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IMPROVEMENT OF CREATIVITY IN MATHEMATICS STUDENTS THROUGH THE AUDITORY INTELLECTUAL REPETITION (AIR) LEARNING MODEL

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Abstract:
This study aims to determine the increase in students' mathematical creativity through the auditory, intellectual, repetition (AIR) learning model in class XI students of SMK Techno Terapan Makassar. Creativity referred to in this study pays attention to 3 aspects of indicators, namely fluency, flexibility, and novelty. This research is research class action (PTK). The subjects of this study were students of class XI at SMK Techno Terapan Makassar. The results showed that there was an increase in creativity in learning mathematics through the auditory, intellectual, repetition (AIR) learning model. Student test results seen based on the percentage per indicator increased from cycle I to cycle II seen in the aspect of fluency 66.66% increasing to 81.48%, the aspect of flexibility 62.96% increasing to 77.78%, and the novelty aspect increasing 33.33% to 48.14%. the learning completeness criteria in cycle I was 55.55% and classically complete in cycle II was 77.77% or as many as 22 people who scored ≥ 75. Data from the analysis of teacher activity in cycle 1 increased by 60.42% to 72.90% while the results of student activity analysis in cycle 1 amounted to 56.26% increased to 70.92%. From the research results obtained, it can be concluded that the Auditory, Intellectual, Repetition (AIR) learning model can increase the mathematical creativity of class XI students of SMK Techno Terapan Makassar.

Keywords: Creativity Mathematics, Auditory Intellectual Repetition

PENINGKATAN KREATIVITAS MATEMATIKA SISWA MELALUI MODEL PEMBELAJARAN AUDITORY INTELLECTUALY REPETITION (AIR)

Abstrak:
Penelitian ini bertujuan untuk mengetahui peningkatan kreativitas matematika siswa melalui model pembelajaran auditory, intellectual, repetition (AIR) pada siswa kelas XI SMK Techno Terapan Makassar. Kreativitas yang dimaksud dalam penelitian ini memperhatikan 3 aspek indikator yaitu kelancaran, keluwesan, dan kebaruan. Penelitian ini adalah penelitian tindakan kelas (PTK). Subjek penelitian ini adalah siswa kelas XI SMK Techno Terapan Makassar. Hasil penelitian menunjukkan adanya peningkatan kreativitas pada pembelajaran matematika melalui model pembelajaran auditory, intellectual, repetition (AIR). Hasil tes siswa dilihat berdasarkan persentase

per indikator meningkat dari siklus I ke siklus II terlihat pada aspek kelancaran 66,66% meningkat menjadi 81,48%, aspek keluwesan 62,96% meningkat menjadi 77,78% dan aspek kebaruan 33,33% meningkat menjadi 48,14%. Kriteria ketuntasan belajar pada siklus I yaitu 55,55% dan tuntas secara klasikal pada siklus II sebesar 77,77% atau sebanyak 22 orang yang memperoleh nilai ≥ 75. Data hasil analisis aktivitas guru pada siklus 1 sebesar 60.42% meningkat menjadi 72,90% sedangkan hasil analisis aktivitas siswa pada siklus 1 sebesar 56,26% meningkat menjadi 70,92%. Dari hasil penelitian yang diperoleh maka dapat disimpulkan bahwa model pembelajaran auditory, intellectual, repetition (AIR) dapat meningkatkan kreativitas matematika siswa kelas XI SMK Techno Terapan Makassar.

Kata Kunci: Kreativitas Matematika, Auditory Intellectually Repetition

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INTRODUCTION

Mathematics is a learning concept that starts from material that exists so that at higher stages the concept is taught again in a wider form by using the notation that is more commonly used in learning mathematics (Nindiasari, 2011; Firmansyah, 2015). Learning mathematics today is a top priority both at the high school and vocational high school level because mathematics is one of the mandatory requirements for graduation in the final exam at each level so a paradigm emerges that makes mathematics a difficult subject and is often considered difficult. scourge by students (Anurahman, 2016; Huliatunisa, Wibisana, & Hariyani, 2019). This is a challenge for a teacher in preparing innovations to increase student creativity which is the main factor in achieving success in learning (Santoso, Widodo, & Sri, 2014 ; Sriwongchai, 2015).

