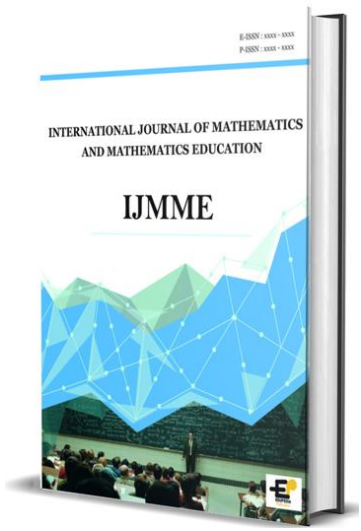

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The Guided Note-Taking Learning Model Effectively Improves Students' Mathematics Learning Creativity

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Abstract

Student creativity in learning mathematics is one of the cognitive abilities that students need to master. The aim of this research is to determine and analyze students' mathematics learning creativity. This type of research is quasi-experimental. The population in this study were all class VII students at SMP Negeri 4 Baubau which consisted of 10 parallel classes with a total of 280 students. The sample in this research was taken using the Random Sampling technique. 28 students from class VII.10 were selected as the experimental class and 28 students from class VII.9 as the control class. The instruments used in this research were observation sheets and students' mathematics learning creativity tests. Data analysis uses descriptive analysis and inferential analysis. The hypothesis testing technique uses Independent Sample t-test analysis. The research results showed that the average pre-test for the experimental class was 43.57, while the post-test was 83.93. The control class pretest average was 46.61, while the post-test was 58.04. The results of the independent sample t-test were obtained t-count= 3,187 > t-table= 1.674 with a significance value of 0.045 < 0.05. It can be concluded that the GNT (Guided Note Taking) learning model is effective in increasing students' mathematics learning creativity. To increase students' creativity in mathematics learning, teachers should use learning media to build students' creativity concepts in visualizing the material being taught

Introduction

Education is a key factor in reducing poverty and social inequality in society (Gatzov P, 2020). Education is a powerful force in bringing society in a better direction (Babalola, 2020). (Tunku Ahmad, 2019) explains that education must be seen as a process of personal growth and development, not just a tool to achieve goals. To foster student creativity, education must be tailored to individual abilities, taking into account students' interests and goals (Tunku Ahmad, 2019). As time goes by, education has become an important field of knowledge for humans, which can be obtained by studying both at school and in tutoring places. Education is not just about acquiring knowledge, but also skills for living life and

forming a personality (Ravikumar, 2022).

Schools as educational institutions have an important role in the educational process, as a means of organizing training and also as a means of developing the potential of participants education (Дзятковская, 2023). Schools play an important role in developing knowledge for all citizens (Saputra, A, 2021). To support the advancement of student creativity, schools must think about student needs and prepare work plans that must be carried out (Manci I. 2018). School management is important because schools are institutions that provide opportunities for students to develop cognitive, affective, psychomotor, behavioral, and social abilities (Aypay, 2017; Faizah, 2020). (Aypay, 2017) reminded that school can be a source of stress for students which leads to emotional problems, academic problems, behavioral problems, and also students' interpersonal problems. So it requires a big role and influence from a professional teacher with good competence in shaping students' personalities (Novitasari, 2022; Cassum, 2015). Schools in carrying out the teaching and learning process have an important role in transferring knowledge and skills from teachers to students (Munna & Kalam, 2021). This role is expected to produce quality people in the fields of knowledge, skills, and attitudes (Pleimaget, 2019).

Teaching and learning process activities in schools should provide opportunities for students to carry out active learning activities (Abdullah, 2017; Kirom, A. 2017). To create an active learning atmosphere, teachers are required to create an atmosphere that can involve students through appropriate and suitable learning methods (Abdullah, 2017; Badar & Bakri, 2022). Choosing the right learning model will make it easier for students to receive material that suits the goals they want to achieve (Warsita, 2018). Through the material received by students Practically, it will make it easier to obtain knowledge that can encourage one's creativity. Teachers can use creative and varied learning so that students can attract students' attention when the teacher provides the material being taught.

