The Effect Of Multy Reprecentacy Discourse Learning Assisted By Liveworksheet On Students' Mathematical Comprehension Ability

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Abstrak

Model diskursus multy reprecentacy (DMR) merupakan salah satu model yang mampu meningkatkan pemahaman matematis siswa dengan kolaborasi kelompok dikelas serta menggunakan aplikasi Liveworksheet. Tujuan penelitian ini untuk mengetahui pengaruh pemahaman matematis siswa setelah dibverikan model DMR dengan aplikasi Liveworksheet. Penelitian ini menggunakan pendekatan kuantitatif. Menggunakan sampel siswa kelas VII di SMPN 1 Cikeusik, kelas VIIA sebagai kelas eksperimen dan VIIB sebagai kelas kontrol yang diambil menggunakan teknik purposive sampling. Teknik pengumpulan data yang digunakan dalam penelitian ini adalah observasi dan tes. Penelitian ini menggunakan analisis data statistik, namun sebelumnya dilakukan uji prasyarat dalam melakukan analisis data dengan statistik parametrik menggunakan rumus polled varians. Berdasarkan penelitian dapat ditarik kesimpulan bahwa terhadap pengaruh model DMR dengan aplikasi Liveworksheet terhadap kemampuan pemahaman matematis siswa SMP.

Kata Kunci: Model Diskursus Multy Reprecentacy; Aplikasi Liveworksheet; Pemahaman Matematik

Abstract

The discourse multy reprecentacy (DMR) model is one of the models that are able to improve students' mathematical understanding by collaborating in groups in class and using the Liveworksheet application. This study aims to determine the influence of students' mathematical knowledge after verifying the DMR model with the Liveworksheet application. This study uses a quantitative approach. Using a sample of grade VII students at SMPN 1 Cikeusik, class VIIA as an experimental class and VIIB as a control class were taken using a purposive sampling technique. The data collection techniques used in this study are observation and tests. This study uses statistical data analysis, but previously, a prerequisite test was carried out to conduct data analysis with parametric statistics using the polled variance formula. Based on the research, it can be concluded that the influence of the DMR model with the Liveworksheet application on the mathematical comprehension ability of junior high school students.

Keywords: Multy Reprecentacy Discourse Model; Liveworksheet app; Understanding Mathematics

1. INTRODUCTION

Education is the process of changing the behavior of a person or a group of people to mature human beings through teaching and training efforts, action processes, and ways of educating. Learning in the education system is the mostessential activity because it is expected to achieve educational goals through changes in behavior, skills, and abilities in students. A good learning plan supported by adequate facilities coupled with the creativity of educators will help students quickly achieve satisfactory learning outcomes. According to (Ahmad et al., 2020), Learning outcomes result from an interaction between learning and teaching. So there

needs to be a development of the quality of education, especially in an era that has been increasingly developed and all technologies that can be used have emerged. According to (Matin et al., 2022) The quality of education is problematic if the educational results have not reached the expected level.

Meanwhile, according to (Tari et al., 2020) The success of students in achieving learning outcomes in each student varies. The factors that affect the success of students in achieving learning outcomes are grouped into two, namely internal factors and external factors. Internal factors are all factors that come from within students, including personality, motivation, and so on. At the same time, external factors are all factors that come from outside students, including the environment, family, associations, learning facilities, and so on.

Understanding is a process, how to understand how to learn well so that you understand and know a lot (ROFEI, 2020). *Comprehension* this ability is generally emphasized in the teaching and learning process. Mathematical understanding is a fundamental mathematical ability and should be mastered by all people to be able to solve mathematical problems or problems. This aligns with the opinion (Khoerunnisa & Hidayati, 2022). Although mathematics is a compulsory subject in every school and university, most students consider mathematics to be a daunting subject in real life. One of the reasons why, according to students, is that the material is challenging to understand, so it is the cause of low mathematics scores and the selection of teaching materials that are less attractive to students in terms of presentation and display of the material. As a result, students are more likely to feel bored and less interested in learning the material presented.

