

THE USE OF THE JIGSAW ASSISTED LEARNING MODEL TO UNDERSTANDING MATHEMATICAL CONCEPTS

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Abstract

The purpose of this study was to find out whether there were differences in the use of the Jigsaw learning model assisted by a visual aid in understanding mathematical concepts. The population in this study were class X students in the even semester of Al-Irsyad High School, Tegal City, in the 2022/2023 academic year. Sampling using purposive sampling technique. The sample in this study consisted of 3 classes with a total of 94 students. Class X.4 as the experimental class was taught using the Jigsaw model assisted by teaching aids, class X.6 as the control class which was taught using a contextual model, and class X.1 as a trial class. The data collection methods used were documentation and test methods. The data analysis technique used a randomized block design. The results of the study showed that there were differences in the Jigsaw assisted learning model with the help of visual aids in understanding mathematical concepts.

Keywords: use, jigsaw, visual aids, understanding of mathematical concepts

1 INTRODUCTION

Mathematics is one of the subjects that occupies an important role in the world of education because mathematics is given at the education level, both at the elementary school (SD), junior high school (SMP), senior high school (SMA) to tertiary institutions in other branches of knowledge.

Understanding of mathematical concepts is a very important ability possessed by students in learning mathematics by providing an understanding that the material being taught to students is not just memorizing or remembering concepts but being able to restate a concept that has been learned (Ustina, n.d)

Meanwhile, according to Antika et al (2019) Understanding mathematical concepts is one of the fundamental goals in the process of learning mathematics and one of the objectives of the material delivered by the teacher. It is possible for students who understand the concept well in the teaching and learning process to have high learning achievement because it is easier to follow the lesson, while students who do not understand the concept tend to have more difficulty following the lesson.

Understanding of mathematical concepts in Indonesia is low because students are less active in learning, many students are afraid to ask questions when they don't understand the material provided or lack confidence to actively process learning and sometimes many students feel bored with the way the teacher conveys materials that still use the lecture method in explaining material, plus the impact of the COVID-19 pandemic where education is carried out by means of distance learning (online) so students can only pay attention to learning at home through zoom meetings, Whatsapp groups, google classrooms and other applications that used in the school.

Understanding of mathematical concepts used according to the 2006 National Education Standards Agency (BSNP) which consists of 7 indicators, namely 1) Restating a concept 2) Classifying objects according to certain characteristics according to the concept, 3) Giving examples and non-examples of concepts, 4) Presenting concepts in various forms of mathematical representations, 5) Developing necessary or sufficient conditions for a concept, 6) Using, utilizing, and choosing certain procedures or operations, 7) Applying concepts or problem-solving algorithms.

Based on the results of an interview with Mrs. Desi Arief Setiani S.Pd, M.Pd as a class X math teacher at SMA AI – Irsyad, Tegal City, it was found that the understanding of mathematical concepts in class X students at SMA AI – Irsyad was still low because the students were in junior high school during the Covid-19 pandemic where learning at that time only used distance learning (online) students were only at home paying attention to the material provided and the lack of interaction, if given questions students were sometimes still confused about answering questions. This can be seen when the writer observes the students write a question, the teacher mostly writes all the questions and immediately answers without the steps to answer a question. The low understanding of the concepts of students in class X can be seen from their initial abilities by looking at the odd end-of-semester summative math scores (SAS) for the 2022/2023 academic year, there are still many students whose scores are below the Minimum Completeness Criteria (KKM). The Minimum Completeness Criteria (KKM) at AI-Irsyad High School is 75.

The learning model used by the teacher is contextual, where the contextual learning model is a learning model that relates material to the surrounding environment or the real world in accordance with the implementation of the independent curriculum. The method used is lectures and group discussions, students are asked to find or explore the material provided by the teacher then present the results of the discussion. Here students are required to be more active in learning based on the implementation of an independent curriculum but students find it difficult to understand a material because the teacher only conveys the material by explaining the material, so students do not understand the concept of the material received.

