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## The impact of implementing auditory intellectually repetition (air) learning model based on learning community for students' creative thinking skills

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**Abstract.** The aim of the research is to know the impact of implementing Auditory Intellectually Repetition (AIR) learning model based on learning community for student's creative thinking skill. The research subjects were Indonesian second-grade students of junior secondary school in class VIIIB as the experimental class and class VIIIA students as the control class. Quasi Experimental is used as quantitative research designs. Data collection methods are observation, pre-test, and post-test. Instrument testing and analysis were carried out before conducting tests to measure discriminatory power, difficulty level of test items, reliability, and validity. Analysis of the data in the affective and psychomotor domains used descriptive techniques, cognitive domains using prerequisite testing, similarity of initial ability averages, and hypothesis testing. The results show that the learning instrument has reached values above 4.0 so that they are declared valid and feasible to be used for the learning process with the aim of exploring students' creative thinking skills. The application of the AIR learning model based on learning community give a positive effect on the students' creative thinking skill. The average achievement aspect of student's creative thinking skills in the experimental class is higher than the control class.

### 1. Introduction

The development of this era forces the next generation to have good competencies which are globally competitive. The world change nowadays turns into industrial and education 4.0 revolution era, or we often called it as 21<sup>st</sup> century learning era, where information and technology become a basis of human life in all aspect, including the process of learning and all the aspect of education. The ability for thinking critically, solving problems and collaborating become a very substantial competency in welcoming the new era of this century [1]. One of the most important demands of the 21<sup>st</sup> century education era is the ability to think creatively [2-6]. That's why, building the students creative thinking is very urgent to be developed so that they are ready to enter this new era.

The purpose of mathematics learning is training students' thinking processes, especially the ability to think creatively. Creative thinking skills are the ability of a person to use his brain based on originality during the acquisition process to find new ideas and develop a creative thing in more details. In their learning activities in the classrooms, creative thinking ability should be trained and developed by the teachers. Teachers should invent and use proper learning method and models that able to grow the student's creative thinking skills [7]. Furthermore, the implementation of



collaborative learning and learning communities can be used to develop the ability of student to think more creative [8].

Student creativity in learning mathematics at school still tends to be weak. This is indicated by students who are only able to work on the questions as exemplified by the teacher. Students cannot do the test if the teacher extend the question. In addition, if given an open ended problem, students can only provide one solution. Whereas, the creative thinking which defined by Hobri *et al.*, [2] is the student's skills to obtain many possible ways and answers to investigate and accomplish the problem. This condition is caused by the selection of learning models that are still not appropriate to facilitate students' creative thinking processes. Various problems in mathematics learning include the way of teachers teach mathematics that is related to the methods of learning that are applied and the applications of mathematics in everyday life [9]. Through the design and process of active learning mathematics with fun, doing observation, asking, reasoning can develop the knowledge and creative thinking of students [10].

The teacher must create a conducive and pleasant learning atmosphere to be able to rectify students' creative thinking skills. One of the model of learning that can be used to increase students' creative thinking skills is AIR (Auditory, Intellectually, Repetition) [11]. The three aspects whis were emphasized by AIR learning model is Auditory, Intellectually and Repetition. Auditory means students learn by speaking, listening, listening, presentation, argumentation, expressing opinions and responding. Intellectually is learning by thinking, students are trained to solve problems, construct and apply. While repetition is a repetition that means deepening the way students are trained through assignments or quizzes. By giving assignments and quizzes students will be more trained in solving problems and responsible for their tasks [11]. The AIR learning model syntax, there are several stages thatthe delivery stage, the training phase and the result presentation. At the delivery stage, teachers provide contextual issues that stimulate students to guess. In the training phase, teachers direct and facilitate students to engage in intellectual activity packaged in group discussions (3-4 students) and in which students have the opportunity to express opinions, gather information, problems (auditory and intellectually). While at the results presentation stage, students are asked to conclude and apply new knowledge which is gained through the work of the problem individually (repetition) [12].