In addition, it is said that mathematics lessons are more focused on concepts (Alzanatul Umam & Zulkarnaen, 2022). The ability to understand mathematics is an initial mastery that students must have to construct meaning. Comprehension is the ability of students to interpret something that is already known and understood which can then be explained and communicated to others (Anindya et al., 2022). The internal factors that cause difficulties in learning mathematics in dyscalculia students are physical health, attitude, interest, and motivation. Unhealthy physical health such as drowsiness, dizziness, and fatigue can cause loss of concentration. Based on the interview, informant 5 admitted that he was dizzy when learning mathematics because he could not answer the questions. This results in dyscalculia students not focusing on learning. It can be concluded that students' mathematical comprehension ability is relatively low, whether the low ability to understand students' mathematical concepts is due to the lack of participation of students in understanding concepts independently and only focusing on memorizing concepts.

Improving the quality of education can start by improving the quality of teachers in teaching and behaving professionally. In addition to learning strategies, things that teachers also need to pay attention to students in the learning process is the preparation of teachers in planning, implementing, and evaluating learning activities. Lesson study provides a method to collaborate and design learning and assess the success of teaching strategies that have been implemented to improve students' learning process and acquisition (Pujasmara *et al.*, 2023).

Some students can be convenient in receiving material by listening to the teacher explain it, because we understand that students have different comprehension abilities. However, students who benefit from audio-visual aids, such as packaging animations in learning videos, may not be aware of the fact that they have a better chance of understanding the material. Videos act as an introduction to information with the ease of repeating or stopping the video so that it can develop students' conceptual understanding skills (Pratiwi *et al*., 2022). The use of video as a learning medium is very appropriate. By combining audio, video, and animation,

visualization of learning media makes the learning process more interesting (Hamidah; Kusuma, 2020; Kusuma & Hamidah, 2019). By creating video a learning medium, learning becomes a practical means that makes it easier to understand.

One of the efforts to improve students' mathematical abilities is using the Multy Reprecentacy Discourse model. the Multy Representation Discourse Model (DMR) is one of the student-oriented mathematics learning. In this model, students do various activities such as issuing ideas, writing ideas, listening to other people's ideas, and having conversations in multiple directions to arrive at the mathematical understanding learned by students. The Multy Representation (DMR) Discourse Model is formed in groups or cooperatively so that students become active in learning (Herdiana et al., 2021). The syntax of the model is as follows: 1) Prepare LKPD and learning media; 2) Students are divided into several heterogeneous groups; 3) Introduction arousing students' interest through exploration using media; 4) Problem development; 5) The application of problem-solving in group discussions; and 6) Final report of each group. One alternative learning media that can be used is LKPD (student worksheet). LKPD is a learning medium used by students to support the learning process. According to (Putra et al., 2021) student learning outcomes can be improved with the help of LKPD. In addition, the presentation must also be simple and easy for students to understand while learning.

Using Student Worksheets as a teaching medium is also one way to improve students' learning activities (Indrawan & Yudiana, 2022). At this time, learning must be technology-based so that learning activities become flexible, so it is necessary to develop an electronic-based Student Worksheet (E-LKPD). E-LKPD is the same as student worksheets in general, only on digital-based E-LKPD which can be accessed via mobile phone or laptop. Through problem-solving, students can think critically and systematically to draw conclusions based on their understanding. From several opinions from experts, it can be concluded that the use of LKPD can help students with their mathematical comprehension.

To realize the activeness of students during learning, it must be supported by the existence of supporting learning tools, one of which is the use of Student Worksheets (LKPD). This LKPD is one of the learning tools or teaching materials used in the learning process. This LKPD was previously better known as LKS (Student Worksheet). The use of LKPD in learning activities helps students dig up information, find information, and apply concepts or develop a concept that they have learned (Fauziah & Hamdu, 2022).

At the same time, in the 21st century, LKPD has experienced positive performance progress, one of which is coordinated with electronic media, known as E-LKPD (Zahroh & Yuliani, 2021). Furthermore, it was revealed that along with technological developments, LKPD was changed to electronic LKPD (E-LKPD). E-LKPD has audio, images, and videos to support learning activities. One of the sites that can be accessed to create E-LKPD is *the liveworksheet.com website*. The use of E-LKPD based on the living worksheet site on the material, where the research result is that E-LKPD based on living worksheets is considered suitable for use as a teaching material. In addition to its feasibility as a teaching material, LKPD is efficacious in improving learning completeness and outcomes. As (Putra et al., 2021) stated LKPD is effectively used in the learning process. This is shown by the increase in knowledge mastery, individual completeness and completeness of psychomotor learning outcomes.