Creativity is needed by students in learning. This can be done by inviting students to actively express ideas and be able to respond to the material being studied so that students are not only motivated by the material presented by the teacher but can develop the material being studied. (Saefudin, 2012). However, in reality, many students are silent when asked questions given by the teacher and few students dare to express their opinions. Thus, in such a situation, a pleasant learning condition is needed for students

and can foster student creativity in learning, especially in mathematics (Leikin & Pitta-Pantazi, 2013; Mursidik, Samsiyah, & Rudyanto, 2015).

Creativity is an individual mental process that gives birth to new ideas, processes, methods, or products that are imaginative, aesthetic, flexible, integration, successive, discontinuity, and differentiation which are useful in various fields for solving a problem (Budiarti, 2015). Creativity is defined as four aspects, namely: (1) creativity is defined as a power or energy that exists within the individual, (2) creativity is defined as a process. Creativity is the process of managing information, doing things,s and making things. Third, creativity is a product. Fourth, creativity is defined as a person (Qulub & Manoy, 2020). This creativity is not addressed to the product the process or the energy. Creativity is interpreted in the individual.

Divergent thinking ability is an indicator of creativity and can be seen from the characteristics of creative children covering two aspects, namely cognitive aspects and affective aspects. The cognitive aspect has the characteristics of aptitude, which are characteristics related to the ability to think creatively, which is characterized by the presence of certain skills, including fluency thinking skills, flexible thinking skills (flexibility), original thinking skills (originality), elaborating skills (elaboration) (Dosinaeng, 2019).

Table 1. Characteristics of Creativity Indicators

Level	Characteristics
Level 4 (very creative)	Students are able to show fluency, flexibility, and novelty with flexibility in solving problems and posing problems
Level 3 (Creative)	Students are able to show fluency, novelty or fluency and flexibility in solving or showing problems
Level 2 (pretty creative)	Students are able to show fluency or flexibility in solving problems and posing problems.
Level 1 (less creative)	Students are able to show fluency and pose problems
Level 0 (not creative)	Students are not able to show the three aspects of the indicator

Source: (Effendi & Farlina, 2017; Novianti & Yunianta, 2018)

Based on the results of initial observations with mathematics teachers at the Applied Techno Vocational School in Makassar, researchers found the existing problem, namely the lack of active learning from students, in this case, because the learning process was still teacher-centered and slightly involved students, and mathematical creativity was still lacking so that it still needed to be improved, this problem can be seen when students work on math problems, students only rely on the examples given by the teacher. Most students do not have a different way of being taught. If the questions given are different from the examples given previously, students have difficulty solving the questions given. As a result, students' creativity does not develop, and this affects their mathematical values.

Based on these problems, appropriate solutions are needed to increase student's mathematical creativity by seeking to improve the learning process and one of the solutions offered is to apply the right learning model, one of the learning models that are considered to reduce or overcome existing problems is using the auditory learning model, intellectually, repetition (AIR).

The auditory, intellectual, repetition (AIR) learning model is a learning capital that has 3 aspects, namely absorption and speaking (auditory), thinking processes and creating ideas based on their intelligence (intellectually), repetition by giving assignments or quizzes with the aim that students can improve reasoning and can draw their conclusions on the material presented by the teacher (repetition) (Puspitawedana, Sujadi, & Harini, 2014; Manurung, 2016). One of the learning theories that support the AIR learning model is Thorndike Theory. This theory reveals the law of exercise, which states that the stimulus and response will have a relationship with each other strongly if the process of repetition occurs frequently. The more repeated activities are carried out, the relationship that occurs will be more automatic (Rahayuningsih, 2017 ; Simanjuntak, Hia, & Manurung , 2019).

There have been many previous studies on creativity and this auditory intellectually repetition (AIR) learning model but only limited to focusing on students, without paying attention to teacher activities, because if explored further, before training students in creativity, the teacher should first design stimuli that will stimulate students' thinking power to be more creative. Creative students certainly come from creative learning and creative learning comes from creative teachers.

Based on the description of the background, the researcher is interested in conducting a research study with the title Increasing students' mathematical

creativity through the auditory intellectually repetition (AIR) learning model in Class XI students of SMK Techno Terapan Makassar.

