

THE IMPLEMENTATION OF STUDENT TEAMS ACHIEVEMENT DIVISION LEARNING MODEL ASSISTED BY QUESTION CARDS AND STUDENTS' MATHEMATICAL LITERACY SKILLS

Lu'lu Finisa¹, M. Shaefur Rokhman², Ibnu Sina³

^{1,2,3}*Mathematics Education Universitas Pancasakti Tegal*

Email : lulufinisa2002@gmail.com¹, saefur98@gmail.com², ibnusinaupstegal@gmail.com³

Abstract

Mathematical literacy skills have a very important role in education. This study aims to determine the differences in students' mathematical literacy skills using Student Teams Achievement Division assisted by question cards and conventional learning models. This type of research is experimental research with a quantitative approach. The population in this study were VIII grade students of SMP Negeri 2 Warureja. The sample was taken by cluster random sampling and three classes were selected, namely experimental class, control class and instrument trial class. Data collection methods were observation, interview, test, and documentation. Data analysis technique using independent sample t test. The results stated that there were differences in students' mathematical literacy skills by using the Student Teams Achievement Division learning model assisted by question cards and conventional learning models.

Keywords: Question cards, mathematical literacy skills, Student Teams Achievement Division

INTRODUCTION

Mathematical literacy is an important cornerstone in education because it not only helps students understand mathematical concepts, but also develops critical thinking skills, problem-solving skills, and preparation for the challenges of a modern world that is increasingly dependent on data and analysis. Literacy is one of the 21st century skills needed by students in the current era of modern education, especially mathematical literacy (Hamidah & Widodo, 2022, p. 722). Mathematical literacy is the skill of students in interpreting information from recognizing, understanding problem situations, and making decisions about how to solve these problems (Mahdiansyah & Rahmawati, 2014, p. 455). Mathematical literacy is not just mastering mathematical formulas and concepts, but also shaping the character of students who are ready to face the challenges of the modern world. Through a deep understanding of problem situations, critical thinking skills, cooperation, perseverance, and data literacy, students will have a strong foundation to face the changing times and contribute positively in an increasingly complex society

The achievement of student literacy skills in Indonesia, one of which is mathematical literacy skills from the Programme for International Student Assessment (PISA), a study organized by the Organization for Economic Co-Operation and Development (OECD). The OECD conducts international studies to assess the basic literacy levels of 15-year-old students in reading, math, and science. PISA is held at three-year intervals and Indonesia has participated in seven PISA cycles since (Pusat Penelitian Kebijakan, 2021, p. 2). The results of Indonesian students' rankings in OECD PISA scores from 2000 to 2018 indicate that Indonesian students' mathematics scores are quite far below the average score This indicates that the mathematical literacy of Indonesian students still needs to be further improved (Mahdiansyah & Rahmawati, 2014, p. 455). Indonesian students' mathematics scores, which are consistently below the OECD PISA average, represent a huge challenge in the education system. Literacy skills need to be developed through various approaches and methods because in today's global era, the skills of understanding information analytically and critically are very important demands (Fatahillah & Amorie, 2022, p. 111).

Based on the results of interviews with one of the mathematics teachers at SMP Negeri 2 Warureja, namely Mrs. Hamimatul Azkiya S.Pd., the mathematical literacy skills of VIII grade students at SMP Negeri 2 Warureja still tend to be lacking, this can be seen from students who still have difficulty solving story problems and student exam results which show that the average is still below the minimum standard. As for the mathematics learning process, it still uses a conventional learning model

From the low literacy skills of students, the factors that influence students' mathematical literacy skills, according to Wilkin, Zembilas, and Travers (2002) as cited in (Mahdiansyah & Rahmawati, 2014, p. 455) are (1) personal variables such as age, motivation, previous achievement, self-concept; (2) instructional variables such as intensity, quality, and teaching methods; and (3) environmental variables such as conditions at home, teacher conditions, class, school, learning friends, and learning media. In the context of mathematics learning, an effective classroom condition is the selection of the right learning model, which can help create effective learning. In addition, the role of the teacher is also very significant in learning activities. Teachers must be able to develop learning models and use learning media that attract students' attention because in the learning process there is interaction between teachers and students through communication

