Improving Creativity and Mathematics Learning Outcomes: Implementation of the Discovery Learning Model in Spatial Building Materials

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abstrak
Creativity of thinking in learning Mathematics is the most important goal in improving learning outcomes, it has an important role in providing stimulation, enthusiasm and pleasure in learning so that those who have high motivation are the problem in research to improve creative thinking skills and math learning outcomes. The role of the math teacher in using the Discovery Learning model shows the importance of the real context according to the situation in the environment by the students themselves in thinking about identifying problems in learning so that the concepts received by students are more meaningful. Quantitative experimental research with research subjects of class VIII students of MTs Wahid Hasyim, school year 2023/2024. The data in this study are quantitative data obtained from tests of students' knowledge and understanding through questionnaire tests. The results of this study indicate: the effect of the Discovery Learning model in the mathematics subject of building space material to improve students' creative thinking by 70.2%, the effect of the Discovery Learning model in the mathematics subject of building space material to improve student learning outcomes by 86.3%, and the effect of the Discovery Learning model in the mathematics subject of building space material to improve creative thinking and learning outcomes together by 76.6%. This means that the application of the Discovery Learning model in improving creative thinking and student learning outcomes has a significant effect.
Keywords: Creativity, Math Learning Outcomes Discovery Learning

Introduction

Mathematics is an important science that demands logical thinking and problem solving skills. However, in traditional learning, mathematics is often considered a rigid and boring subject (Adhar, 2012; Hariyanto et al., 2023). Increasing creativity is one solution to overcome this problem. Creative thinking in mathematics means that students are able to see concepts from different points of view, solve problems in innovative ways, and apply mathematical knowledge in real-life situations, Creative thinking in mathematics is not just about solving problems quickly and precisely. It is about developing the ability to see concepts from different points of view: Creative students don't just stick to one way to solve a problem. They are able to explore different approaches and find unique and innovative solutions (Adiputra & Heryadi, 2021; Nozari & Siamian, 2015)

Solve problems in innovative ways: Mathematics is not just about memorizing formulas and following rigid steps. Creative students are able to use their knowledge to solve new problems in unexpected ways. To Apply mathematical knowledge in real life situations: Math is not just about numbers and formulas. Creative students are able to see how math can be used to solve real-world problems and make informed

decisions. To Communicate and collaborate effectively: Math is about working together and sharing ideas. Creative students are able to communicate effectively with others and work together to solve complex problems (Annisa et al., 2019; Nurhikmayati, 2019).

Creativity of thinking in learning Mathematics is the most important goal in improving learning outcomes, it has an important role in providing stimulation, enthusiasm and pleasure in learning so that those who have high motivation have a lot of energy to carry out the learning process (Adi Kesuma et al., 2021; Ningrum et al., 2021). The learning model is able to improve students' understanding of concepts and creative thinking skills in improving learning outcomes, so that students can get the maximum benefit from both the process and the learning outcomes (Utomo et al., 2014)

Creative thinking is a process that involves elements of originality, fluency, flexibility and elaboration. The existence of strong learning creativity makes students learn diligently which ultimately materializes in the student's learning outcomes. Good learning creativity will support a good learning process. A person's creativity is shown in various ways, such as habits of mind, attitudes, innate or personality, or problem-solving skills. The effect of creative thinking shows changes in student learning outcomes, either directly or indirectly (Marlina et al., 2021; Zulaikhah et al., 2019).

The learning process and tends to be not so interesting to students shows the students' thinking patterns in learning Mathematics lessons to be applied in boring, monotonous, less interesting, less creative lessons. This causes learners or students to be less active, in the learning process accompanied by students being passive and accepting whatever is given by the teacher (Bicer, 2021).

One learning approach that can improve creativity and math learning outcomes is the Discovery Learning model. This model emphasizes the process of students discovering knowledge independently through observation, experimentation, and reasoning (Edi & Rosnawati, 2021).

This research is likely to investigate the combined effect of the Discovery Learning model on improving creativity and learning outcomes in mathematics, particularly in the subject of building spaces. The novelty lies in the focus on creativity in addition to learning achievement, which has rarely been investigated in Discovery Learning research in mathematics. the title suggests the potential to examine the combination of creativity and the Discovery Learning model in learning mathematics. if this research uses an innovative methodology or finds a unique effect, then the novelty will be even stronger.