RESEARCH METHOD

This type of research is classroom action research using the auditory intellectual repetition (AIR) learning model. This research was carried out in two or more cycles in accordance with the achievements to be improved in the learning process. Each cycle consists of four stages, namely: 1) planning, 2) implementation, 3) observation, 4) reflection, (Salahudin, 2015).

The subjects and objects of the research were class XI students of SMK Techno Terapan Makassar consisting of 27 students consisting of 21 male students and 6 female students. While the object under study is mathematical creativity which consists of 3 aspects of indicators namely fluency refers to how students understand or analyze, and correctly identify questions given by the teacher, then the aspect of flexibility indicators is the ability of students to give answers to questions according to concepts or orders with appropriate solutions. Different, and the aspect of the novelty indicator refers to the ability of students to answer mathematical problems in new or unusual techniques or ways.

To obtain data, researchers used data collection techniques that were by the problems studied, namely student creativity tests, and observation sheets. The student creativity test is used to see the extent to which students' creative abilities take into account three indicators, namely fluency, flexibility, and novelty. Meanwhile, student observations were carried out to determine students' creativity in learning mathematics using the auditory intellectually repetition *(*AIR) learning model which was carried out at the end of each cycle.

The data analysis technique used in this study was carried out in 2 stages, namely with qualitative descriptive techniques and quantitative descriptions. This is because the data obtained are based on the results of teacher and student observations in the form of explanations or information in the form of qualitative data, while the data obtained based on test results are in the form of numbers in the form of quantitative data. Therefore, the qualitative and quantitative data were analyzed using comparative descriptive analysis by comparing the conditions of the cycle I and cycle II, so that it can be seen the increase in student creativity through the auditory intellectual repetition (AIR) learning model.

RESULTS AND DISCUSSION

The study in which the writer is typing study action class (PTK) can be said as an effort or an action taken by researchers to solve learning problems. Classroom action research this held in class XI SMK Techno Terapan Makassar held in two cycles. Each cycle is carried out in 4 meetings each, with 3-time meetings used as process learning and 1-time meeting evaluated at the end of each cycle. The following table increases then test scores in creativity cycle I and cycle II.

Table 2. Test Scores in Creativity Cycle I

Aspect	Cycle I			
Smoothness		11,11 %	22,22 %	66,66 %
Flexibility	7,41 %	18,51%	11,11 %	62,96 %
Novelty	37,03 %	29,63%	33,33 %	

Table 3. Test Scores in Creativity Cycle II

Aspect	Cycle II			
Smoothness		7,41 %	11,11%	81,48 %
Flexibility	7,41 %	3,7 %	11.11 %	77,78 %
Novelty	18,52 %	33,33 %	48,14 %	

1. Aspects of Creativity Indicators in Categorizing Abilities in Cycles I And II Increased Through The Auditory, Intellectual, Repetition (AIR) Learning Model

a. Fluency Indicator Aspect

Based on the analysis of the average score indicators of student creativity at each level consisting of levels of not creative, less creative, creative, and very creative data obtained in the first cycle there are no students who are at the level of not creative, 3 students are at the level of less creative or as much as 11.11% then 6 students are at the creative level or as much as 66.66% and as many as 18 students who are able to reach the very creative category or as much as 66.66%. Furthermore, in the second cycle, data was obtained that there were no students who were at the uncreative level, 2 students, or 7.41% were at the less creative level and 3 students were at the creative level, or 11.11%, then 22 students were at the creative level. Very creative level or as much as 81.48%. Based on these data, it can be concluded that in terms of overall fluency indicators, it can be said that there is an increase.

b. Aspects of Flexibility Indicators

Based on the analysis of the average score indicators of student creativity at each level consisting of levels not creative, less creative, creative, and very creative data obtained in cycle I yes it consists of 2 students or 7.41% are at the uncreative level, 5 students or 18.51% are at the less creative level, 3 students or 11.11% are at the creative level and 17 students or as much as 62.96% were able to reach the very creative level. Furthermore, in the second cycle, data obtained from 2 students, or 7.41% were at the uncreative level, 1 student, or 3.7% was at the less creative level, 3 students, or 11.11% were at the creative level and 21 students, or 77.78% were able to reach the very creative level. Based on the data obtained, it can be concluded that the overall flexibility indicator aspect has increased.

