

Research Article

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Mathematical Connection Ability through the Application of the AIR (Auditory Intellectually Repetition) Learning Model Assisted by Geogebra Software

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DOI: <https://doi.org/10.47353/ijedl.v1i4.21>

Abstract: expected model can fosters students' mathematical connection skills, namely through the application of the AIR (Auditory Intellectual Repetition) model assisted by geogebra software. The purpose of this study was to determine differences in students' mathematical connection abilities after obtaining learning by applying the AIR (Auditory Intellectual Repetition) model assisted by geogebra software. This study used a quantitative approach with a pre-test and post-test control group design. The population of this study was class IX students of SMPN 1 Peukan Pidie by taking samples of two classes consisting of an experimental class and a control class. The sample selection was done by random sampling. The instrument used is a mathematical connection ability test. The data analysis technique uses the ANOVA test. Based on the results of the study, it was found that there were differences in the mathematical connection abilities of students who were taught through the application of the AIR (Auditory Intellectual Repetition) model assisted by geogebra software with conventional learning. Furthermore, the results of this study also identified that there was no interaction between learning and student level on students' mathematical connection abilities.

Keywords: Mathematical Connection Ability, AIR (Auditory Intellectual Repetition), and geogebra software.

Introduction

Mathematical connection ability is an important ability which one of the aspects must be achieved in mathematics learning activities. Mathematical connection ability includes the ability to connect various topics in mathematics (body of knowledge), the ability to connect with other sciences (connection with other sciences), and the ability to connect in everyday life (connection in everyday life). By developing these mathematical connection skills, students can understand a very broad range of mathematical sciences and apply them in everyday life. Through the ability of mathematical connections (mathematical connections) students are expected to have better insight and knowledge in mathematics, in order to generate a positive attitude towards mathematics (Afgani, 2011 & Hadin, 2018).

Achieving learning objectives requires the ability to connect students with the need for a learning model. The learning model is the coverage of teaching materials which include learning carried out by the teacher directly or indirectly in the teaching and learning process (Istarani, 2012). The learning model is a systematic framework for integrating learning experiences to achieve certain learning goals, and serves as a guide for learning designers and teachers in planning learning activities. The term learning model refers to a particular learning approach including goals, syntax, environment, and processing systems (Arends, 2013 & Shoimin, 2014).

One of the innovative learning models to see students' connection abilities in the teaching and learning process is the AIR (Auditory Intellectual Repetition) model. The AIR

(Auditory Intellectual Repetition) learning model is a learning model that directs students to hear, think, and repeat lessons that have been given by the teacher as a way to reinforce material so that students are able to remember for a long time and the AIR (Auditory Intellectual Repetition) learning model) is a learning model that uses a constructivist learning approach, where students are emphasized to take advantage of all the sensory tools they have, if in the teaching and learning process many of the five senses are used, it will improve students' mathematical concepts better (Hutagalung et al, 2018);

Application of software-assisted AIR (Auditory Intellectual Repetition) learning model geogebra expect students to be able to have student connection skills (Senjayawati & Bernard, 2018). Therefore the application of the AIR learning model (Auditory Intellectually Repetition) assisted by software Geogebra in learning mathematics will make teaching and learning activities more varied because students can learn various mathematical materials at once (Rohaeti & Bernard, 2018). This is in line with what was stated by Hohenwarter (Syahbana, 2016) that the Geogebra program offers 60 effective opportunities to create interactive online learning environments that allow students to explore various mathematical concepts both in educational settings and at home.

This learning model has been widely applied such as; elementary school thematic lessons (Bonatua et al, 2021), Physics lessons (S & Noe, 2014), and mathematics lessons (Ika et al, 2014). There are many previous studies that have examined the effect of the Auditory Intellectually Repetition (AIR) learning model assisted by visual aids on students' understanding of mathematical concepts in class VII Limas material (Christi, 2018), further research on the effect of AIR (Auditory Intellectually Repetition) learning on mathematical connection abilities class VII students (Anita et al, 2014). Based on the background that has been described, this study

aims to see Are there differences in students' mathematical connection abilities taught through the application of the AIR (Auditory Intellectually Repetition) learning model assisted by Geogebra Software with conventional learning.

Method

This study used a quantitative approach with an experimental research design with the research design pre-test and post-test control-group design. This study involved two classes, namely the control class and the experimental class. The experimental class is the class that follows the application of AIR (Auditory Intellectual Repetition) learning and the control class applies conventional learning. The research procedure consists of problem identification stage, research planning stage, implementation stage and data analysis stage.

The population in this study were all fourth grade students consisting of 4 classes at SMPN 1 Peukan Pidie for the 2021/2022 academic year. The research sample was taken by random sampling from all students in class IX, namely one class as a trial class and two classes for the actual research, namely class IX2 as an experiment and class IX3 as a control class. The learning experimental class was carried out using the AIR (Auditory Intellectual Repetition) model assisted by Geogebra Software, while the other class as a control class received ordinary or conventional learning. about the ability of mathematical connections in the pretest with prerequisite test questions and in the post test transformation questions. The test instrument was validated before being used to determine content validity and construct validity. The problem instrument validators consisted of a mathematics teacher and a mathematics education lecturer. Test questions that have been validated are tested on students IX at SMPN 1 Peukan Pidie. Trials are used to determine the level of validity and reliability of items about mathematical connection ability.

