process from free to paid applications (Amami Pramuditya et al., 2017). From the explanation above, it can be concluded that the use of technology in the teaching and learning process (education) is a must (Iskandar & Raditya, 2017).

The development of technology must be used properly, to be able to use technology teachers must be able to master the technology. Teachers can not only use or operate the technology but teachers must be able to choose which technology can be used well and can help the teaching and learning process in the classroom (Rahma et al., 2021). At this time students are very close to the technology they use every day, ranging from laptops, PCs, smartphones and other technological tools. Demands Mathematics learning that must perform mathematical operations quickly and precisely is carried out using technological tools, where in ancient times fast and precise mathematical calculations were done manually. As one of the current examples, graphing in mathematics does not need to take a long time by inputting direct graph equations can be obtained quickly (Septianingrum et al., 2019). Things like these need to be handled correctly since students cannot fully understand the context and ideas of mathematics if teachers do not properly supervise and direct their usage of technology.

For this reason, the use of technology in learning must be able to develop students' mathematical abilities well. So that later the use of technology does not make students not understand the concept well, but helps students to understand the concept (Nalasari et al., 2021). Development of mathematical skills can use technology in Learning. Currently, students' ability to think mathematically is still not able to develop properly. This is based on the results of observations made in several schools in Tangerang City, it is known that the ability to think mathematically, including creative thinking, students have not developed optimally. Students are given math problems, students cannot find solutions well. This is in line with the results of PISA 2023 research, it is known that the mathematical ability of Indonesian students is still ranked at the bottom, even though they have experienced an increase in scores and rankings, but this increase is considered not enough, because it is still lagging behind other countries (PISA, 2023). Seeing the potential possessed by students' mathematical abilities can still be developed for the better. To improve students' mathematical abilities, they can incorporate current learning technology into the learning process (Hewi & Shaleh, 2020).

The use of technology in the learning process can improve students' abilities and focus in the problem-solving process also technology can function as a tool that can help students in exploring a concept meaningfully. And the use of technology as a learning tool can hone students' procedural skills so as to train students' mathematical skills (Jupri, 2015).

One technology or software that can be used in mathematics learning is the I-Spring Suite application. I-Spring Suite is one of the Learning applications in the form of SCORM / AICC which is a Learning application with e-learning LMS (Learning Management System)

The i-Spirng suite application is one of the applications that has complete features, which in the I-Spring Suite application is equipped with features to present active teaching materials. Provides evaluation features with various types of tests (Cahyanti et al., 2019). This application can be used online or offline (Martiningsih, 2018). With the various features of this application, learning can be carried out by applying various innovations. One such innovation is interactive learning. Interactive learning can increase student motivation and participation in the Learning process (Rohaeti et al., 2019). Increased student motivation and student participation and student creativity can improve students' mathematical abilities (Martiningsih, 2018).

The purpose of education today is to improve problem-solving skills, creative thinking skills, and critical thinking skills (Palguna et al., 2020; Watson & Geest, 2005). The ability to think creatively in mathematics is the ability to generate new ideas in solving complex problems, developing new models and theories in innovative

and creative ways (Kartikasari et al., 2022). Increasing the ability to think creatively in mathematics includes (a) solving problems creatively; (b) develop new models; (c) look for patterns and relationships; (d) divergent thinking; (e) think analogously; (f) critical thinking; (g) collaborate. The ability to think creatively can indirectly develop problem-solving and critical skills, because to be able to think creatively requires problem-solving skills to think critically first.

The ability to think creatively in mathematics can help a person in many fields including science, technology, engineering and business, besides that the ability to think creatively can also help a person in everyday life such as decision making for complex problem solving (Suherman & Vidákovich, 2022). The use of Learning applications can be complemented by elements of realistic mathematics learning (RME). The development of mathematical creative thinking skills aims to facilitate students in making decisions in dealing with everyday mathematical problems. Realistic math learning will read students into situations they usually face in everyday life. So that way the mathematics learning provided by teachers is no longer new to students because they often experience these situations in their lives (Yulianty, 2019).

The study's statement of the problem is to create interactive teaching materials using the RME-based iSpring suite and assess whether or not using the created materials increases students' capacity for creative thought. The goal of this study is to create engaging instructional resources and enhance students' capacity for creative thought.