c. Aspect Indicator of Novelty

Based on the analysis of the average score indicators of student creativity at each level consisting of the level of not creative, less creative, creative, and very creative data obtained in the first cycle which consists of 10 students or 37.03% are at the level of not creative, 8 students or as many as 29, 63% are at a level less creative, then 9 students are at the creative level or as much as 33.33% and there are no students who are at the very creative level. Furthermore, in the second cycle, the data obtained consisted of 5 students or as much as 18.52% were at the uncreative level, and 9 students, or as much as 33.33% were at the non-creative level. Less creative, then consists of 13 students who are at the creative level or as much as 48.14% and there are no students who are at the very creative level. Based on these data, it can be concluded that in the aspect of the novelty indicator as a whole, it can be said that there is an increase even though there are no students who can reach the very creative level.

2. Percentage of Observations of Teacher Activities and Student Activities

a. Teacher Activity

Observations of learning by the teacher were carried out for three meetings, where several changes were noted in the teacher's activities during the research. In this study, the bearer of the material is the researcher himself, because the subject teacher requests that the researcher himself carries out the material or as a teacher so that the one who acts as a researcher observer is assisted by one of the mathematics teachers at the school. From the results of

the analysis of teacher activity data above, the average cycle I obtained was 60.42% in the moderately active category, while the results of the data analysis on teacher activity in the second cycle obtained an average of 72.97% belonging to the active category. Cycle II is in the active category, which means an increase through the application of the auditory intellectual repetition (AIR) learning model.

b. Student Activities

The results of the analysis of student activity data obtained that the average cycle I was 56.25% in the less active category, and the average student learning activity in the first cycle was still many students who were less active and less cooperative. This needs to be considered for repair materials in the next cycle. While the results of the analysis of student activity in the second cycle increased to 70.92% so it can be concluded that there was an increase in student activity through the auditory intellectual repetition (AIR) learning model.

The success of increasing creativity is due to the application of the auditory, intellectual, repetition (AIR) Learning model which is done according to the syntax. According to Bonatua, Mulyono, and Febriandi (2021) the AIR Learning Model is a learning model that emphasizes 3 aspects, namely learning by listening, learning by thinking, and repetition which can fulfill the basic characteristics of a learning model where knowledge will grow and develop through direct experience, thus the ability students' creative thinking will be trained. The obstacle in this study was dealing with students with different characters so a more creative design of teacher activities was needed.

CONCLUSION

Based on the results of this study, it can be concluded that the auditory, intellectual, repetition (AIR) learning model, can increase students' mathematical creativity, in the linear program material for class XI SMK Techno Terapan Makassar, the increase can be seen in the student's Mathematics Creativity test in the first cycle testmand cycle II. Student creativity through the auditory intellectual repetition (AIR) learning model on linear programming material has increased from cycle I to cycle II, namely the fluency aspect of 66.66% increased to 81.48%, the flexibility aspect was 62.96% increased to 77.78% and the novelty aspect was 33.33% increased by 48.14%.

The results of observations of student activities through the Auditory Intellectually Repetition (AIR) learning model in cycle I showed that students were not fully active and did not dare to express opinions on problems in cycle I, with student activity at 56.26% and increased in cycle II the average percentage is 70.92% is in the very good category. And teacher activities from cycle I the average percentage of 60.42% is in a good category and the second cycle increases, namely 72.90% is in the very good category. The learning completeness criteria in cycle I was 55.55% and classically complete in cycle II was 77.77% or as many as 22 people who scored ≥ 75.

Based on the conclusions described briefly above, in this study, there are suggestions given by researchers, including for schools it is hoped that the school will support the creativity of teachers in choosing learning models or methods to improve student learning outcomes and mathematics creativity. one of which is applied in the classroom is the auditory, intellectually, repetition (AIR) learning model, then for teachers it is expected that to improve the quality of learning in the classroom teachers are expected to use the auditory, intellectually, repetition (AIR) learning model because by using this model students required to be active and creative both orally and in writing to increase students' mathematical creativity. Then for further research, this research should be used as a reference to improve the quality and quality of education. In the learning process in the classroom, students should pay more attention to student activity, providing stimuli that can make students interested in learning to be more creative in solving mathematical problems in everyday life.

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