The implementation of the AIR learning model can be formed through a learning community to improve students' creative thinking skills. Learning-community is the result of lesson study. The aim of the learning community is improving the students' learning activities thus they can cooperate and collaborate collegiality [13, 8, 14]. The learning process involves both aspect, teacher and also student. They are one entity and cannot be separated from one another. Students and teachers can share their knowledge and acquire knowledge from one another [15]. Therefore, the lesson study application nowadays is expanded in the form of learning community. Thus, we often called it as LSLC (Lesson Study for Learning Community) [17]. LSLC teaches students to ivent a new things in groups, so that they can pay attention and care about each other. LSLC also makes sure that in the process of learning there are no student are left behind. The stages of lesson study can be described as a process: plan, do and see [15, 16].

The previous researches, Misnawati in [11] described the improvement of the student's character of responsibility and problem solving skills through the AIR learning model. Agoestanto *et al.*, [12] determine whether the AIR learning is effective towards students' mathematical reasoning ability. The differences of creative thinking ability between two classes where one class taught using conventional method and another class taught by implementing Mathematical problem posing based on LSLC also discussed by Fauziah *et al.*, [15]. The aim of this research is determining the impact of AIR implementation learning model based on learning community for students' creative thinking skills.

## 2. Methods

This research was using double design research, they were descriptive design and quasi-experimental design. The quasi-experimental design this was conducted by comparing the results of the pre-test and post-test in the experimental class and the control class. A descriptive design was used to obtain a real

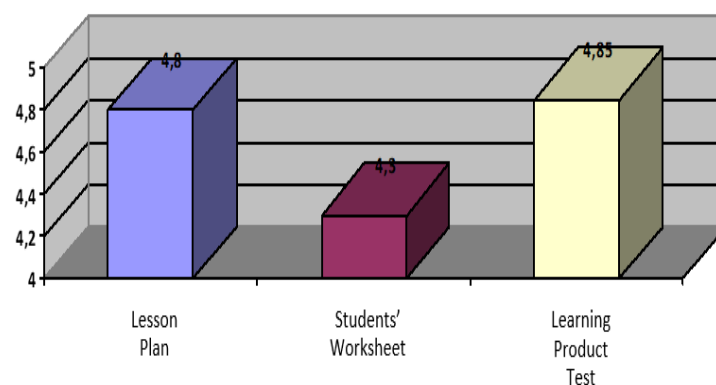
description of student creativity after learning using the AIR learning model. While the quasi-experimental design aimed to determine Influence the Auditory Intellectually Repetition (AIR) learning models based on learning community to students' creativity.

This research was conducted at MTs Negeri 1 Lumajang (State Madrasah Tsanawiyah 1 Lumajang, it is a junior high school) with the research subjects are 8A grade students as the control class and 8B students as the experimental class. Each class consist of 40 students in each class. The instruments used in this study were in the form of student observation sheets, pre-test, and post-test. The observation sheet was carried out by direct observation of the learning activities in the plan, do and see stages. At the beginning of the learning, students were given a pre-test to determine the level of students' creativity before learning took place in both classes.

Then the pre-test results were analyzed using the normality and homogeneity test. After the learning activities, the two classes were given post-tests in the form of descriptive questions which included indicators of the ability to think creatively. If the post-test data is distributed normally and homogeneous, then the independent sample t-test as a parametric test is carried out. But if the post-test data is normally distributed, then the nonparametric test is performed the Mann-Whitney test.

### 3. Results and Discussion

The first stage in this research is the plan stage. Before the experimental class and the control class were given a treatment, the research instrument was prepared, validated and revised. The validation process in this study was carried out by 3 validators consisting of 2 mathematics lecturers and a mathematics teacher. The validation results of the learning device and the instruments of research are shown in Figure 1 below.



**Figure 1.** Validation Result of Learning Devices

Based on Figure 1, we know that the average validation results of the three validators in the learning instrument have reached values above 4.0 namely, the lesson plan gets a value of 4.8, the Students' Worksheet gets a value of 4.3 and the Learning Product Test gets a value of 4.85. Therefore, the results of the validation show that the learning instruments developed are valid and feasible to be used for the learning process with the aim of exploring students' creative thinking skills.

The next stage is the of implementing learning with the AIR learning model based on learning community which consists of three meetings. The first meeting material is about drawing a graph of a straight line equation, the second meeting is the straight line equation gradient and at the third meeting is to determine the equation of a straight line. At the beginning of the learning, both control and experiment classes were given pre-tests with the aim of knowing the initial ability of the level of creativity before being given learning.