2. Method

The 4D model (Define, Design, Development, Disseminate) is used in this study to do development research (R&D) (Azaryahu et al., 2023). This paradigm was chosen in response to the requirement to create interactive educational resources with the iSpring suite, which is RME-based. This investigation, however, was restricted to the development phase. Initial and final analyses, analyses of student needs, analyses of material to be developed are all completed during the define stage. A product prototype or initial plan is prepared during the design stage, and tools that have undergone validation from experts or validators are produced during the development stage.

The test subjects in this study were grade VIIIE students of SMP Dharma Siswa Kota Tangerang. For the validation of the developed product involves material experts, media experts, and linguists. For the material to be included in the teaching materials adjust the learning carried out at the time of data collection. In the school where the trial was carried out, facilities for the use of interactive media were very adequate so that the implementation of research could run well. The subject trials will be conducted in the even semester in February 2024.

Data collection techniques in this study used test instruments, validation sheets, and student response questionnaires. For test questions using description type questions consisting of 5 questions. For the questionnaire, student responses used the Likert scale. Likert scale is used to measure respondents' attitudes, responses, perceptions and opinions towards teaching materials that have been developed (Sugiyono, 2019).

To evaluate the viability of generated goods by considering their feedback, data analytic techniques are combined with expert validation sheets. validation sheet of subject matter experts, media experts, and experts utilizing the Likert scale in conjunction with the following assessment process:

Table 1. Expert Assessment Guidelines for Products

Value	Criteria
1	Very Less (SKS)
2	Very Less (SK)
3	Good (B)
4	Very Good (SB)

Furthermore, the conversion of the score or score into qualitative value is carried out with guidelines

Table 2. Product validity score guidelines

Value	Criteria
$\bar{X} \leq 1.6$	Invalid
$1.6 < \bar{X} \leq 2.2$	less valid
$2.2 < \bar{X} \leq 2.8$	Quite valid
$1.8 < \bar{X} \leq 3.4$	Valid
$\bar{x} > 3.4$	Very valid

(Pranata et al., 2021)

Likert scale questionnaires with the following scoring rules were used to analyze student response surveys in order to assess the efficacy and viability of the created product.

Table 3. Student response questionnaire score guidelines

Value	Criteria
1	Strongly Disagree (STS)
2	Disagree (TS)
3	Agree (S)
4	Totally Agree (SS)

Next, the score is converted to determine the practicality of the product with the following guidelines:

Table 4. Product validity score guidelines

Value	Criteria
$\bar{X} \leq 1.6$	Impractical
$1.6 < \bar{X} \leq 2.2$	Less practical
$2.2 < \bar{X} \leq 2.8$	Quite practical
$1.8 < \bar{X} \leq 3.4$	Practical
$\bar{x} > 3.4$	Very Practical

A paired sample t-test is used to compare the ability before and after utilizing the generated product in order to assess how successful it is on the capacity for creative thought. Using the supposition that is:

H_0 : There is no difference between students' creative thinking skills before and after using interactive teaching materials with the RME-based ispring suite

H_1 : There is a difference between students' creative thinking skills before and after using interactive teaching materials with the RME-based ispring suite

Students use the N-Gain test to assess how well the product improves their capacity for innovative thought. Scores from the pretest and posttest are compared using the N-Gain test. The N-Gain value's criteria are as follows:

Table 5. Product validity score guidelines

Value	criteria	Effective
$g > 0.70$	Tall	Effective
$0.30 \leq g \leq 0.70$	Keep	Quite Effective
$g < 0.30$	Low	Less Effective

3. Results and Discussion

3.1 Results

3.1.1. Define

The first analysis is the first step in the definition stage, which is broken down into sections. Based on preliminary investigations, it is known that passive learning problems remain, that the amount of media consumed is still limited, and that manual media and props are still used.

The learning carried out is still teacher-centered, so there has not been established interactive and good communication between students and teachers. The teaching materials used by students in schools are only limited to existing teaching materials published by the Ministry of Education and Culture. Therefore, based on these problems, interactive teaching materials are developed that can help increase student participation and student activity in the learning process.