The independent curriculum learning model can use other alternative models that can enhance the development of maturity in high school, namely the Jigsaw learning model assisted by visual aids. The props used are opportunity boards because in this study entering the opportunity material, with the opportunity board props students can easily understand the material provided and improve understanding of mathematical concepts.

According to Rusman (2016: 217) the Jigsaw learning model takes the pattern of how to work a saw (zigzag), namely students carry out a learning activity by working with other students to achieve common goals. The Jigsaw learning model is a learning technique that consists of several members in one group who are responsible for mastering part of the learning material and are able to teach that material to other members in their group. The Jigsaw learning model consists of the original group and the expert group. The home group is a group of students consisting of several members who receive different materials and assignments, while the expert group is a group that receives the same subchapter of material to be discussed in the expert group and then the results of the discussion are conveyed to the home group members.

According to Ari Indriani (2019) teaching aids are a set of concrete objects or objects that display the characteristics of the concepts they learn. Teaching aids can help students learn abstract objects that can be presented in the form of models, so that participants can manipulate these objects by looking at them, holding them, touching them, turning them around, to make it easier to understand mathematics.

Based on the description above, a research entitled "Use of Teaching Aid Assisted Jigsaw Learning Models for Understanding Mathematical Concepts (Research Study on the Subject of Opportunity Material for Students of Class X Even Semester SMA AI - Irsyad, Tegal City, Academic Year 2022/2023)"

2 METHODOLOGY

This study uses a quantitative approach. This type of research is an experimental research. The population of this study was all of class X in the even semester of AI-Irsyad High School in the 2022/2023 academic year with a total of 173 students. Determination of the sample of this study using a portion sampling technique. Based on the results of determining the sample, there are 3 classes, namely 1 control class, 1 experimental class, and 1 trial class.

The subject matter used in the opportunities studied in class X even semester 2022/2023. The data collection techniques used in this study include documentation techniques and test techniques. While the research instrument used in this research is a test of understanding mathematical concepts. Instrument trials were carried out by validity testing using the product moment formula and reliability using the KR-20 formula. The level of vulnerability and discriminating power are also calculated.

Prior to conducting the research, the samples in this study were tested for sample equivalence first. The sample equivalence test aims to determine the similarity of the abilities of students in the control class, experimental class, and trial class whose data is taken from odd semester SAS mathematics scores. To find out the equality of the samples, a one-way analysis test (ANOVA) was used.

The one-way ANAVA Prerequisite Test is as follows:

Normality test

To test the data obtained for normality, you can use the Lilifors test. The results obtained from the normality test for each trial class, experimental class and control class are normally distributed.

Homogeneity test

To test whether the data obtained is homogeneous or not, a homogeneity test is carried out using the Bartlett test. The results obtained from the homogeneity test of the trial, experimental and control classes are "homogeneous"

One way anava test

To test the equality of the samples, a one-way anava test formula was used. From the calculations, it was found that H_0 was accepted, meaning that there was no difference between the trial class, the experimental class, and the control class.

3 RESULTS

This research was conducted at Al-Irsyad High School, Tegal City, which took place from May 2 to May 24, 2023. The population in this study was all class X SMA Al-Irsyad Tegal City, with a total of 173 students consisting of 6 classes. The sampling technique uses a proportion sampling technique. The sample in this study consisted of 3 classes with a total of 94 students. Class X.4 as the experimental class was taught using the Jigsaw model assisted by props, class X.6 as the control class which was taught using a contextual model, and class X.1 as the trial class.

The curriculum used at SMA Al-Irsyad Tegal City class X is the independent curriculum. The independent curriculum has been implemented in every school including Al-Irsyad High School, Tegal City. Opportunity is the last material in the discussion of mathematics subject matter for class X even semester. The Minimum Completeness Criteria (KKM) in mathematics for class X even semester is 75.

