Student's Mathematical Representation using PMRI Approach and LSLC on Algebra Operating Materials in 7th Grade

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Abstrak

Penelitian ini bertujuan untuk mengetahui kemampuan representasi matematis siswa pada materi operasi penjumlahan dan pengurangan bentuk aljabar dengan menggunakan pendekatan PMRI dan LSLC. Subjek penelitian ini adalah siswa kelas VII. SMP 1 Palembang Pusri berjumlah 24 orang. Proses pembelajaran berlangsung sesuai dengan prinsip dan karakteristik PMRI dan LSLC. Teknik pengumpulan data yang digunakan dalam penelitian ini adalah tes tertulis yang terdiri dari 2 pertanyaan deskripsi, observasi dan wawancara yang diperlukan untuk memperoleh data pendukung. Tes dilakukan untuk mengetahui kemampuan representasi matematis siswa saat mengerjakan soal. Observasi dilakukan untuk dapat melihat aktivitas siswa selama proses pembelajaran berlangsung. Kemudian wawancara digunakan untuk mengkonfirmasi jawaban siswa. Berdasarkan hasil penelitian, gambaran kemampuan representasi matematis penjumlahan dan pengurangan bentuk aljabar menggunakan pendekatan PMRI dan LSLC adalah sebagai berikut: pada soal tes siswa telah mampu memunculkan 3 indikator yaitu representasi verbal, simbolik representasi dan representasi visual. Namun masih ada siswa yang mengalami kesalahan dalam mengidentifikasi unsur-unsur dalam soal atau kesalahan dalam pengoperasiannya.

Kata Kunci: Kemampuan Representasi Matematika, Aljabar, PMRI, LSLC

Abstract

This study aims to determine the ability of students' mathematical representation in the addition operation material and the reduction of algebraic forms using the PMRI and LSLC approaches. The subject of this research is class VII students. 1 Palembang Pusri Middle School totaling 24 people. The learning process takes place in accordance with the principles and characteristics of PMRI and LSLC. The data collection technique used in this study is a written test consisting of 2 description questions, observations and interviews needed to obtain supporting data. The test was conducted to determine the ability of students' mathematical representation when working on the problem. Observations are made to be able to see student activities while the learning process is taking place. Then the interview is used to confirm students' answers. Based on the results of the study, an illustration of the mathematical representation ability of the addition and reduction of algebraic forms using PMRI and LSLC approaches is as follows: in the test questions students have been able to bring up 3 indicators namely verbal representation, symbolic representation and visual representation. But there are still students who experience errors in identifying the elements in the problem or errors in operating.

Keywords: Mathematical Representation Ability, Algebraic, PMRI, LSLC

INTRODUCTION

Algebra is one of the basic materials in mathematics that must be mastered by students as initial knowledge in order to understand the next material. Halim, Ruroto & Soerjono (2013) state that students must be able to truly understand and enjoy algebra, because algebra is the basic material for students to be able to understand top-level material. In line with what Tukidjo (2014) argues, the operation of algebraic forms is an important material because it is a prerequisite for several other mathematical materials. One of the basic materials in algebra that students must master is the operation of the algebraic form, both addition and subtraction.

The basis or foundation for how a student can understand and use mathematical ideas is the ability of representation (Sulastri, 2017). Sabirin (2014) states that representation ability is one of the goals of learning mathematics in school, representation ability is important because it is closely related to communication and problem solving skills. So the ability of representation is one of the important things that students must have.

The lack of interest and talent of students in the field of mathematics makes it increasingly difficult for students to understand the material provided by the teacher, one of which is the lack of student interest in mathematics because students do not know the application of algebraic material given in everyday life. So that students think mathematics is only calculations on paper and has no benefit in everyday life. Gumanambo, Sukayasa & Sugita (2016) also argue that one of the causes of students' lack of understanding on algebraic material is that students do not know the benefits in everyday life and many students do not like mathematics.

Based on the 2016 Permendikbud, the learning process must be held interactively, inspiring, fun, challenging, motivating, active and independent. Therefore the teacher must use an appropriate method, model or approach when learning. One approach that is effectively applied is the PMRI approach. As stated by Putri (2013) that one of the approaches that is compatible with the curriculum is the PMRI approach, where mathematics must be close to students and relevant to everyday life. Starting learning by asking problems that are in accordance with the experience and level of knowledge of students is one of the characteristics of PMRI. Through PMRI, it is hoped that students will be able to develop mathematical representation skills because through the material provided and accompanied by giving examples of mathematics that originate from the conditions of daily life students can represent problems better and simpler. (Hernawati, 2016)

In following the current global era, there are 4 things that need to be developed by students, namely (1) critical thinking skills, (2) communication skills, (3) collaboration skills and (4) creativity (As'ari, 2015). However, in fact, students are not given the opportunity to actively collaborate, discuss and argue to find mathematical concepts for themselves (Surati, 2014). Lesson Study for Learning Community (LSLC) is a learning system that is not only focused on how the teacher teaches, but also pays attention to students, how they learn in class and what they are based on in real situations, and how teachers can understand students so that student learning more quality (Sato, 2014). Sato (2014) continues his explanation that the factors that determine the quality of learning include (1) the quality of assignments given to students or the lesson plans (RPP), (2) learning in established relationships (dialogue and collaboration) and (3) activeness, enthusiasm, cognition and emotions of students. From the description above, it is found that LSLC supports the collaboration or collaboration between students during the learning process.

Based on the description above, this study aims to determine the mathematical representation ability of students in algebraic form operation material through PMRI and LSLC in Grade 7..