Curriculum analysis: Since schools are currently in an independent phase of change, the 2013 curriculum is still being implemented in classrooms. The realistic math education learning model is one that will be used to create interactive teaching material items using the iSpring suite. Initial analysis conducted on students, students' problem-solving skills are still low, critical and creative thinking skills are still low and consequently student learning is still relatively low because still 60% of students are still below the minimum completeness criteria set by 70 students. Based on the above analysis, it is concluded that the subject is qualified to be a research subject in the development of interactive teaching materials using the RME-based ispring suite. Based on the results of the analysis, it is known that the learning carried out is still unable to motivate students well in the learning process. Teachers still lack the use of media or develop learning media, learning does not associate the material discussed with daily life and student scores are still low so that a media or learning device is needed that can increase student motivation, relate to daily life, then interactive learning media will be developed using the ispring suite with a realistic mathematics approach.

3.1.2 Design

The media design developed based on the results of the initial analysis carried out is the low motiation of students in the learning process, lack of learning media, attribution to daily life, learning media is developed, to increase student motivation, the media is designed interactively so that students are more motivated in the learning process. To link the learning process with everyday life, a realistic mathematical approach was chosen for the basis of media development

At this design stage, create product designs for the development of interactive teaching materials. The design of teaching materials is interactive teaching materials based on Realistic Mathematics Education. The things stipulated in the design stage are material selection, the material chosen is the material for building flat side space with the subject matter surface area and volume in class VIII even semester with competency

standards understanding the concept of surface area and volume in building flat side space.

The choice of development media is the ispring suite application because the ispring suite application is an application that can be used to develop teaching materials and evaluation instruments that can be used both online and offline. The development of teaching materials uses a realistic mathematic education learning model, because this learning model includes everyday mathematics in the learning process which aims to make students not feel unfamiliar with the mathematical concepts taught.

After choosing the application and development model, a storyboard will be made from the design of interactive teaching materials. Here's a storyboard plan.

Table 6. Interactive Teaching Material Storyboards

Part	Fill
Introduction	Cover
	Splash Page
	Contents
	Instructions for use
Fill	Material Part I (cube)
	Cube Elements
	Evaluation (can be continued if it has reached the set value)
	Surface area
	Evaluation
	Volume
	Evaluation
	Material 2 (beam)
	Cube Elements
	Evaluation (can be continued if it has reached the set value)
	Surface area
	Evaluation
Final part	Material Enrichment
	Final Test
	Self-evaluation

Each section of the teaching material will be equipped with a play button that functions to run animations and illustrations in the teaching materials. The next button functions to advance to the next page, and the previous button functions to rewind to the next page, in this teaching material, users can continue if they have mastered the previous material, namely by answering questions at the end of each session or section.

The instruments in this study consisted of validation sheets, student response questionnaires, and pretest and posttest test instruments. Validation sheets are divided into 3 types, namely material, language and media expert validation sheets. Each validation sheet consists of 25 questions. with Likert scale i.e. Very Good, Good, Less Good, Very Less Good. For student response questionnaires consist of 30 questions that students will answer and contain questions related to the effectiveness of use and student responses to the teaching materials used. For the test instrument, it is divided into two pretest and postest, prestes consist of 5 description questions and postest questions consist of 5 description questions.

3.1.3 Development

The development stage consists of developing interactive teaching materials based on the design stage. Validation sheet instruments, student response questionnaires are developed at this stage. At this stage the ultimate goal is to obtain teaching materials, validation sheets, response questionnaires and test instruments that can be used properly. Therefore, at this stage teaching materials and test instruments will be submitted to experts for assessment in order to obtain interactive teaching materials and valid test instruments.

The results of the assessment from experts are analyzed to find out the level of validity of the product developed. At this stage interactive teaching materials using an RME-based ispring suite are created. The product is an interactive teaching material equipped with animations,

materials, and evaluations for building materials flat side space calculating surface area and volume.

The following validation results from material experts can be seen in the following table:

Table 7. Material expert validation results

No	Indicator	Question Item	Score
1	Basic Compatibility	4	13
2	Material compatibility	5	17
3	Presentation of material	3	12
4	Compatibility of the questions with the material	3	10
5	Learning Presentation	4	14
6	RME stage	3	10
7	Purpose of RME	3	10
	Sum	25	86
	Rata-rata	3,44	
	Category	Valid	

Based on Table 7, it can be inferred that interactive instructional materials built with the RME-based iSpring suite have a proper material presentation since the average is 3.44 with valid categories.