The use of E-LKPD also upholds the creation of applicative and actual model recordings by adding connections, sounds, and various types of decision questions, short sections, drop and down so that learning becomes very interesting, can be given by assignment instructors to students, without correction because the application of direct worksheets can automatically correct the grade results. It saves time and paper and can be a suitable learning medium and

teaching material for in-person and distance learning (Fauzi et al., 2021). Technological changes develop over time, resulting in the use of technology being widely used in many fields. Likewise, in education, technology is used as a means of media to help convey messages about learning materials from educators to students. In Law No. 20 of 2003 regarding the National Education System, it can be concluded that to face world challenges, the national education system must be able to increase teaching efficiency, distribute education equally, increase the relevance of education management and carry out periodic and structured education reforms. The rapid development of technology is also constructive for teachers in developing and preparing teaching materials that are relevant to the needs of students.

In addition, the use of supporting teaching materials is also very much needed because it can encourage students to understand the learning material delivered by teachers more quickly so that the learning goals can be achieved optimally. The development of teaching materials must be integrated with learning because teaching materials support the learning process. When teachers develop teaching materials in any form that must be adapted using the objectives contained in the curriculum that students must master, the development of live worksheet-based teaching materials for students is essential. With the effort to be able to produce expertise in solving a problem in mathematics learning in students, it is also considered necessary to be able to apply a lesson that can help students understand a subject matter, be active in the process of implementing lessons, can make students motivated by using the multi representant (DMR) discourse model with the live worksheet application. The formulation of the problem in this study is: 1) whether there is an influence on students' mathematical comprehension ability after being given the learning model of the multi representant (DMR) discourse model with the live worksheet application; 2) how the students who are given learning with the learning model of the multi representant (DMR) discourse model with the live worksheet application.

2. RESEARCH METHODS

This study uses a quantitative approach. According to Sugiyono, the philosophy of positivism can see that these phenomena/realities/phenomena can be grouped and measured, there is a causal symptom relationship, relatively fixed, observable, and concrete. Research activities are carried out by directly reviewing a particular population or sample that is representative. The stages in conducting research have a deductive nature, which means that the researcher is able to provide answers to the formulation of problems using theories or concepts so that the hypothesis can be formulated effectively later (Hermawan & Hariyanto, 2022). This type of research is an experiment with a quasi-experimental design. According to Abdullah, the experimental method determines the influence of independent variables that have been manipulated or given specific treatment to the bound variable (Makmun et al., 2023).

The design form in this study is a form of Nonequivalent Control Group Design carried out using two classes as control groups. Before the Multy Reprecentacy (DMR) Discourse learning model was implemented, the two classes were given a pretest, and after the treatment the two classes were given a posttest. Students in the experimental class were given the Multy Reprecentacy (DMR) Discourse learning model using the liveworksheet application and in the control class were not given treatment/given conventional learning so that the results of the student comprehension ability test between the two classes could be compared.

$$O_1 \qquad x \qquad O_2$$

$$O_3 \qquad\qquad O_4$$

Information:

O_1 : Pretest in the Experimental Class
O_2 : Posttest conducted in the experimental class
x : Multy Reprecentacy (DMR) Discourse learning with live worksheet application
O_3 : Pretest on the control class
O_4 : Posttest performed on the control class
--- : Researchers cannot fully control

The population in this study is 190 students in SMPN 1 Cikeusik class in 5 classes. The samples in this study are class VIIA as an experimental class and VIIB as a control class taken using a purposive sampling technique. The data collection techniques used in this study are observation and tests. Data analysis techniques are used to ensure that the learning process runs following the planned procedures. At the same time, a test is a series of questions or tools used to measure the skills, knowledge, intelligence and abilities or talents possessed by an individual or group. The instruments used before use have been tested and analyzed using validity, reliability, question differentiation, difficulty, and expert validity tests. This study uses statistical data analysis, but previously, prerequisite tests were carried out, namely the normality and homogeneity tests. Furthermore, a parametric or nonparametric average difference test is carried out according to the results of the prerequisite test.