If teachers keep using a lecture-based learning approach that only focuses on transferring information from the teacher without giving students the opportunity to actively participate, and rarely use discussion methods, then students who have limited understanding of learning materials will continue to have difficulties in understanding the concept. Therefore, it is necessary to change the learning model to encourage students' active participation, including involving them in group learning, in order to improve their understanding in the learning process in the classroom (Zulfaningrum, 2021, p. 485). One of the strategies to solve this problem is to use a student-centered learning model, which is cooperative learning model. According to Arends in (Kusuma, 2017, p. 89) one of the important aspects of cooperative learning is that this model is supports increased collaborative behavior and more positive interactions among students, while simultaneously assisting them in achieving academic results. Cooperative learning is learning in groups so that student cooperation and interaction occur in the learning process so that learning achievement increases (Amin et al., 2020, p. 222).

The Student Teams Achievement Division (STAD) learning model is one of the cooperative type learning models that provides opportunities for teams to learn concepts and skills together in groups. Basically, each student has diverse capabilities. Involving students in group learning can increase self-confidence and facilitate accepting and appreciating the opinions of classmates (Zulfaningrum, 2021, p. 485). With the Student Teams Achievement Division learning model that encourages students to work together in groups, in these groups, students discuss with each other, share their understanding, and help each other in understanding mathematical concepts. Through this collaboration, students can develop critical thinking skills and understand math more deeply. Each team member has the responsibility to understand and explain mathematical concepts to their team members. This encourages students to play an active role in the learning process and learn the material individually. Students' mathematical literacy skills can develop through individual efforts in understanding and explaining concepts to their team members

Besides the learning model, the use of the proper media becomes the unique combination that can provide deeper meaning in the learning process. One of the media that can help is card media (Kusuma, 2017, p. 34). These question cards contain a set of questions related to the learning material, which are displayed in the card shape. The use of question cards is adopted as a variation in the task. The application of question cards can stimulate students' enthusiasm in participating in the learning process. The existence of question cards invites students to work on questions while collaborating with their groups, so as to develop students' understanding of the material taught by the teacher (Nada et al., 2020). When using question cards in learning, students are invited to discuss and interact with their group members. This process allows them to talk about their understanding of the problem and the strategies used in finding solutions. Communicating about mathematics helps students construct arguments and articulate their ideas clearly, which is an important aspect of mathematical literacy.

The purpose of this study was to determine the differences in students' mathematical literacy skills using Student Teams Achievement Division assisted by question cards and conventional learning

METHODOLOGY

The method used in this research is a quantitative method. This research is an Experimental research. In this experimental research there are three classes, which are experimental class, control class and trial class. The experimental class received treatment during mathematics learning by using the Student Teams Achievement Division learning model assisted by question cards, while the control class used a conventional learning model and the trial class as a trial class for the research instrument. The research design or pattern of this study is by using a pre-test post-test control group design. The pre-test post-test control group design table is shown as below

Table 1. Research Design

<i>Pre-test</i>	<i>Treatment</i>	<i>Post-test</i>
O_1	X_1	O_3
O_2	X_2	O_4

Notes:

O_1 dan O_2 : Both groups were given a pre-test

X_1 : Division Experimental group with Student Teams Achievement Division model

X_2 : Control group with conventional learning model

O_3 dan O_4 : Both groups were given a post-test

In this study there are two types of variables, namely the independent variable and the dependent variable. The independent variable is the Student Teams Achievement Division learning model assisted by question cards as X and the dependent variable is the students' mathematical literacy skills as Y

This research was conducted in class VIII even semester of 2022/2023 SMP Negeri 2 Warureja. Sampling by means of cluste random sampling, namely drawing from all classes to take three classes. Of the 10 classes, three classes were selected, that is, class VIII G as an experimental class totaling 31 students, class VIII H totaling 32 students as a control class, and class VIII A totaling 31 students as a trial class. The topic material taught in this study was statistics

The data collection methods in this study are: (1) Test. The tests used in this study were pre-test and post-test were conducted to determine students' mathematical literacy skills. The test consisted of 10 essay questions. With indicators of mathematical literacy skills used are indicators according to PISA, which are (a) communication, (b) devising strategies for solving problems, (c) mathematizing, and (d) reasoning and argument. Before the test, the test instrument that has been made needs to be tested for validity, reliability, differentiability, and difficulty test. If the question results are valid, good reliability, and have good differentiation, the instrument is ready to use, (2) Observation, conducted to obtain supporting data about the description of the research location, student conditions, facilities and infrastructure, and study schedules, (3) Interviews, conducted to complement and strengthen the data obtained by researchers from observation and documentation techniques, (4) Documentation, used to obtain data directly from the research site. In this case, the documentation needed in this study is data about teachers, and students and photos during research time learning.

