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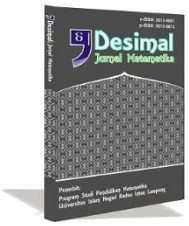

Mathematical Problem Solving Ability: The Impact of Auditory, Intellectually and Repetition Learning Models and Bassed Learning Problems on Trigonometry Materials

Suci Hartati[1], Dadang Gufron[2], Rita Melinda[2,*]

[1] Universitas Pancasakti Tegal, Indonesia
[2] Universitas Islam Negeri Raden Intan Lampung, Indonesia.

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*Correspondence: E-mail:
Ghufron3589@gmail.com

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ABSTRACT

Mathematical problem-solving ability is one thing that must be possessed by students in learning mathematics. This study aims to determine students' problem solving abilities with auditory, intellectual and repetition (AIR) and problem bassed learning (PBL) learning models in mathematics learning. This research is a quasy experimental study consisting of two independent variables namely the learning model AIR and PBL and the dependent variable namely problem solving. The results of the T test hypothesis indicate that the AIR model has a different impact / influence in influencing students' mathematical problem solving abilities compared to the PBL model. In the test of students 'mathematical problem solving abilities obtained AIR models are better at influencing students' mathematical problem solving abilities compared to PBL models.

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INTRODUCTION

Education has a very important role in human life. Education is a factor that largely determines the quality of Human Resources (HR) itself (Widiansyah, 2018). Through Education, it is expected that the quality of human beings in all aspects can develop to reflect knowledge, attitudes, and qualified skills. The more qualified the education, the more qualified the HR produced (Akilah, 2018). Quality education needs to be given especially to students from an early age at kindergarten education and elementary to high school education. For the sake of creating quality students in learning learning models are needed in order to improve students' problem solving abilities(Afryany, 2015). There are so many learning models that can be used by a teacher in learning activities. Of the many learning models, the researchers took two sample learning models, namely the AIR learning model and PBL in students' problem solving abilities.

In previous studies the Auditory learning model, Intelectually and Repetition (AIR) has been associated with improving student problem solving, increasing creativity and student learning outcomes in mathematics ability to understand mathematical concepts, student learning outcomes in mathematics(Agustiana, Putra, & Farida, 2018; Alan & Afriansyah, 2017; Fitriana & Ismah, 2016; Latifah & Nurlaeli, 2017; Manurung, 2016; Rahayuningsih, 2017; Sarniah, Anwar, Wahyu, & Putra, 2019; Siswanto, Akbar, & Bernard, 2018; Wijaya, Destiniar, & Mulbasari, 2018).

The Problem Bassed Learning learning model has also been linked to the ability to think critically, the ability to understand students' mathematical concepts, students' self-efficacy of teacher candidates, students' mathematical communication skills, mathematics learning(Arnidha & Rekawati, 2018), grow the ability of mathematical disposition, mathematical problem solving abilities in terms of learning independence, creativity and learning outcomes of mathematical induction, mathematical reflective thinking ability (Alan & Afriansyah, 2017; Angraini & Masykur, 2018; Arnidha & Rekawati, 2018; Cahya, Sunardi, Suharto, Susanto, & Murtikusuma, 2018; Dongoran, Said, & Defitriani, 2019; Maharani, Darhim, Sabandar, & Herman, 2018; Nuriana, Pujiastuti, & Soedjoko, 2018; Yanti & Prahmana, 2017; Yuliasari, 2017).

Apart from the two learning models certainly have a problem solving for both and have also been discussed in problem solving abilities in the provision of learning treatment, high learning motivation based on ideal problem solving, cognitive style relationships, through open ended learning, through react strategies, and in terms of gender differences (Gunawan et al., 2019; Hasanah, Supriadi, Wahyu, & Putra, n.d.; Nurhayati & Zanthy, 2019; Ulya, 2016).

This article will confront the AIR and PBL learning model. Its usefulness is to determine the best effect or impact between the PBL and AIR models on mathematical problem solving.

METHOD

This research is an experimental Quasy study in which there are two learning methods which are independent variables (explanatory variables or estimating variables), and dependent variables (consequent or effect)(Indriani, 2016). This study consists of two independent variables, namely the AIR learning model and the PBL learning model and the dependent variable, namely the problem-solving ability. The steps of the research model can be seen in Figure 1.

From Figure 1 it can be seen that the AIR learning model process includes the Auditory, Intellectualy, and Repetition processes(Rahayuningsih, 2017). The PBL model is based on steps: identifying problems, collecting data, analyzing data, solving problems, choosing how to solve problems, planning implementation of problem solving, conducting trials and finally action to solve problems(Yuliasari, 2017). The analysis technique of this research uses the T test. With the prerequisite test normality test and homogeneity test.

H_0 : Model A has the same problem-solving average as Model B.

H_1 : Model A does not have the same problem solving average as Model B.

It can be concluded if T count > T table then H_0 rejected, the AIR model has a different average from the PBL model.