The data obtained from the value *pre-test* and *post-test* analyzed to see the ability of students' mathematical connections. The data analysis technique used is the Anava test by analyzing the N-gain value. Before carrying out the ANOVA test, prerequisite tests were first carried out in the form of normality and homogeneity tests.

Results and Discussion

Mathematical Connection Ability Results

Based on the results of the pre-test scores on the normality and homogeneity tests that the data for the two classes are normally distributed and the variances are homogeneous so that the test can be continued by testing the similarity of the two average values with the help of SPSS 21 are:

$$H_0: \mu_A = \mu_B = \mu_C$$

H_1 : At least one pair of population means is different

H_0 : There is no difference in the ability of students' mathematical connections taught through the application of the assisted AIR (Auditory Intellectual Repetition) learning model *Geogebra Software* with conventional learning reviewed based on student level (high, medium, low).

H_1 : There are differences in students' mathematical connection abilities taught through the application of the assisted AIR (Auditory Intellectual Repetition) learning model *Geogebra Software* with conventional learning reviewed based on student level (high, medium, low).

The test criteria are reject H_0 if the sig < 0,05

Analysis of the test results from the difference in the mean N-gain mathematical connection abilities in the experimental class and control class with ANOVA calculations as shown in the table below:

Table The Results of the N-gain Average Difference Test on the Mathematical Connection of Experimental and Control Class Students

	Sum of Squares	Df	Mean Square	F	Sig.
Between Groups	2,725	1	2,725	44,048	0.000
Within Groups	3,403	55	0.062		
Total	6,128	56			

Based on the results of Table 4.4 it can be seen that $F = 44.048$ and $\alpha = 0.000$. Because the sig. = 0.00 value is obtained, namely $\alpha < 0.05$, which means that H_0 is rejected. Therefore, it can be concluded that there are differences in students' mathematical connection abilities taught through the application of the assisted AIR (Auditory Intellectual Repetition) learning model *Geogebra Software* with conventional learning.

The research results show that there are differences in students' mathematical connection abilities taught through the application of the assisted AIR (Auditory Intellectual Repetition) learning model *Geogebra Software* with conventional learning

The difference between the experimental class and the conventional class is that the experimental class applies the AIR (Auditory Intellectually Repetition) learning model assisted by *Geogebra Software*, while the conventional class applies conventional learning models without the help of *Geogebra Software*. Learning takes place through three stages, namely:

In the first stage, listening, presenting (Auditory), initial activities at completion by directing and giving instructions in writing about what concepts are asked in a problem. On each Student Worksheet (LKPD), students can write down information and compile a problem that is needed in the concept of solving a problem. The initial activity was carried out so that students could not fail to understand the concept of the problem at hand.

The second stage, analyzing and solving problems (Intellectual), at this stage students can

analyze how to solve the problems given and the teacher encourages students to make experiments using Geogebra software, namely, students can make axes on reflection lines, students can determine shadows on rotations. Students in groups can solve questions on each Student Worksheet (LKPD) that has been given by the teacher, after completing them students present in front of the class using Geogebra Software and provide opportunities for other groups to express their opinions, while other groups present answer and can defend the results it works.

The third stage, repetition (Repetition), the teacher directs students to work on the questions individually and can conclude orally and in writing about understanding the material that has been discussed.

Differences in the mathematical connection abilities of students taught using the AIR (Auditory Intellectually Repetition) model assisted by Geogebra Software and students taught by conventional learning models, in which the AIR (Auditory Intellectually Repetition) learning model assisted by Geogebra Software has additional innovations, namely the AIR model (Auditory Intellectually Repetition) and Geogebra Software. The experimental class in the second stage used Geogebra Software to visually present the problems encountered, while in the control class students used millimeter blocks.

The results of this study are in line with research (Juanda et al., 2014; Machmud et al., 2013; Sugiman & Kusumah, 2010) which found that there was no interaction between learning model factors and students' levels of mathematical connection abilities. Interaction only occurs if neither group has the same increase as the other group.

Conclusion

Based on the results of the research and statistical analysis conducted, it can be concluded that there are differences in students' mathematical connection abilities taught through

application the AIR (Auditory Intellectual Repetition) learning model assisted by geogebra software and conventional learning and there is no interaction between learning using the AIR (Auditory Intellectual Repetition) learning model assisted by geogebra software with the student's level of students' mathematical connection abilities.

Suggestion

Based on the suggestions in this study, learning using the AIR (Auditory Intellectual Repetition) learning model assisted by geogebra software can be applied in learning mathematics to develop mathematical connection skills. Students actively develop their connection skills so that it is easier for teachers to convey material and can develop students' abilities.

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