Mathematics learning is related to what and how students can solve problems based on their thoughts. Mathematics is a field that has an important role in education. Mathematics is found in almost every subject in school (Naufalia, A et al, 2019), such as physics, chemistry, economics, biology, and even in Indonesian language lessons. However, this does not make mathematics an interesting subject, let alone fun for students. This is in line with the opinion of (Widodo et al., 2015) which states that Mathematics is considered a difficult subject and is less popular because students judge Mathematics as an abstract and boring subject. So the lack of student interest makes students' Mathematics subject scores low.

Based on the results of the average Computer-Based National Examination (UNBK) score obtained at SMP 4 Negeri Baubau for the 2019/2020 academic year, the average Computer-Based National Examination (UNBK) score for Mathematics is 46.56. The student's average score was lower than the score for the 2018/2019 academic year, namely 53.42. Apart from that, based on the results of observations on December 4 2021 regarding the learning process and learning models used, especially for class VII students at SMP Negeri 4 Baubau. The learning process is carried out using a limited face-to-face offline system, with the learning model used being the Teacher Center. However, from the learning process, only 10 out of 29 students in the class often asked questions and actively answered

questions Teacher. Meanwhile, as a result of obtaining test scores from 29 students per class, only 11 students obtained scores above the KKM (Minimum Completeness Criteria), which is more than equal to a score of 75. Based on this, it can show that students' mathematical knowledge and activeness are still lacking, which means the goal of learning has not been fully achieved. Therefore, this learning model is still less effective. Teachers must be able to collaborate the learning models that have been used with other learning models so that they can support student creativity. Pratiwi, et al (2015) argue that teachers are required to be more creative in conveying the material to be taught, for example when choosing learning models, methods, and media that are appropriate and not monotonous so that students are interested and more motivated to follow the learning process to completion.

Learning-*oriented* is what causes students' abilities to reason, communicate, and solve problems to not develop properly (Herman, 2010). According to (Sembiring et al., 2008) since Indonesia abandoned modern mathematics in 1970 which resulted in problematic school situations, concerns have emerged openly regarding the mathematics teaching process. These concerns are supported by several research results that show weaknesses in mathematics teaching in basic education, such as students' difficulties in understanding mathematical concepts, difficulties in building and solving mathematical representations of contextual problems, teachers' teaching styles that are difficult for students to learn and understand, which gives rise to students' fear of mathematics (Haji, 1994). These teaching weaknesses then have an impact on the results of the National Examination (UN), which always makes mathematics the subject with the lowest score (Kemendikbud, 2017). Most students who solve mathematical problems only do what the teacher gives them without any creativity in their work (Adriani et al., 2022). Apart from that, there is a lack of variety in the models used by teachers, students do not pay attention to the teacher's explanations, and students' lack of interest in learning results in students' lack of creativity in learning (Arini & Surya, 2016).

Good learning outcomes require an appropriate learning model that will make students active both emotionally and socially (Putra Praditya & Haryana, 2020). Suprihatiningrum (2013) said that the learning model is a conceptual framework that can be described using systematic and varied learning procedures, which is useful so that students have a good learning experience so that students achieve the desired learning goals. This is in line with the opinion of Saefuddin, A & Bardati (2014) who say that a learning model is a conceptual framework that can organize a learning system that has the function of achieving a learning goal designed by educators in planning learning activities which become a guide when carrying out the learning procedure.

In achieving learning goals, learning creativity can be an indicator of student success in learning which plays an important role in achieving learning success. This is in line with Munandar (2012) who believes that student creativity is a priority benchmark and indicator of program goals or student learning targets. Students who have creativity in learning will be known by showing their level of creativity in various activities. They always want to solve or resolve problems, dare to take even difficult risks, and believe in themselves.

Sumidral (2018) stated that creativity is very important in student learning because creativity is something that is universal and is a characteristic aspect of the world of life around us. Student learning creativity will influence the student's learning conditions Saputra (2020) so that it will have an impact on student learning outcomes which include students' cognitive, affective, and psychomotor aspects (Adriani et al., 2022). Creativity in learning mathematics is by solving mathematical problems in many ways, both to create new solutions and to see relationships with existing solutions. Students' creativity can be seen when they try to find alternative answers to solve a problem (Makmur, 2016). In the learning process at school, students will have difficulty solving problems in the form of new questions that require solving in new ways that require creativity (Budiarti & Jabar, 2016).