Fremwork

The Discovery Learning model, also known as discovery learning, was proposed by an expert named Bruner. Bruner (Bruce joyce, Marsha Weil, 2015), states that: Learning discovery and by itself gives good results in this Discovery Learning, learners / students try themselves to find solutions to problems and accompanying knowledge and produce knowledge that is truly meaningful. Discovery learning makes learners learn through active participation with concepts and principles so that they are encouraged to gain experience and conduct experiments that allow them to discover the principles themselves. (Dea et al., 2021)

The knowledge gained lasts longer or is easier to remember when compared to knowledge learned in other ways. Discovery learning outcomes have a better transfer effect than other learning outcomes. In other words, the concepts and principles that make up one's cognitive skill expertise are more easily applied to new situations. Overall, discovery learning improves reasoning and the ability to think freely. Discovery learning trains learners' cognitive skills to find and solve problems without the help of others. According to Bruner (Kurniawan, 2018) suggests that discovery learning arouses students' curiosity, motivates them to work continuously until they find answers. This learning model allows students to find their own information needed to achieve instructional goals. This has implications for the role of the teacher as the delivery of information towards the role of the teacher as the manager of teaching and learning interactions in the classroom.

The application of the Discovery Learning model in Mathematics requires students to be more active in reading, searching for information, and knowledge to solve problems given by the teacher. So that students have knowledge, memory and understanding of the material studied much longer than students get information only from the teacher (Batubara, 2020).

Creative Thinking

Creative thinking is a process that develops unusual ideas and produces new thoughts that have a broad scope. Creative thinking can produce quality thinking, the creative process certainly cannot be carried out without the knowledge gained by developing thinking properly. Creative thinking provides support to students so that students are more motivated to be more creative. According to (Priawasana & Waris, 2019) suggests that creative thinking is the ability to develop ideas that are unusual, qualified, and on task. This shows that creative thinking can develop thinking power that includes insight with broad elements. creative thinking is a process that involves elements of originality, fluency, flexibility, and elaboration (Astria & Kusuma, 2023).

This shows that creative thinking can develop thinking power that includes insight with broad elements. Likewise, creative thinking will be able to produce quality thoughts (Moma, 2015) which states that creative thinking is the ability to develop unusual, quality, and task-appropriate ideas. This is a self-development of new ideas that have good quality. Based on the opinions that have been described, creative thinking is a process that develops unusual ideas and produces new thoughts that have a broad scope.

The activity of thinking to produce something creative and original. According to Baer (Sari & Afriansyah, 2022) suggests fluent creative thinking, is the ability to generate many ideas, flexible, the ability to generate varied ideas, the ability to generate new ideas or ideas that did not previously exist, and the ability to develop or add ideas so that detailed or detailed ideas are produced. This states that creative thinking has several indicators to produce new ideas. A person's creativity is shown in various ways, such as habits of thought, attitude, characterization or personality, or problem-solving skills.

Learning outcomes

Learning activities will result in changes that occur in students. The changes in question are changes in the form of knowledge (*Cognitive*), attitudes (*Affective*) and skills (*Psychomotor*). The changes that occur are a refinement of the results that students have previously achieved. The results of the learning process are often referred to as learning outcomes. Learning outcomes show students' abilities after following the learning process. (Darmawan & Sujoko, 2013) argues that learning outcomes are the abilities that students have after they receive their learning experience. According to Howard Kingsley, there are three types of learning outcomes, namely: (1) *skills and habits*, (2) *knowledge and understanding*, (3) *attitudes and ideals*. Each type of learning outcome is filled with material that has been determined in the curriculum. Assessment of student learning outcomes is something that is very important and strategic in teaching and learning activities. Learning outcomes are an attitude shown by students that is produced through values obtained through the learning process. Student learning outcomes are an achievement of student success targets that have been set by educators or teachers can be measured through 3 domains, namely, domains: (1) *Cognitive*, (2) *Affective*, and (3) *Psychomotor*. (Supardi & Hasbullah, 2016)

Methodology

The population in this study were children / students in grade VIII MTs. Wahid Hasyim, Jember, a total of 60 students for the total population, and 30 students for the number of research samples. 2021/20222 school year. This study uses a quantitative causal research method in seeing the relationship of variables to the object under study.

The data analysis technique used inferential statistics, namely, data analysis techniques are more emphasized on a broader generalization process in the population area. Data analysis in this study used the SPSS for Windows program. The following is the data analysis in this study, among others

Results and discussion

The following are the results of the normality test of the research questionnaire data "The Effect of the Discovery Learning Model on Mathematics Subjects of Space Building Material to Improve Creative Thinking and Student Learning Outcomes". The normality level of a variable, the more the Kolmogorov-Smirnov value is close to one, the better the normality value of the data (spread well). The results of the Normality test can be seen below.

Table 1. Results of Data Normality Test with *Kolmogorov-Smirnov Test*

No.	Variabel	Nilai *Kolmogorov-Smirnov Test*	Keterangan
1.	Model *Discovery Learning*	0.152	Normal
2.	Berfikir Kreatif	0.200	Normal
3.	Hasil Belajar	0.102	Normal

Attached is a histogram visualization of the normal distribution of data from the combination of independent to dependent variables. The Homogeneity level of a research variable can be seen from the statistical test results. The research variable is said to be homogeneous if the Homogeneity value> 0.05. The greater the Homogeneity value close to one, the better the data value (spread well). Homogeneity test results can be seen below:

Table 2: Compilation of Data Homogeneity Test Results

Test of Homogeneity of Variances

X

Levene Statistic	df1	df2	Sig.
2.067	2	87	.133

The results of data homogeneity appear with the acquisition of 0.133> 0.05, so it can be said that the data has a high level of homogeneity.