3. RESULTS AND DISCUSSION
RESULT

This research was carried out by applying the Multy Reprecentacy Discourse (DMR) learning model using a live worksheet application to grade VII students at SMPN 1 Cikeusik. Before the learning process is carried out, a test sheet containing essay questions totaling five questions is given according to the learning material. The learning model of the Multy Reprecentacy Discourse (DMR) using the live liveworksheet application was implemented in class VIIA, which was used as an experimental class and then compared to class VIIB, which was used as a control class and treated conventionally. The learning model of the Multy Reprecentacy Discourse (DMR) uses a live worksheet application implemented in class VIIA. In this study it is carried out by dividing student groups according to the stages of the Multy Reprecentacy Discourse (DMR) learning model. With the help of teachers, students are asked to:

1. Each student conducted a group discussion on the material that had been developed.
2. Students are randomly assigned to present the results of their group discussion in front of the class while other students take note of things that are considered important.
3. Teachers provide opportunities for students to ask questions and answer each other.
4. The teacher adds an explanation of the answers to the questions given by the students.

In solving the problem, the students had to form into several groups. Then the teacher explained a little about the material to be studied to provide a stimulus for students to ask. Students are given E-LKPD or Liveworksheet with appropriate questions. After that, students and their groups will analyze the problem. Teachers go around to guide students through the analysis. After all groups of students have finished examining the problem, then the group of students is directed to present the results of their analysis. After all groups of students have

done their assignments, the teacher conveys problems regarding the material studied. In the next meeting, the researcher provided a posttest as research data. The results of the study can be presented as follows:

Table 1. Data of Pretest and Posttest Results of the experimental class and control class

Data	Class	N	Max	Min	X
Pretest	Experiment	38	60	30	46,44
	Control	38	65	30	46,04
Posttest	Experiment	38	95	60	76,97
	Control	38	85	50	66,84

The score data obtained by students in the table above shows that there is a difference in student scores in the classroom after the implementation of the Multy Reprecentacy (DMR) Discourse learning model with the liveworksheet application. The average post-test score obtained by students in the experimental class was 76.97. Meanwhile, the average score of the posttest in the control class was 66.84. The following table shows the calculation results of the prerequisite test.

Table 2. Data on the Results of Normality of the Experimental Class and Control Class

Data	Class	n	X^2count	X^2table	information
Posttest	Eksperiment	38	7,486	11,070	Normal
	Control	38	8,354	11,070	Normal

Based on the results of data analysis of the data normality test contained in the table above, it shows that the calculation results from the posttest data of the experimental class were obtained X^2count = 7.486 and in the control class X^2count = 8.354 with the value of X^2table = 11.070. If X^2count < X^2table at a significant level of 0.05%, it can be concluded that the calculation results show that the experimental and control classes' posttest data groups are normally distributed.

Table 3. Data on Homogeneity Test Results of Experimental and Control Classes

Data	F_{count}	F_{table}	information
Posttest	1,328	1,730	Homogeneous

The F test was used to determine the homogeneity of the two data groups, as seen from the data from the calculation results from the post-test data in the experimental class. The control class had a homogeneous variance because the F_{count} < F_{table} at a significant level of 0.05 which was shown by the data from the calculation results F_{count} = 1.328 < F_{table} = 1.730 So that the data group has a homogeneous variance, after knowing that the data group in this study is usually distributed and homogeneous, a hypothesis test is carried out to find out whether the hypothesis that has been formulated based on previous theories and research is accepted or rejected. The results of the prerequisite test that has been carried out show that the data is eligible to be tested using parametric statistics, so the hypothesis test of this study uses a t-test with a polled variance formula that produces the following data.

Table 4. Test Result Data *t*

Statistics	Post-Test result data	
	Eksperiment	**Control**
N	38	38

Statistics	Post-Test result data	
	Eksperiment	**Control**
x^2	76,97	66,84
S^2	48,026	54,623
S	6,930	7,391
t-count	6,164	
t-table	2,026	

Based on the results of the calculation in hypothesis testing using the polled variant formula at a significant level of 0.05 (5%) with the degree of freedom dk = n1 + n2 – 2 = 74, then t-count = 6.164, while t-table = 2.026 was obtained. So following the criteria in decision-making that if the t-count > t-table then (6.164 > 2.026) then the alternative hypothesis (Ha) is accepted, and the null hypothesis (Ho) is rejected. This means there is a significant difference between the average scores of the two groups, namely the experimental and control groups. Thus, it can be concluded that the Multy Reprecentacy (DMR) Discourse learning model using the liveworksheet application has an influence on students' mathematical comprehension ability in mathematics subjects in grade VII of SMPN 1 Cikeusik because there was a significant difference between the mean scores of the two groups, namely the experimental group and the control group.