One learning model that can overcome this problem is by using the GNT (Guided Note Taking) cooperative learning model. Suprijono (2012) states that GNT (Guided Note Taking) is a learning model that uses charts, and schemes (handouts) as media that can help students take notes when a teacher is delivering a lesson. According to (Silbermen, 2007; Sulistyoningrum et al., 2012; Junaidah, 2022) the Guided Note Taking learning method is one of the active learning methods chosen to help deliver teaching material using handouts/teaching materials. This learning is used by teachers to get students' concentration and attention to be active and creative, especially in classes with quite a lot of students. The steps for the GNT learning model according to Junaidah (2022) which summarizes the opinions of experts are 1) The teacher provides teaching materials in the form of student handouts, 2) The teacher leaves the important points in the handout blank, 3) The teacher explains to the students that the empty parts, 4) the handout is deliberately made so that they concentrate on following the lesson, 5) During the lecture the teacher asks the students to fill in the blanks, 6) After delivering the lecture material, the teacher guides the students to read the results of the handout in front of the class.

In supporting students' creativity in learning mathematics, the advantages of applying the GNT learning model are a) in this learning there is a narrative summary of the material, and b) this learning model is easy to use for material that tests cognitive abilities. Through these steps and their advantages, it is hoped that students can make the learning process more meaningful and give a more interesting impression to themselves. Students will be more easily motivated and more active in showing their level of creativity and learning goals can be achieved. Especially for junior high school students, it is very suitable, because they are in a period of building and strengthening their creativity to prepare them for the next level of knowledge.

Method

This research was conducted using a quasi-experimental approach. The research was carried out at SMP Negeri 4 Baubau in the even semester of the 2021/2022 academic year. The research subjects were students in classes VII9 and VII10 with 28 students in each class. Technique

Data collection is carried out by using tests. The test is used to describe students' creative abilities in flat-sided geometric material. Learning outcomes are obtained through evaluation tests in the form of *pre-tests* and *post-tests*. Before being used in sample classes, the two tests had met the criteria for

validity and reliability.

The indicators for knowing students' creativity in solving mathematical problems according to Silver (1997) are indicated by fluency, flexibility, and novelty. (Krisnawati, 2016) explains these three aspects: 1) fluency refers to the correctness and diversity of answers given by students, 2) flexibility aspect refers to different ways given by students in solving problems, and 3) novelty aspect refers to the answers given unusual for the student's general level of knowledge or can also refer to a new way that the student displays.

Furthermore, creativity abilities in a person's mathematical thinking. According to Siswono, E.Y.T (2009), creativity is divided into 5 levels, namely, level 4 (very creative), level 3 (creative), level 2 (quite creative), level 1 (less creative), and level 0 (not creative). The explanation can be seen in Table 1.

Table 1. Levels of creativity and their characteristics

Value	Step	Characteristics
4	Very Creative	Students can show fluency, flexibility, and novelty in solving problems
3	Creative	Students can show fluency and novelty or fluency and flexibility in solving problems
2	Quite Creative	Students can show novelty or flexibility in solving problems
1	Not creative	Students can show fluency in solving questions
0	Not creative	Students are not able to show the three aspects of the indicators to solve the problem

Interpreting tables from (Richardo et al., 2014)

There are 2 test analyses used, namely descriptive analysis and inferential analysis. In inferential analysis, because it uses random samples before hypothesis testing is carried out, prerequisite tests such as normality and homogeneity tests are first carried out, then hypothesis testing is carried out. Based on data analysis using SPSS For Windows 22, the normality test shows that the data is normally distributed. Meanwhile, the homogeneity test on the pre-test data shows that the variance comes from homogeneous groups. In this study, homogeneity testing was used *Levene Test* through the program *for Windows 24*. Meanwhile, in the post-test data, homogeneity testing was carried out, and heterogeneous data was obtained. So it is suspected that the two research classes, namely the experimental class and the control class, after being given treatment showed different results.

Results

This type of research is a quasi-experiment (*quasi-experiment)* in a good sense the sample is randomized. application of the GNT learning model *(Guided Note Taking)* in the experimental class and applying a direct learning model *(Teacher Center)* in the control class was also randomized. This research was conducted to determine the level of student creativity both before and after implementing GNT learning *(Guided Note-taking)*. The selected sample is Class VII.10 as the experimental class and class VII.9 as the control class. The scoring criteria for each question that the researcher prepared follows the criteria in the table above which is then converted to an interval value of 0-100.