Furthermore, validation from media experts, for validation results from media experts can be seen in the following table:

Table 8. Media expert validation results

No	Indicator	Question Item	Score
1	Templar	9	33
2	Interactive	10	35
3	Use	6	19
	Sum	25	87
	Rata-rata	3,48	
	Category	Valid	

Based on the table, it is obtained that interactive teaching materials using RME-based ispring suite are already in the valid category of the media category.

Furthermore, the validation results from linguists can be seen in the following table:

Table 9. Linguist validation results

No	Indicator	Question Item	Score
1	Compatibility of linguistic rules	8	28
2	Communicative	10	33
3	Interactive	7	25
	Sum	25	86
	Rata-rata	3,44	
	Category	Valid	

Based on the results of the conclusions above that the interactive teaching materials developed are already in the category of valid in terms of language.

The following table displays the outcomes of the recapitulation based on the overall evaluation findings of the validators, which include linguists, media professionals, and material specialists:

Table 10. Validation recapitulation results

No	Indicator	Score
1	Material	3.44
2	Media	3.32
3	Language	3.48
	Sum	10.24
	Rata-rata	3.41
	category	Valid

Using the validation score recapitulated results, an average score of 3.41 - which falls within the valid category was obtained.

After the product in the form of interactive teaching materials using the RME-based ispring suite is declared valid and can be used, then next, the product is implemented in class to the subject of grade VIII students to determine the effectiveness of the product and student responses after using interactive teaching materials. Before carrying out the learning process using teaching materials, students are given a pretest first, after that students carry out 3 learning meetings using interactive teaching materials, and after that at the end of the meeting a postest and student response questionnaire are given. Response questionnaires were given to determine student responses to using interactive teaching materials with RME-based ispring suite. Pretest and postest are given to determine the increase in students' creative thinking skills after using interactive teaching materials.

The following results of student responses to the use of interactive teaching materials with RME-based ispring suite can be seen in the following table

Table 11. Student Response Questionnaire Results

No	Indicator	Question Item	Score
1	Ease of Use	3	10
2	Highlights	4	13
3	Learning media provisions	3	11
4	Others	4	13
5	Language	5	18
6	Evaluation	3	11
7	Interest	4	14
8	Learning Motivation	4	13
	Sum	30	103
	Rata-rata	3,43	
	Category	Very Practical	

The study of the student answer questionnaire data revealed that the average score from eight question indicators was 3.43, falling into the very practical group. Therefore, it can be concluded that one effective strategy to improve student learning in the classroom is to use interactive teaching resources with an RME-based iSpring suite.

Students' capacity for creative thought can also be enhanced by observing the efficacy of interactive teaching resources using the RME-based iSpring suite. The following are the findings from the pretest and posttest that students took after using interactive teaching resources to complete their learning:

Table 12. Results of Pretest and postest of research subjects

Subjek	Pretest	Posttest
S1	44	68
S2	52	78
S3	54	74
S4	62	79
S5	74	80
S6	78	84
S7	68	78
S8	54	76
S9	80	84
S10	84	88
S11	56	68
S12	58	68
S13	48	56
S14	52	70
S15	50	70
S16	64	74
S17	76	84
S18	78	80
S19	78	84
S20	76	86
S21	74	86
S22	56	70
S23	80	84
S24	68	74
S25	74	78
S26	74	76
S27	82	86
Sum	1794	2083
Average	66.4	77.1
Number of completed students	13	23

For the total number of students as many as 32 people but for students who took pretests and postes as many as 27 students, for 5 other students did not take the pretests and postes completely. So that for research subjects who are subjects only 27 students. Based on the table above, it is known that for pretest students who completed with a minimum completeness criterion of 70 as many as 13 students while for postes students who completed as many as 23 people. With the percentage of completeness for the pretest is 48.14% while the percentage of completeness of students in postes is 85.18%. These findings indicate that the number of completed pupils increased by 10 individuals, or 37.04%.

Additionally, using the paired sample T-Test, an analysis will be conducted to ascertain the difference in creative thinking capacity before and after employing interactive instructional materials. These are the findings of the paired sample t-test performed with the SPSS software.