Discussion

According to Nichol and Colin, the DMR learning model is a learning model that focuses on the process of understanding concepts through group discussions. If other learning focuses more on the skills of one or two people in the group, DMR learning focuses more on the discussion process to find answers to problems and get the results of discussions agreed upon by all group members (Annisa, 2022). Based on research conducted at SMPN 1 Cikeusik, the results show that applying the Multy Reprecentacy (DMR) Discourse learning model using liveworksheet significantly influences student's comprehension ability in mathematics subjects in grade VII. This is shown by the data on the increase in posttest results in students in the experimental class after applying the Multy Reprecentacy (DMR) Discourse learning model using live worksheets in mathematics subjects. The increase in student outcome scores after being treated using the Multy Reprecentacy Discourse (DMR) learning model using live worksheets in mathematics subjects is seen from the results of the student's mathematical comprehension ability tests. This is inversely proportional to the students who are still using conventional learning. Previously, the Multy Reprecentacy (DMR) Discourse learning model was implemented in the experimental class (VIIA), first preparing the Liveworksheet or E-LKPD application which will be used when completing tasks that can support the implementation of learning in the classroom.

Liveworksheet is a supporting application because it has entered an era where everyone uses technology, so young people must be educated about this problem. This is very helpful for students and educators in working and making problems about mathematics because the E-LKPD or Liveworksheet Application used by researchers makes teaching more illustrated. After all, there are 2-dimensional and 3-dimensional elements that can be seen directly. With this, the mathematical picture will be visible through animation from the liveworksheet application. Before implementing the learning process in the classroom, students first prepare things that can support the learning process. (Krisnan, 2021) explained that the quantitative method is a research method based on the philosophy of positivism, which is used to research a specific population or sample, which is generally sampled randomly, and data is collected using research instruments, then quantitatively/statistically analyzed to test the hypothesis that

has been determined. This is carried out so that the learning process can run well. After treating the two sample groups, the next activity was carried out: post-test. In Table 1, the post-test results in the experimental class show that the average score is 76.97 while the control class's average post-test score is 66.84. From the results of this pre-test and post-test, it can be concluded that there is a significant increase in students' learning outcomes after learning.

To conduct the next test, the researcher conducted a prerequisite test to evaluate whether the test data used had a regular and homogeneous distribution or not, in Table 2, after conducting a prerequisite test (X^2count = 7.486 < X^2table = 11.070) and in the control class obtained (X^2count = 8.354 < X^2table = 11.070) The data group was generally distributed because it met (X^2count < X^2table), it can be concluded that the calculation results show the posttest data group in Experimental class and normally distributed control class. The researcher also identified that the experimental and control classes with the data from the calculations in Table 3 F_{count} = 1.328 < F_{table} = 1.730 prove the homogeneity that is homogeneous or normal the data obtained and then processed. And also the researcher In this study, the researcher used a manual method with the help of Microsoft Excel.

Furthermore, the researcher conducted a hypothesis test. The hypothesis proposed in this study was Ha, which was tested to find the truth. The Ha hypothesis was as follows: "There is an influence of the Multy Reprecentacy Discourse (DMR) learning model using live worksheets on the mathematical comprehension ability of students in mathematics subjects in grade VII SMPN 1 Cikeusik". The results obtained using Excel show that the data from the research results have a regular and homogeneous distribution. After the data of the two sample groups have been declared regular and homogeneous, the next step is to test the hypothesis in Table 4, resulting in (6,164 > 2,026), then the alternative hypothesis (Ha) is accepted and the null hypothesis (Ho) is rejected. According to the results of the hypothesis testing in this study, it can be concluded that there is an influence of the Multy Reprecentacy (DMR) Discourse learning model using the live worksheet application on students' mathematical comprehension ability in mathematics subjects in grade VII SMPN 1 Cikeusik. This increase in average score can be caused by applying the Multy Reprecentacy Discourse (DMR) learning model using the live worksheet application. In this learning model, students face a situation that focuses on small groups in the classroom that stimulates students' mathematical understanding and a sense of responsibility in cooperation with their friends, both those they have experienced and those they have met before. This model is also assisted by a Liveworksheet that makes Shiva feel happy and feel that the learning is more varied than conventional learning in general.