This research began by administering a pre-test regarding students' mathematics learning creativity in both the experimental class and the control class. This test aims to determine initial abilities before being given treatment. The average initial ability of students in the experimental class and control class is still low, namely 43.57 and 46.61 respectively. To improve students' creativity in learning mathematics, learning activities were carried out in four meetings. In the control class, conventional learning was carried out, while in the experimental class, the GNT learning model was applied.

The results of observations of student activities in the experimental class during the implementation of GNT learning obtained the following data. At meeting 1, it was found that student activity based on the observation sheet was 27 or 51.92% of active students. At the second meeting, the score for student activity based on the observation sheet was 32, or 61.53% of students were active. At the 3rd meeting, the activity gain score based on the observation sheet was 38 or 73.07%. At the 4th meeting, the activity gain score based on the observation sheet was 46 or 88.46%. From these observations, it can be seen that student activities are getting better at each meeting. Increasing student learning activities by implementing GNT learning by teachers is in line with improving learning outcomes (Novianti, 2016). Students' active learning through GNT learning is motivated by integrated guidance through notes prepared by the teacher (Safitri E, 2017; Junaidah 2022).

The results of observations of learning management by teachers in experimental classes during learning obtained the following data. At the first meeting, the score for implementing GNT learning by the teacher based on the observation sheet was 30 or 57.69%. At the second meeting, it was 36 or 69.23%. At the third meeting, it was 39 or 75%. At the fourth meeting, it was 43 or 82.69%. From the results of these observations, it can be seen that the implementation of GNT learning by teachers is getting better at each meeting. Increasing the application of GNT learning by teachers is in line with improving learning outcomes (Novianti, 2016). Integrated handouts/notes prepared by active teachers have a positive impact on the smooth running of learning activities (Safitri E, 2017; Junaidah 2022).

Furthermore, the results of the descriptive analysis of students' mathematical creativity learning abilities in the experimental class can be seen in Table 2.

Table 2. Descriptive Statistics Data*Pre-test* and *Test* Experimental Class

		Pretest	Postest
N	Valid	28	28
	Missing	0	0
Mean		43.57	83.93
Std. Error of Mean		3.899	3.530
Median		40.00	85.00
Mode		40	80
Std. Deviation		20.632	8.676
Variance		425.661	348.810
Range		70	85
Minimum		5	15
Maximum		75	100
Sum		1,220	2,350

From the results of descriptive analysis of data obtained through *the* students' mathematical learning creativity was tested, in the experimental class, an average score of 43.57 was obtained, while the average *post-test* amounted to 83.93 after using the GNT learning model *(Guided Note-Taking)*. Based on the results of the average creativity abilities of students in the experimental class in the table above, the pretest results are 43.57 while the post-test results are 83.93. If these two values are converted to the level of creativity criteria, it shows that the average student in the experimental class before being given treatment meets the criteria $\frac{43,57}{25} = 1,74 = 2$ means category quite creative. Meanwhile, after being given GNT treatment, the experimental class met the criteria $\frac{83,93}{25} = 3,35 = 3$ which means creative. Using the Guided note-taking method can improve student learning outcomes (P. Sare K, Sa'o S, Taga G, 2023).

Next, the calculation of the increase using N-Gain in the mathematics learning creativity of class VII students at SMP Negeri 4 Baubau in the experimental class is carried out, as in the following table

Table 3. Recapitulation of N-Gain Calculations for Students' Mathematics Learning Creativity

N	Difference Average	Ideal Value	N-Gain Calculation	N-Gain Criteria
28	40,36	100	0,72	High

Based on the table above, it shows that the average increase in students' mathematical creativity learning abilities in the experimental class is included in the high criteria with an average value of 0.72. This result is supported by the results of research conducted by (Novianti, 2016) who said that the GNT learning model improves student mathematics learning outcomes.