Table 13. Analysis Paired sample T-Test

Paired Samples Test

		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Pretes – postes	-10.70370	7.07006	1.36063	-13.50053	-7.90688	-7.867	26	.000

A sig value of 0.000 < 0.05 was found in the Paired Sample T-Test test results above, indicating that there was an average difference between the pre- and post-use of interactive teaching materials with RME-based Ispring Suite.

Additionally, an N-Gain test was used to assess how well pretest and posttest learning outcomes were improved by using interactive teaching materials. The N-Gain Test analysis's findings are as follows:

Table 14. N-Gain Test results

	N	Min	Max	Mean	Deviation
NGain Percent	27	7.69	54.17	0,769	12.28

The employment of interactive teaching resources using the RME-based Ispring suite is successful in fostering students' creative thinking

abilities, as indicated by the N-gain test data, which show that the mean is 0.769. in order for this instructional resource to be utilized during the classroom learning process.

3.2 Discussion

Based on the findings of a study on interactive teaching resources using an RME-based iSpring suite to enhance students' capacity for creative thought. The study was carried out at SMP Dharma Siswa class VIII. An average validation score of 3.41 was obtained from the validation results, which were administered to three experts: linguists, media experts, and material experts. This score fell into the valid category. Interactive teaching resources can be used in the classroom to support student learning once the expert validator's findings are received and the product is deemed legitimate. The purpose of this implementation is to evaluate the product's usefulness and efficacy in order to enhance problem-solving skills.

The implementation in class was carried out as many as 3 meetings starting with pretests and postes first. From the results of the student response questionnaire, a score of 3.43 was obtained with a very practical category, so it can be concluded that the use of interactive teaching materials with the RME barbasis ispring suite is practical for use in the classroom learning process. The use of interactive media in the classroom can increase student participation and motivation. This is because the use of interactive teaching materials students are directly involved in the learning process so that student progress in understanding the material can be well observed, this is in accordance with the opinion of (Sumilat, 2018) the use of interactive media in the learning process can increase student activeness and participation in the learning process. This opinion is in line with the results of research conducted by (Misselya, 2023) the use of media in the learning process can invite students to be active in the learning process.

Moreover, to determine how well instructional resources enhance students' capacity for original thought. Thus, a review of the students' pretest and posttest findings was conducted. Based on the analysis results, it is known that there was a 10 percent increase in the number of completed students. During the pretest, students completed up to 13 people, and during the posttest, students completed up to 23 people, meeting the minimum completeness criterion of 70. The percentage increase in completed students was 27.04%. Furthermore, an analysis was carried out using the paired sample t-test, it was found that there were differences in students' creative thinking abilities before and after using interactive teaching materials with RME-based ispring suite. This can be concluded based on the results of the analysis it is known that the sig value < 0.05 so that there are differences in student abilities. Furthermore, the N-Gain test was carried out to determine how effective it was to increase creative thinking ability after students used interactive teaching materials in the learning process from the results of the N-gain test analysis obtained an N-gain score of 0.769 which is in the effective category. So it can be concluded based on the paired sample t-test and N-gain test, there are differences in students' creative thinking ability before and after using interactive teaching materials with RME-based ispring suite with a fairly effective improvement.

In this study on creative thinking in particular, the utilization of instructional resources can enhance students' mathematical proficiency. based on studies showing that using learning media to enhance students' mathematical skills (Sari et al., 2020). this is due to the fact that interactive teaching materials and learning media allow students' senses to be fully engaged in the learning process. Students' learning abilities can be enhanced by including other senses into the process. Based on the cone of Dale's experience, (Sari, 2019) established the opinion that using one's senses during the learning process can enhance memory and comprehension.

4. Conclusion

Research on the creation of interactive teaching materials using RME-based Spring suites has led to the following conclusions: (1) instructional materials created using expert assessment results are already classified into valid categories. Interactive teaching materials after implementation and analysis of student pretest and postes results show that there are differences in students' creative thinking ability before and after using interactive teaching materials, and from N-gain analysis that the increase in students' creative thinking ability is in the effective category. (2) Based on implementation results and student response questionnaires, interactive teaching materials are known to be practical to be used in the learning process in the classroom.

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