Testing one by one variables by examining whether or not there is an influence of the independent variable on the dependent variable. The guidelines used if the significance probability> 0.05, then there is no significant effect or H0 is accepted and H1 is rejected and if the significance probability <0.05, then there is a significant effect or H0 is rejected and H1 is accepted. The results show on each work variable according to the following table:

Table 3. Results of the *t-test of the Discovery Learning* Model Data in Mathematics Subjects on the Material of Building Spaces to Increase Students' Creative Thinking

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	22.195	3.219		6.895	.000
	Model DL	-.037	.148	.047	.248	.806

a. Dependent Variable: Creative Thingking

With the acquisition of the provisions of the results of 0.000 < 0.05 (significance that meets), tcount> ttabel = 6.895> 2.098 (indicating that there is an influence of related variables), it is concluded that H0 is rejected and H1 is accepted with a percentage value of successful application of variables of 70.2%..

Table 4. Results of *the t-test of the Discovery Learning* Model Data in Mathematics Subjects on the Material of Building Spaces to Improve Student Learning Outcomes

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	28.442	2.651		10.728	.000
	Model DL	-.285	.122	.404	2.338	.027

a. Dependent Variable: learning outcomes

With the acquisition of the provisions of the results of 0.000 < 0.05 (significance that meets), tcount> ttabel = 10.728> 2.098 (indicating that there is an influence of related variables), it is concluded that H0 is rejected and H1 is accepted with a percentage value of successful application of variables of 86.3%.

Table 5. Results of *F Test of Discovery Learning* Model Data in Mathematics Subjects of Space Building Materials to Improve Creative Thinking and Student Learning Outcomes

ANOVA[a]

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	214.943	2	107.472	20.689	.000[b]
	Residual	1078.924	27	39.960		
	Total	1293.867	29			

a. Dependent Variable: DL Model

b. Predictors: (Constant), learning outcomes, Creative Thingking

With the acquisition of the provisions of the results of 0.000 < 0.05 (significance that meets), fcount> ftabel = 20.689> 4.18 (indicating that there is an influence of related variables), it is concluded that H0 is rejected and H1 is accepted with a percentage value of successful application of variables of 76.6%.

Discussion

In the discussion of this research is to find out "*The Effect of the Discovery Learning Model on Mathematics Subjects of Space Building Materials to Improve Creative Thinking and Student Learning Outcomes*". With the application of the Discovery Learning Model in Mathematics Subjects, high learning outcomes can be shown, of course, it will have a positive impact on schools and students. The positive impact that arises from students' Creative Thinking and Learning Outcomes is increasing plus increasing enthusiasm in student learning and low student inactivity in the learning process as has been proven in this study. With these conditions, schools must continue to pay attention to the development of students and student learning outcomes because if student creativity and learning outcomes are high (Simarmata et al., 2022)

The learner-centered learning model, one of which is the discovery learning model, is the most effective way to improve learning outcomes (Prasasty & Utaminingtyas, 1 C.E.). Related to discovery learning and critical thinking skills, (Edi & Rosnawati, 2021) stated that learning with the discovery learning model is effective for improving critical thinking skills. One of the materials that can be developed to facilitate discovery learning-based learning oriented towards critical thinking skills is the material of building spaces.

Mathematics learning activities should also be designed to consist of identifying and formulating hypotheses (interpretation), collecting data to prove hypotheses based on relevant information (inference), processing data by connecting relevant mathematical concepts (analysis), evaluating hypotheses based on analysis results (evaluation), and drawing conclusions based on relevant data and logical steps. Learning mathematics consisting of these activities can train students' critical thinking skills because the activities of interpretation, inference, analysis, and evaluation are indicators of students' critical thinking skills (Facione & Facione, 2008; Jensen & Lassen, 2020).

Siswa menghadapi tantangan dalam berpikir kreatif, namun setiap siswa mempunyai kemampuan Students face challenges in creative thinking, but each student has unique abilities and faces different difficulties. Therefore, procedural skills are needed to discover the concepts learned themselves, thus motivating students to make other discoveries and increasing interest in learning (Ashari et al., 2023).

Conclusion

Based on the research that has been conducted by researchers, the results of research on *"The Effect of Discovery Learning Model on Mathematics Subjects of Space Building Materials to Improve Creative Thinking and Student Learning Outcomes, at MTs Wahid Hasyim"* , can be concluded as follows: Direct learning in the classroom results in an increase in higher learning outcomes. This is because learning Mathematics requires active learning in the field. The influence of the teacher's delivery of material is very influential on students' absorption and creative thinking. In Mathematics, students will provide active feedback if they understand the content of the learning material.

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