After pre-test in the control class and experimental class had been conducted, the next step was giving different treatments to the two classes. In the experimental class, learning was conducted using the AIR learning model based on learning community, while the control class was given conventional

learning. At the beginning of learning in the experimental class students were grouped into several groups consisting of 3-4 students in each group. In the AIR learning model based on learning community on the auditory stage, students together with group members discussed to solve a problem. At the stage of intellectual student analyzed problems with strategic planning to reward to creative idea. At this stage students were also asked to present the results of the work that had been discussed with the group members. The next stage was the repetition, the teacher was giving the task of stabilization through giving assignments or quizzes related to the topics discussed.



**Figure 2.** Students' discussion activities in the group

Based on Figure 2, we can see that the discussion activities in the experimental class were very different from the discussion of students in the control class. In the experimental class, student collaborative learning activities had run well compared to the control class. Student C interacted in the form of giving explanations to all of his friends in the group, while students A and D were also not shy to ask if there was anything he had not understood in the completion of the Student Worksheet. However, there was one student who was still embarrassed when asking, namely student B. However, in groups there had been a caring community so that all students in the group kept giving explanations to student B until the students understood the material well. Students with better ability will provide intensive assistance for low-ability students [2]. Therefore, in the experimental class, it appeared that learning communities had actually appeared in groups. With group discussion activities, they absorb more knowledge, increase the intensity of the thinking process, and have the learning experience to be used as new knowledge [12]. Whereas in the control class the learning community aspect was still not visible. Only interaction appeared in students K, L and N only in student discussions. While student M was ignored by his friend. M worked individually on student worksheets. While in the control class, the discussion that occurred just a discussion between students when the teacher asked something [12, 18].

Teachers can apply the AIR learning model as a variation and new innovation in learning because the Auditory Intellectually Repetition learning model facilitates students to be active in learning and is able to develop students' problem-solving abilities and is able to develop students' character responsibilities [19]. The application of the AIR learning model based on learning community has a positive effect on the students' creative thinking skill.

At the end of the learning, both the experimental class and the control class were given a post-test to determine the students' creative thinking skills after being given different learning. The following Table 1 shows the results of students' post-test in the control class and experimental class.

**Table 1.** Post-test Result

	N	Minimum	Maximum	Mean	Std. Deviation	Classical completeness percentage
posttest_experiment	40	65.00	100.00	85.0000	23.1818	85%
posttest_control	40	50.00	80.00	70.7	12.0138	70%
Valid N (listwise)	40					

In Table 1, it appears that the percentage of completeness of students in the experimental class is greater than the control class which is equal to 85% with the details of 34 students completed and 6 students still did not complete. While in the classical completeness control class of 70% with details there were 30 students completed and 10 students not complete. Result of the post-test was also analyzed by Kolmogorov Smirnov normality test to know if the data normally distributed or not. The result of Kolmogorov Smirnov normality test on experiment and control class is presented on Table 2.

**Table 2.** kolmogorov – smirnov normality test result

Class	Kolmogorov-Smirnov <sup>a</sup>		
	Statistic	df	Sig.
posttest_experiment	.121	40	.166
posttest_control	.113	40	.189

The data is normally distributed if the value sig. > 0.05. Based on Table 2, the result of the sig post-test on experiment class is 0.166 and control class is 0.189. It can be concluded that the posttest scores on both classes are normally distributed ( $p > 0.05$ ). After normality test analyzed, the next step is analyzing the independent sample t-test to know if there is significant influence the AIR learning model based on learning community to students' creative thinking skill. The result of independent sample t-test can be seen on Table 3.

**Table 3.** Data Analysis by independent sample t-test

Post-Test Result	
Mean Difference	12.61235
Std.Error Difference	2.5464
Df	40
Sig. (2-tailed)	.000

Based on the Table 3, the result of analyzing test by independent sample t-test reveal that the significant value for the post-test result is 0.000 ( $p < 0.05$ ). It means that there is a significant influence of the Auditory Intellectually Repetition (AIR) learning model based on learning community to students' creative thinking skill.