Data analysis in this study using the independent sample t test, the reason for this technique is to test the difference between students' mathematics literacy skills using the Student Teams Achievement Division learning model assisted by problem cards and conventional learning models before treatment and after treatment. Parametric prerequisite tests are carried out first before data analysis. The prerequisite test consists of normality test, homogeneity test, sample equality test. While hypothesis testing uses independent sample t test.

RESULTS

This research uses Student Teams Achievement Division learning model assisted by question cards which is a cooperative type learning model. Through cooperative learning, students are given the opportunity to interact, discuss, and help each other in understanding the material. They can exchange ideas, solve problems, and work together. In learning groups, students can support each other, clarify concepts, and gain a better understanding through discussion. According to Jhonson, the main objective of cooperative learning is to optimize students' learning process to improve academic achievement and understanding, both on an individual and group scale (Ariani & Agustini, 2018, p. 66).

Mentioned by Slavin that the main idea of the Student Teams Achievement Division learning model is to motivate students to encourage each other in mastering the material. The Student Teams Achievement Division learning model can create a learning atmosphere so as to create active, innovative, and creative learning for students so that it can also increase students' enthusiasm for learning so that it will affect students' abilities (Nikmah et al., 2016, p. 55)

This study aims to determine the differences in students' mathematical literacy skills with the Student Teams Achievemnt Division model assisted by question cards and conventional learning models. In the Student Teams Achievement Division model emphasizes teamwork, this is what requires students to be able to help each other, motivate and provide opportunities to be able to learn

together, that is, share knowledge and opinions, listen to each other and motivate each other,. this form of cooperation is realized in learning teams consisting of four to five students of academic ability, gender, and ethnic race. Its function is to be able to work together and help each other in completing tasks and in mastering the material. Because fellow students have the same language, level of intellectual development and experience of closeness that can make students easier to understand the material (Nikmah et al., 2016, p. 55). In contrast to the control class which was taught using a conventional learning model, in the conventional learning model, the process of learning generally takes place in one way, which is only the transfer of knowledge and others from teachers to students. This process is built on the assumption that students are likened to a white canvas so that the teacher must fill in the white canvas. This kind of learning system can also be called banking concept (Helmiati, 2012, p. 121) By using conventional learning models, students become passive and if used for too long it will be boring and monotonous so it is less effective if used continuously. This can result in a lack of student understanding of the material being taught.

The results of the independent sample t test before treatment showed that there was no difference in the average pre-test scores of the experimental and control classes. This shows that the mathematical literacy skills of students in both classes before treatment are equal with the value of $t_{STATISTIC} < t_{\frac{\alpha}{2},n-2}$ is $1,413 > 2$

Table 2. Pre-test independent sample t-test results

Class	N	Mean	$t_{statistic}$	$t_{\frac{\alpha}{2},n-2}$	Description
Experiment	31	43,161	1,413	1,697	H_0 rejected
Control	32	39,875			

he results of the independent sample t test after treatment in the experimental and control classes show that the value of $t_{statistic} > t_{table}$ is $5,651 > 2,000$ then H_0 is rejected, meaning that there is a difference in students' mathematical literacy skills with the Student Teams Achievement Division learning model assisted by question cards and conventional learning models..

Table 3. Post-test independent sample t-test results

Class	N	Mean	$t_{statistic}$	$t_{\frac{\alpha}{2},n-2}$	Description
Experiment	31	73,097	9,101	1,697	H_0 rejected
Control	32	59,687			

The test results after being given treatment show that there is a difference between students' mathematical literacy skills using the Student Teams Achievement Division learning model assisted by question cards and conventional learning models. It can be seen that the experimental class average is 73.097 greater than the control class average which is 59.687 so that the Student Teams Achievement Division learning model assisted by question cards is better than the conventional learning model

CONCLUSIONS

Based on the results of the analysis and discussion, it can be concluded that there are differences in students' mathematical literacy skills using the Student Teams Achievement Division learning model and conventional learning models.

Based on the above conclusions, suggestions are proposed that can use other media assistance considering there are many media that can be used so that the learning process is more enjoyable in order to improve mathematical literacy skills

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