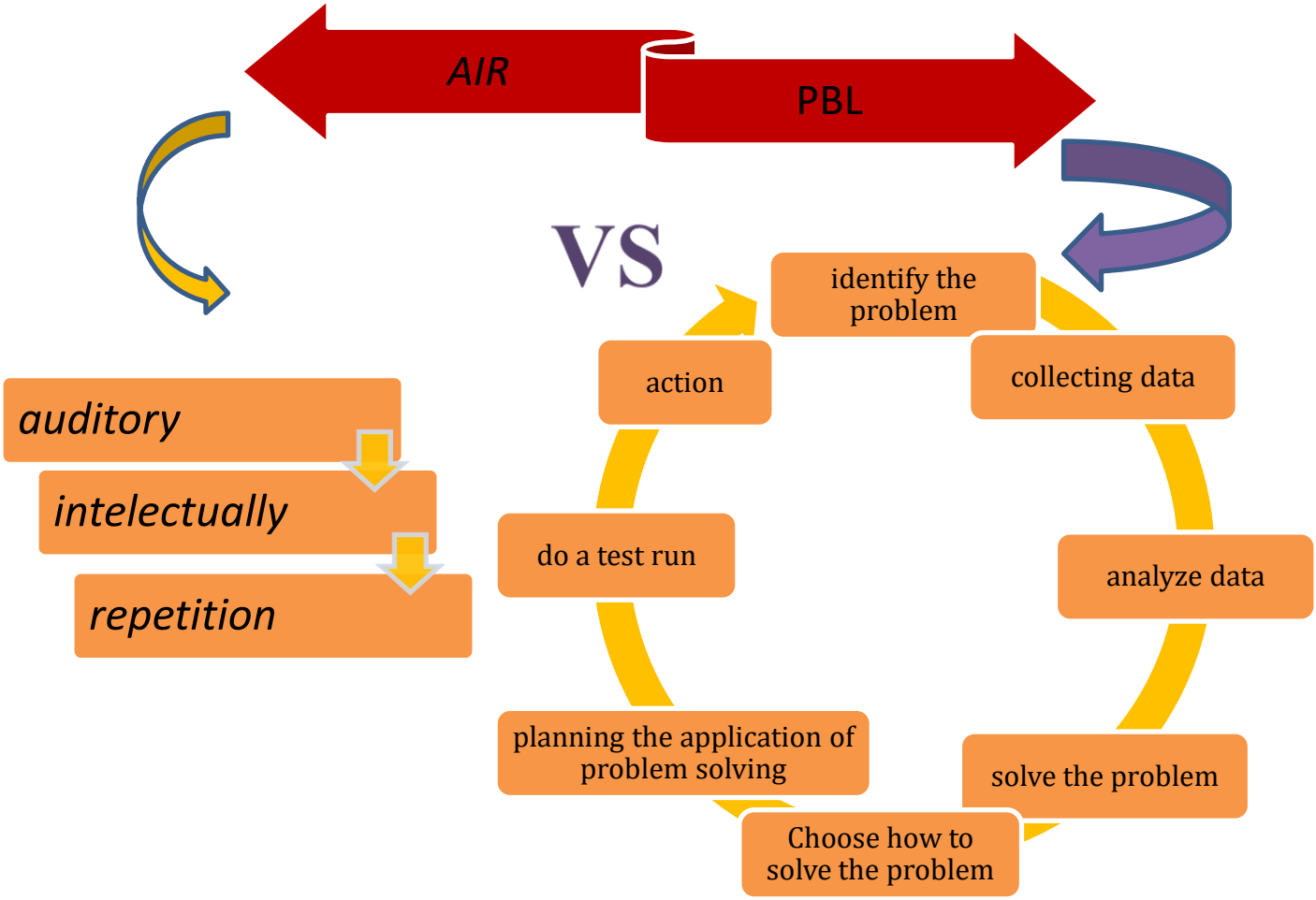

Figure 1. Research Design

RESULTS AND DISCUSSION

After being pre-tested, the normality test and homogeneity test result that the data is normally distributed and homogeneous, the researcher will conduct an independent samples test. The data obtained from the discussion after the learning activities are completed, have been tested students' mathematical problem solving ability test. The results obtained can be summarized in Table 1.

Table 1. Descriptive Test Results for Test Data for Mathematical Problem Solving Ability

Model	Mean	Median	Varians	Standard deviation	Minimum	Maximum	Range
AIR	68.4500	75.0000	242.892	15.585	41.00	91.00	50.00
PBL	67.1500	66.0000	66.0000	14.068	41.00	81.00	42.00

Based on Table 1 it can be seen about the general data picture, that the average value for the AIR learning model is 68.4500, while the average value for the PBL learning model is 67.1500. the AIR model obtained a mean value of 67,1500 while the PBL model was 66,0000. Also note that the standard deviation for the AIR model is 15,585 while the PBL model is 14,068. Then the acquisition value of variance, maximum, and drinking AIR models are 242,892, 41.00, and 91.00 while the PBL models are 66.00000, 41.00, and 91.00. so that the obtained value of the AIR model variety is 50.00 while the PBL model is 42.00 then the AIR model has

better problem solving ability than the PBL learning model.