The assessment of pre-test and post-test results in the experimental class and control class was carried out based on the indicators of students' creative thinking skill which included three aspects, namely fluency, flexibility and originality. Table 4 shows the level of students' creative thinking skills.

**Table 4.** The level of creative thinking skills

No.	Fluency	Flexibility	Originality	Creative thinking levels
1	-	-	-	Not Creative
	√	-	-	
2	-	√	-	Less Creative
	-	-	√	

	√	√	-	
3	√	-	√	Creative Enough
	-	√	√	
4	√	√	√	Very Creative

Based on criterion on Table 4, the levels of students' creative thinking skills can be classified into four groups, they are not creative, less creative, creative enough and very creative. On not creative levels, three aspects of creative thinking is not fulfilled, while on less creative level, it's only one aspect fulfilled. On creative enough level, only two aspects fulfilled, while on very creative level, all three aspects of creativity are fulfilled.

Figure 3 shows the results of students' answers to the post-test with the criteria of creative thinking skill that relatively high and low. Based on Figure 3, the results of students' answers with high creative thinking skills can be described as follows; students are able to describe more than three positive lines and negative lines (fluency), determine several line gradients in different ways (flexibility and originality), determine several line gradient values in an easy and precise way (flexibility), determine line equations in other ways than others (originality), draw more than three lines that are parallel to a line (fluency), determine several line gradients in different ways (flexibility and originality), and able to determine line equations in other ways than others (originality). The results are also in line with Siswono [20] indicated that these differences are based on fluency, flexibility, and novelty in mathematical problem solving and problem posing. Furthermore, Silver [10] asserts that the indicator to evaluate the creative thinking skill using The Torrance Test of Creative thinking (TTCT), contains three key components, namely fluency, flexibility, and novelty.

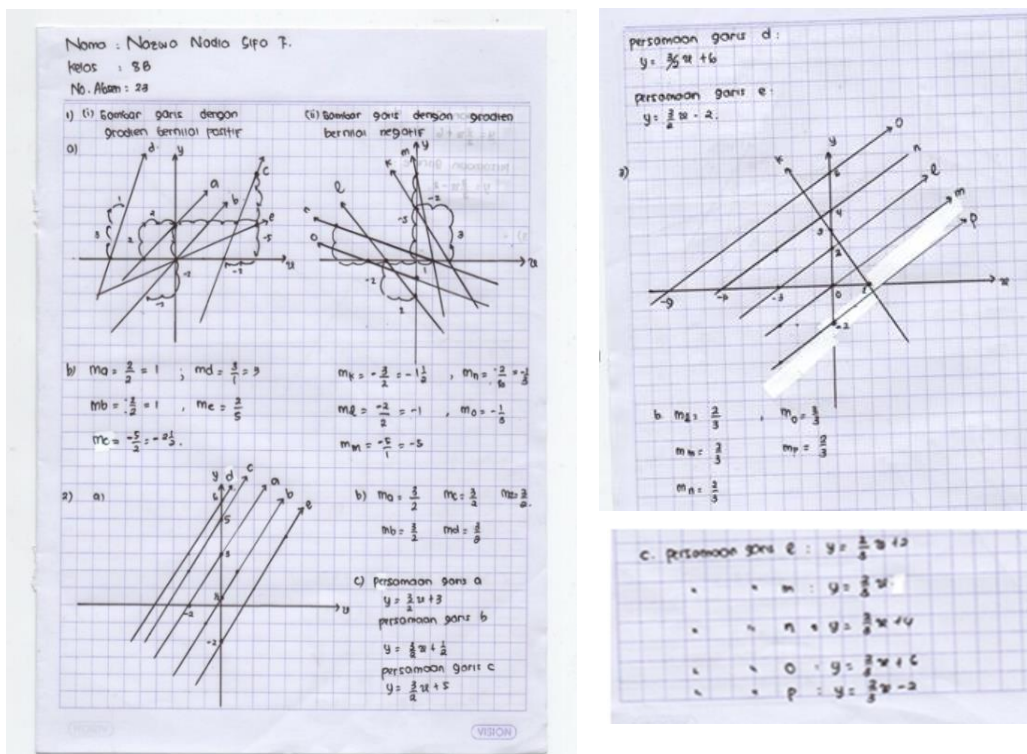


Figure 3. The results of students' answers with high creative thinking skills

Figure 3 shows the results of students' answers with low creative thinking skills can be described as follows; students are only able to draw a line with a positive gradient and a negative line