From the data that has been collected and tested by the researcher, the difference in the final results between the two groups shows that the experimental class that uses the Multy Reprecentacy Discourse (DMR) learning model using the live worksheet application has advantages compared to the control class that gets conventional learning. The Multy Reprecentacy Discourse (DMR) teaching model uses live worksheets to help improve students' mathematical comprehension skills with exciting and collaborative learning. The Multy Reprecentacy Discourse (DMR) learning approach uses live worksheets to stimulate students' mathematical comprehension skills by collaborating with their friends, as well as to help students use technology in sync with the development of the times.

The Multy Reprecentacy Discourse (DMR) is a model used by teachers in the learning process, especially in mathematics, by facing students with heterogeneous small groups to feel braver when learning with their friends. This stimulates their sense of responsibility for their small group. Applying this DMR model teaches participants relevant to students' daily lives how to get used to collaborating with others, and it can help students' mathematical

comprehension skills improve. By applying the Multy Reprecentacy Discourse (DMR) model using live worksheets, students become more active in class with group collaboration receive good knowledge, ultimately producing positive learning outcomes.

Several advantages support the success of using the DMR model. First, students are encouraged to have the ability to learn communication with their groups through learning activities collaboratively. Second, learning is focused on a sense of responsibility with the group. Third, small discussion activities make students more courageous, allowing them to collaborate and learn from each other. Fourth, students can communicate scientifically in discussion activities or presentations of their work. Fifth, individual students' learning difficulties can be overcome through group work. And finally, the help of the live worksheet application helps provide questions in the form of E-LKPD that can be accessed through each student's cellphone, but because the DMR learning system prioritizes teamwork and collaboration, learning to use the live worksheet together or alternately. These advantages significantly contribute to successfully implementing the DMR model in the learning process. By implementing the DMR learning model, it is hoped that there will be an improvement in the teaching and learning process and students' understanding of learning, especially in mathematics subjects. With the application of the DMR learning model, students' mathematical comprehension skills can be improved, and with the help of Liveworksheet, student learning outcomes can become good.

Several experts explain that this learning model is a heterogeneous small-group discussion. This is in line with the theory put forward by Jean Piaget. Jean Piaget's definition of cognitive development is that it depends on how a child interacts with the environment (Kusmiati et al., 2024). When students interact with their group friends, a learning atmosphere will be created and development will be caused. It is different when students only learn conventionally.

The response of students who were used to using the conventional model when given the Multy Reprecentacy Discourse (DMR) learning model students was more active in class and easily communicated with their small group friends, the improvement of students' mathematical understanding also increased when given the Multy Reprecentacy (DMR) Discourse learning model assisted by the live worksheet application which is used to fill in math problems. This research is also in line with previous research journals, namely (Nurhidayati & Mahpudin, 2023), which said that the application of the Multy Reprecentation Discursus Model received a positive response from students. The learning atmosphere in the classroom becomes more active and provides a learning outcome that makes students quickly understand the material. Although students have difficulty adapting to the learning stages at the first meeting, they begin to get used to it in the next meeting. Students have problems because they are not used to this learning model. However, this difficulty encourages students to help each other because students in a group have different levels of ability, and students also become more active in group learning than studying alone.

4. CONCLUSION

This study concludes that the mathematical comprehension ability of students given the DMR model assisted by the Liveworksheet application is improved compared to students who learn using conventional. The mathematical comprehension skills of students at SMPN 1 Cikeusik are classified as very good after being given a DMR model assisted by the Liveworksheet application. Suggestions for further research are that the DMR model assisted by the Liveworksheet application is used for collaboration skills in the classroom so that mathematical understanding is improved and then combined with the Problem-Based Learning model to integrate more the ability of the model to solve problems.

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