This research has several stages of research in order to obtain optimal results, one of which is the prerequisite test. The prerequisite tests used were normality and homogeneity tests. This prerequisite test is used as a condition or assumption of various parametric tests where the researcher uses the T test as data analysis. Here is the normality test summarized in Table 2.

Table 2. Normality Test Results Mathematical Problem Solving Ability

	Kolmogorov-Smirnov[a]			Shapiro-Wilk		
	Statistic	**Df**	**P value**	**Statistic**	**Df**	**P value**
AIR Model	.167	21	.131	.953	21	.382
PBL Model	.208	21	.018	.920	21	.085

Based on Table 2 normality test results with a significant level α = 0.05 shows that the application of the AIR learning model and PBL learning model to the mathematical problem solving ability looks p value of the AIR learning model is 0.131 and the PBL learning model is 0.018 for the Kolmogorov-Smirnov output probability. Because the values of p value > α, then both data are normally distributed. The next prerequisite test is the homogeneity test which we can see in Table 3.

Table 3. Homogeneity Test Results for Problem Solving Capabilities

Levene Statistic	df1	df2	P value
.146	1	40	.705

Based on Table 3 homogeneity test results with a significant level of 0.05, it can be seen that the p value is 0.705 greater than 0.05, so it can be concluded that the data is homogeneous, then the researcher will conduct an Independent sample Test. The independent sample test can be seen in Table 4.

Table 4. Descriptive Independent sample Test

		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	**Sig.**	**T**	**Df**	**p-value**
Mathematical Problem Solving Ability	Equal variances assumed	.255	.605	.277	38	.783
	Equal Variances not assumed			.277	37.609	.783

Based on Table 4 the AIR Model is obtained t_{count}= 3.55 >t_{table}= 1.724 then H_0 rejected. It can be concluded that the AIR model and PBL model have different problem-solving abilities. The first hypothesis H_0 rejected, it can be concluded that there is no similarity between the AIR Model and the PBL Model. While the average of the two models, namely AIR and PBL, it is found that the AIR model has a higher average than the PBL model, it can be concluded that the AIR model is more effective than the PBL model in students' mathematical problem solving ability.

Learning model (AIR) is a learning model where teachers are facilitators while students are more active. The AIR

learning model consists of three things namely Auditory, Intellectual, and Repetition. Auditory (listening, listening, presentation, argumentation, expressing opinions, and responding), Intelectually (learning to use the ability to think), and Repetition (repetition, in the learning process, this refers to the strengthening and deepening of students with assignments or quizzes). The advantage of the AIR learning model is the participation of students by expressing opinions in the learning process so that more opportunities take advantage of the knowledge they have. The next learning model is a problem-based learning model (problem bassed learning) which is one of the innovative learning models that can provide active learning conditions for students. The steps are: identifying problems, collecting data, analyzing data, solving problems based on existing data and analysis, choosing ways to solve problems, planning the application of problem solving, conducting trials on a set plan, and taking action (actions) to solving problems. PBL excellence is that it can stimulate the ability of students to find new knowledge and develop it.

Based on these differences it can be seen that the AIR learning model is better than the PBL learning model. This is proven by previous studies that the AIR model is better than conventional models for reasoning and problem solving abilities. In addition, the AIR learning model can also improve students' mathematical understanding abilities, improve student learning outcomes, and improve understanding of mathematical concepts (Alan & Afriansyah, 2017; Munawarah, Suratmat, & Fathani, 2019; Nansabaris & Sdn, 2019; Talib, Ihsan, & Fairul, 2018). In other conditions PBL learning models are also better than conventional models (Kurniyawati, Mahmudi, & Wahyuningrum, 2019). in addition to improving problem solving skills, PBL models can also improve social attitudes and critical thinking skills (Primayanti, Suarjana, & Astawan, 2019). However, in terms of influencing problem solving abilities, the AIR learning model has a better impact than the PBL learning model.

CONCLUSIONS AND SUGGESTIONS

From the results of the T test hypothesis above shows that the AIR model has a different variance with the PBL model, the problem solving ability test using the AIR model is obtained t_{count}= 3.55 > t_{table} is 1,724 then it can be revealed that there is a different problem solving ability between the two. In the second research, this model shows that the AIR model is better than the PBL model. Thus students will have the ability to solve problems well if using the AIR model.

Researchers hope that our research will make prospective educators selective in providing a learning model through which this study students can gain the ability to solve good problems. And researchers are also still aware that this research is still far from the perfect category. So from us as researchers are open to constructive suggestions that are positive for the sake of perfect research.

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