(fluency), only able to determine the value of a line in the usual way (flexibility and originality), only able to draw a line that is parallel to another line (fluency), only able to determine the value of a line in the usual way (flexibility and originality), only able to draw a line that is perpendicular to another line (fluency), and only able to determine the value of a line and straight line equation in the usual way (flexibility and originality). The results are in line with Khoiri *et al.*, [21] and Tohir *et al.*, [4] opinion that creative thinking skills were measured based on four indicators: fluency, flexibility, originality, and elaboration. The product of creative thinking that is, the problem solution or the problem posed, allows the researcher to determinethe presence of the three aspects that are fluency, flexibility, and novelty [20].

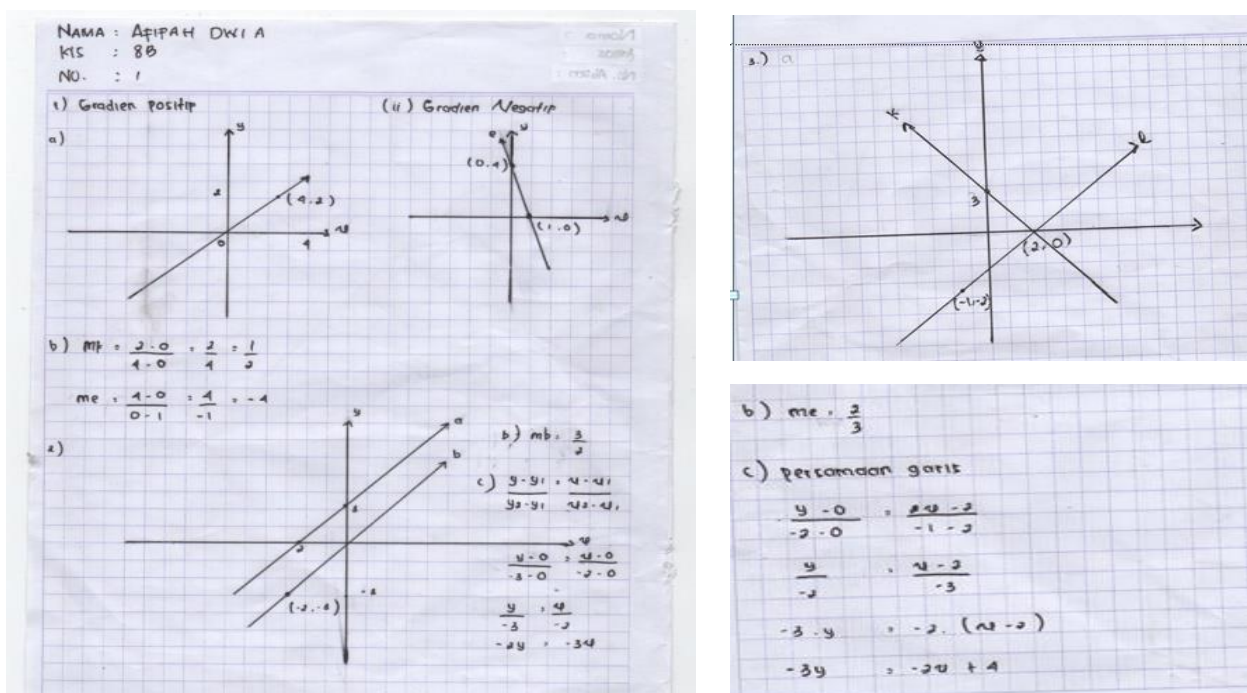


Figure 4. The results of students' answers with low creative thinking skills

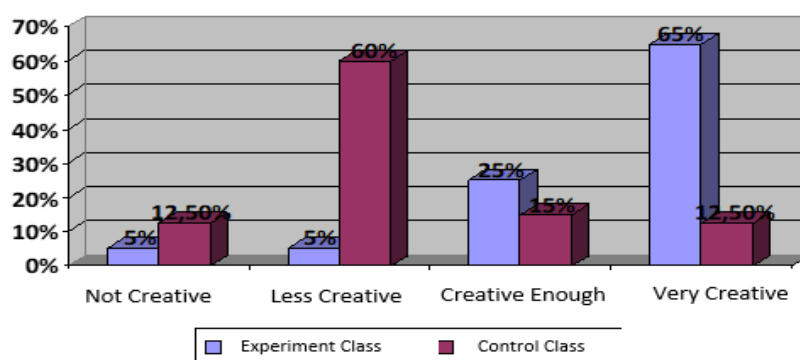


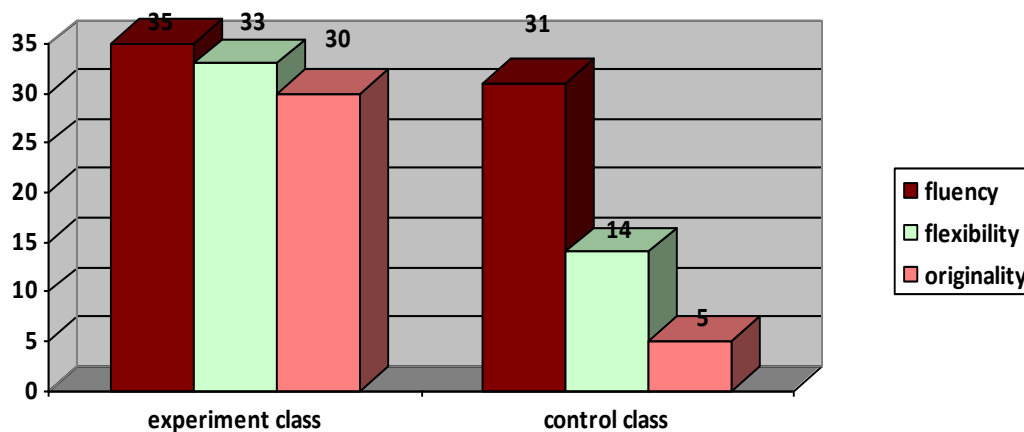
Figure 5. Levels of students' creative thinking skill

Based on Figure 4, students in experiment class were very creative on thinking level on 65% consist of 26 students, while on creative enough level, there are 25% students consist of 10 students. And on less creative and not creative levels, there are 2 students on each levels with 5% as the percentage. It is very different with the levels gained by students in control class. There were 5 students or 12,5% on creative levels, 6 students or 15% on creative enough level, 24 students or 60% on less creative and 5 students or 12,5% on not creative level.



**Table 5.** The number of students' creative thinking skill levels

<i>Fluency</i>	<i>Flexibility</i>	<i>Originality</i>	Creative thinking skill level	Number of Students in Experiment Class	Number of Students in Control Class