Furthermore, the results of the pre-test and post-test descriptive analysis in the control class are presented in the following table

Table 4. Descriptive Statistics DataPre-test and Test Control Class

		Pretest	Postest
N	Valid	28	28
	Missing	0	0
Mean		46.61	58.04
Median		40.00	60.00
Mode		40	60
Std. Deviation		21.690	17.070
Variance		470.470	291.369
Range		70	65
Minimum		5	15
Maximum		75	80
Sum		1,305	1,625

The results of the descriptive analysis were obtained *by testing* students' creativity in learning

mathematics, in the control class an average score of 46.61 was obtained *post-test* amounted to 58.04 after using the learning model *Teacher Center*. Based on the results of the average creative ability of students in the control class above, the pretest results were 46.61 while the post-test results were 58.04. If these two scores are converted to the level of creativity criteria, it shows that on average the control class students before being given treatment met the criteria $\frac{46,61}{25} = 1,86$ rounded to 2 means it is in the quite creative category. Meanwhile, after being given the treatment, it meets the criteria $\frac{58,04}{25} = 2,32$ rounded to 2 which means sufficient creativity. This shows there is no difference. Conventional learning cannot provide learning results that are comparable to group learning (Nuraisah et al., 2016; Bunga et al., 2016).

Next, an increase in the N-Gain calculation of mathematics learning creativity for class VII students at SMP Negeri 4 Baubau in the control class is carried out, as in the following table.

Table 5. Recapitulation of the N-Gain Calculation for Students' Mathematics Learning Creativity

N	Difference Average	Ideal Value	N-Gain Calculation	N-Gain Criteria
28	11,43	100	0,21	Low

Based on the table above, it shows that the average increase in students' mathematical creativity learning abilities in the experimental class is included in the high criteria with an average value of 0.21. This result is supported by the results of research conducted by (Bunga et al., 2016).

Based on the results of the descriptive analysis of the two classes, both the pretest and post-test above, it is not enough to describe the significance of increasing students' mathematical learning creativity abilities, therefore hypothesis testing must be carried out. In hypothesis testing, the results of the pre-test and post-test in the control class and experimental class will be compared to determine whether there has been an improvement or not. Based on the results of the normality test and homogeneity test, it is known that the pret-test and post-test data The test meets the assumptions of normality and homogenity.

The normality test is used to see whether the data is normally distributed or not. The normality test used in this research is o*ne sample Shapiro-Wilk* Using a significance level of 0.05, data is declared to have a normal distribution if the significant value is >0.05. Based on calculation results using the help of the SPSS program *Windows 24* data obtained as in the following table**.**

Table. 6 Experimental Class Normality Test Results

Class		Shapiro-Wilk		
		Statistic	Df	Sig.
Result	Pretest	.933	28	.773
	Postes	.676	28	.100

a. Lilliefors Significance Correction

Based on the table above, the normality of data results from the control class students' creativity in learning mathematics using the normality test *Shapiro-Wilk* shows the significance value-*test*=0.520 and significance value *post-test* 0.530. Greater than α (0.05), which means the data is normally distributed.

Next, a homogeneity test is carried out to find out whether the data obtained has the same population variance or not. It is said to be homogeneous if the significance level is >0.05 (5%). Based on the results of calculations using assistance *SPSS for Windows 24* The following data was obtained:

Table 8. Pre-test Homogeneity Test Results

	Class	Shapiro-Wilk		
		Statistic	Df	Sig.
Result	Pretest	.899	28	.520
	Postes	.656	28	.534

a. Lilliefors Significance Correction

Based on the table above, the normality of data results from the control class students' creativity in learning mathematics using the normality test *Shapiro-Wilk* shows the significance value-*test*=0.520 and significance value *post-test* 0.530. Greater than α (0.05), which means the data is normally distributed.

Next, a homogeneity test is carried out to find out whether the data obtained has the same population variance or not. It is said to be homogeneous if the significance level is >0.05 (5%). Based on the results of calculations using assistance *SPSS for Windows 24* The following data was obtained:

Table 8. Pre-test Homogeneity Test Results

Levene Statistic	df1	df2	Sig.
2.135	1	54	.150

Based on the table for homogeneity testing, the data on the results of students' pre-test mathematics learning creativity results shows a significance value of 0.150 which is greater than α (0.05), which means the data is said to be homogeneous.