Table 1. The Value of Understanding Mathematical Concepts

Class Size	Class Experiment	Class Control
Means	79,969	71,563
Median	80	70
Mode	80	70
St. Deviation	6,337	5,645
Variant	40,160	31,867
Highest Rated	94	82
Lowest Rated	69	54

As can be seen in the table, it shows that the average value of understanding mathematical concepts of students who are taught using the Jigsaw learning model assisted by visual aids is higher than the understanding of mathematical concepts of students who are taught the Contextual learning model. The average understanding of mathematical concepts of students who were taught using the Jigsaw learning model assisted by visual aids was 79.969 higher than students who were taught the Contextual learning model of 71.563.

DATA ANALYSIS

Before testing the hypothesis, a prerequisite test is carried out, namely, the normality and homogeneity tests.

Normality test

The results of the calculation of the normality test for the ability to understand mathematical concepts using the Lilifors formula are presented in table 5.

Table 2. Normality Test for Understanding Mathematical Concepts

Variabel	Lo Maximum	$L_{tabel(\alpha=5\%)}$	Conclusion
Experiment	0,123	0,159	Normal
Control	0,140	0,159	Normal

It can be seen in table 5 that Lcount for data on understanding mathematical concepts is smaller than Ltable. Because $L_{count} < L_{table}$, H_0 is accepted, meaning that the sample comes from a normally distributed population

Homogeneity Test

The results of the calculation of the homogeneity test of the ability to understand mathematical concepts using the Bartlett formula are presented in table 6.

Table 3. Homogeneity Test of Understanding of Mathematical Concepts

Homogeneity Test (χ^2)	Table $\chi^2(\alpha = 5\%)$	Conclusion
0,400	3,814	Homogeneous

It can be seen in table shows that χ^2 count for data understanding of mathematical concepts is smaller than χ^2 table. Because $\chi^2_{count} < \chi^2_{table}$, H_0 is accepted, meaning that the sample comes from a population that has a homogeneous diversity.

Hypothesis testing

To prove this hypothesis, hypothesis testing is carried out. there is a research hypothesis, namely:

Ha: There are differences in the use of the Jigsaw learning model assisted by visual aids and the Contextual learning model for understanding mathematical concepts

Ho: There is no difference in the use of the Jigsaw learning model assisted by tools and the Contextual learning model on the understanding of mathematical concepts

Based on the results of the calculation of the randomized block design test on students' understanding of mathematical concepts using the Jigsaw learning model assisted by props, it is known that $F_{count} = \text{KTP/KTG} = 8.486$ at a significant level $\alpha = 5\%$, so H_0 is rejected, so there is a difference in the use of the Jigsaw learning model assisted by tools visual aid with Contextual learning models on understanding mathematical concepts.

Based on the results of research conducted at Al-Irsyad High School, Tegal City, in class X students in the even semester of the 2022/2023 academic year, the following results were obtained:

There are differences in the use of the Jigsaw learning model assisted by visual aids and the Contextual learning model for understanding mathematical concepts. This can be proven in the calculation of the Randomized Design Group (RBD). Differences in understanding of mathematical concepts can also be seen from the average understanding of mathematical concepts, where the experimental class treated with the Jigsaw model assisted by teaching aids has an average of 79.969. Whereas in the control class with the Contextual model the average understanding of mathematical concepts is only 71.594. So that it can be said that the understanding of mathematical concepts of students who are taught using the Jigsaw model assisted by visual aids is higher than the understanding of mathematical concepts of students who are taught using the Contextual model. In line with Lilis Saputri (2020) in her research using the Jigsaw learning model can increase understanding of mathematical concepts, because through the Jigsaw learning model it can develop students' abilities to test their own ideas and understanding. Students can solve problems without being afraid of making mistakes, because the decisions made are group decisions.

This is also because in this study using the Jigsaw learning model assisted by teaching aids students work together in maximizing learning conditions to achieve learning goals and get maximum learning experience, not just in groups, but students are also responsible and work together in discussions and the ability to solve problems quickly and precisely.

4 CONCLUSIONS

Based on the results of the study, it was concluded that there were differences in the use of the Jigsaw learning model assisted by visual aids and the Contextual learning model for understanding mathematical concepts in class X students of Al-Irsyad High School, Tegal City.

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