-	-	-	Not Creative	2	5
√	-	-		1	20
-	√	-	Less creative	1	4
-	-	√		-	-
√	√	-		6	5
√	-	√	Creative enough	2	1
-	√	√		2	-
√	√	√	Creative	26	5



**Figure 6.** The measurement result of students' creative thinking skill

Figure 5 shows a diagram of students' creative thinking skills aspect in the experimental and control classes. In the experimental class, the fluency aspect consisted of 35 students, aspect flexibility consisted of 33 students and the originality aspect consisted of 30 students. While in the control class, the fluency aspect consisted of 31 students, aspect flexibility consisted of 14 students and the originality aspect consisted of 5 students. The average achievement aspect of the students' creative thinking skills in the experimental class is higher than the control class. The results of this study reinforce the research conducted by Angela *et al.*, [22] which show that the learning achievements in the experimental class I are better than the control class. The factor affecting these two results is the different treatments given to the experiment class and the control class [21].

**4. Conclusion**

The learning instrument has reached values above 4.0 so that they are declared valid and feasible to be used for the learning process with the aim of exploring students' creative thinking skills. It was observable that interaction of discussion on experiment class was more active than the control class. In experiment class, the activities of learning was more visible. The learning proses was shown by the awareness of each member of groups to their friends in their group. The application of the AIR learning model based on learning community has a positive effect on the students' creative thinking

skill. The average achievement aspect of students' creative thinking skills in the experimental class is higher than the control class.

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