Tabel 9. Post-test Homogeneity Test Results

Levene Statistic	df1	df2	Sig.
7.128	1	54	.012

Based on the table above for homogeneity testing, the post-test student mathematics learning outcomes data shows a significance value of 0.012 which is smaller than α (0.05), the data is said to be no. Next, to find out the difference in increasing students' creativity in mathematics learning between the

experimental class and the control class, an average difference test was carried out on the post-test results of the two classes. This is based on the same initial capabilities. Look at the table below

Table 10. Independent Sample *T*-test

		Lavene'e Test for Equality of Variances			
		F	Sig.	*T*	Df
Post-Test	Equal Variances assumen	3,241	0,000	3.187	54
	Equal Variances Not assumen			3.187	53,765

Based on the table of independent sample t-test data results *from post-t*est in the experimental class and control class using SPSS *for Windows 24* t value is obtained = 5,342 regarding the $_{table}$ with a significance level of 95% with a value of $\alpha = 0.05$ and df = $(n_1 + n_2)$ -2 =56-2=54 obtained stable mounting to 1.671. The results of the independent sample t-test show that t count > t table (3.187> 1.674) then H_0 rejected means that the increase in creativity in students' mathematics learning using the GNT learning model is significantly better than conventional learning. In line with research conducted (Sulistyoningrum et al., 2012) shows that the GNT strategy is more effective compared to conventional methods.

The results of the analysis obtained can be explained that in learning with the application of the GNT learning model *(Guided Note Taking)* students respond more to the material being taught, students do not find it difficult to follow the learning steps using the GNT (Guided Note Taking) learning model. Guided notes prepared by the teacher are prepared with the answers still left blank. This arrangement of answers encourages students to think for themselves, discover for themselves, and be creative in finding answers. Each answer presented by Sometimes students is different from one another, but the answers presented lead to one correct and correct answer. Students play an active role in learning activities because students are required to fill in *handouts* given by the teacher. This encourages students to participate more actively in the learning process (Sulistyoningrum et al., 2012; Novianti, 2016; Safitri E, 2017; Junaidah 2022; P. Sare K, Sa'o S, Taga G, 2023).

Discussion

Based on the results obtained, researchers have found that student activities in meetings 1 to 4 in the implementation of GNT learning have received a very good response. This can be seen from the results of the analysis of the application of GNT learning to students and also their learning outcomes. This is because when implementing GNT learning the teacher prepares teaching materials in the form of handouts and provides intense guidance. The contents of the handouts prepared by the teacher require students to work independently and the steps for solving them are well structured to solve the questions prepared, students just need to use their creativity to fill in the handouts prepared by the teacher. This makes it easier for students to get answers to the questions provided by the teacher in class. From the

question-solving activities at the Handout, students felt interested and provoked to conquer the existing questions. So that the implementation of GNT learning in the classroom makes students active, serious, and enthusiastic in filling in answers to the questions in the teacher's handout. The handouts given by the teacher are a medium for training students' thinking skills. According to (Tria Mardiana et al., 2023), the application of media in learning can facilitate the transfer of information. The ease of information received by students through handouts prepared by the teacher is in the form of material summaries and also steps for solving questions that have been prepared.

So the application of the GNT learning model as proposed by the experts above, including GNT learning, can activate students in learning activities in the classroom. In the learning process in the classroom, the teacher always supervises and guides the learning activities in the class and occasionally the teacher provides intense guidance to students who ask questions and are unable to solve the questions themselves. Many students ask questions during GNT learning activities, and most of the students' questions are to check the answers written. Students prepare themselves before presenting their answers in front of the class by first checking their correctness through the guidance given by the teacher in class. From the results of student learning and the results of teacher observations that take place in the classroom, there has been an increase in activity at each meeting. To achieve the percentage of complete application of classical GNT learning. Based on the results of the students' handout work, the teacher invites students to think at a higher level, because creativity in learning mathematics is part of high-level thinking. According to (Susilo, et al, 2023) that the Industrial Revolution 4.0 requires various parties to develop their potential, including in the field of education. Students' abilities and thinking abilities are one of the aspects that support the achievement of educational goals.

Conclusion

Based on the results of data analysis, it was concluded that the GNT learning model *(Guided note-taking)* effectively increased the creative learning abilities of class VII students at SMP Negeri 4 Baubau on flat-sided geometric material.

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