METHODS

This type of research is descriptive. The subjects in this study were 24 students of class VIII.1 SMP Pusri Palembang. The data collection technique used was observation, giving 2 test questions in the form of descriptions, and interviews. The data analysis used is descriptive. This research was conducted in accordance with the LSLC stages, namely Plan, Do, See, and Re-design. The steps taken at each stage are as follows:

Plan

At this stage the researcher and the teacher jointly make learning tools consisting of lesson plans, student worksheet (share and jumping task) and evaluation questions. It aims to produce a good learning tool so that it can make learning more maximal by collaborating between students.

Do

At this stage the model teacher carries out learning based on the design of the lesson plan that has been designed together. Meanwhile, researchers and other teams became observers, in which the observers observed student activities during the learning process.

See

At this stage it is a reflection stage carried out by the observers together, starting from the model teacher conveying the impression after carrying out the learning in class. And then the observer took turns conveying his findings to the students in the class during the learning process.

Re-design

This stage is a follow-up to the see stage, where the learning devices that have been made are redesigned based on input during the reflection.

RESULTS AND DISCUSSION

At the plan stage, the researcher met the VIII grade mathematics subject teacher. Researchers and teachers in making learning tools in the form of lesson plans, LKPD 1 (share task) and LKPD 2 (jumping task). In making the lesson plan using 2 references, namely the teacher's lesson plan and the lesson plan that has been made by the researcher which will later be made into a new lesson plan. In addition, the preparation of RPP is adjusted to the principles and characteristics of PMRI. In LKPD 1 in the form of Share tasks or containing routine questions for students and for jumping tasks containing non-routine questions adjusted to the principles and characteristics of PMRI. In addition, the researcher and the subject teacher also made evaluation questions that were adjusted to the indicators of mathematical representation ability, in which the evaluation questions consisted of 2 questions.

At the do stage, learning is carried out based on PMRI and LSLC by using learning tools that have been designed together. Learning begins with apperception, in which the teacher uses powerpoint media to remind students about the elements in algebra and for example in everyday life. After that the teacher conveys the learning objectives, then the teacher distributes LKPD 1 (share task) to each student. In LKPD 1 (share task) there are 2 problems given to students, which are expected to occur learning from each other while students work on the LKPD. After students complete LKPD 1 (share task), the teacher asks one of the students to present the results of their answers in front of the class. Then the teacher distributed the second LKPD to each student in the form of jumping tasks. Jumping task is a non-routine question that must be solved by students. On the work of LKPD 2 (jumping task) many students have difficulty solving these problems. The teacher provides

guidance as needed and directs students to ask their group friends. After the students have finished working on the second LKPD, the teacher again asks one of the students to present the result of the answer. At the end of the lesson the teacher distributed 2 questions for the mathematical representation ability test. After that the teacher closes the lesson by asking students to conclude the learning that has been implemented.

After carrying out the test of students' mathematical representation ability, the following results were obtained:

Table 1. Frequency of students who meet the mathematical representation abilities of students

		Question Number	
The number of students who meet		1	2
	Verbal Representation	22	22
Indicator	Symbolic Representations	22	18
	Visual Representation	-	22

Question Number 1

1. Di dalam sebuah tas terdapat 5 buah buku, 2 penggaris dan 3 buah pensil. Tanpa sepengetahuan Fatimah, adiknya mengambil 2 buah penggaris, 1 pensil dan 2 buku. Berapakah jumlah masing-masing alat tulis yang ada di dalam tas Fatimah ?

Figure 1. Question test number 1

In question number one there are several types of student answers, there are students who can identify the elements of the question and operate them appropriately, students who can identify the elements of the question but there are errors in the calculations, and there are students who are wrong in identifying the elements of the question.

HS student is one of the students who has been able to identify the elements in the questions but there are still errors in operating them. Based on the results of observations during learning, HS tends to be silent and less active in group discussions, where HS focuses more on the answer sheet itself.

Figure 2. Students' answer (HS)

From the results of the answers above, HS students have been able to identify the elements that are known and asked the questions correctly and completely, so that HS students get the maximum score on the verbal representation ability indicator with a score of 4. In solving problems given HS students have involved symbols or Mathematically form correctly but there are still errors in doing calculations so that HS can bring up the symbolic representation indicator but it is not maximized with a score of 3. Based on the results of the interview, students consider the variable y to be 0 not 1

Question Number 2

Figure 3. Question test number 2

In question number 2, there are several types of student answers, there are students who can identify the elements of the question, and make tables and involve the form of mathematics appropriately. Students who can identify the elements of the problem, make tables and involve mathematical forms but still have errors in calculations. And students who can identify the elements of the question, make tables but have not continued to the calculation stage.

SP students are students who are able to identify the known and asked elements of the questions and are able to present data in tabular form. However, SP students have not yet proceeded to the calculation stage. In the SP group they prefer to be quiet and focus on their own answer sheets, and are less active in group discussions. The following is the student answer sheet to question number 2.

Figure 4. Students' answer (SP)

From the results of the answers above, SP has been able to identify the elements known and asked the questions completely so that they get a score of 4. In addition, SP students have been able to present data in tabular form. In solving the questions given by SP students, they have not involved symbols or mathematical forms, and have not done calculations so that they get a score of 0. However, based on the results of the interview, it was found that the student's problem was the lack of processing time. Based on interviews, students are able to solve problems by involving symbols or mathematical forms.

In learning using share tasks and jumping tasks as well as test questions, several obstacles were found, including: students were not careful in reading the questions and performed algebraic addition operations, besides that there were some students who were still wrong in understanding the meaning of the variable "x" which was considered valuable. 0 is not 1. In line with what was expressed by SupRYiningsih (2014), the difficulties of students were various, there were difficulties in calculating and there were difficulties in connecting problems to be solved. In addition, students' understanding in understanding symbols in algebra makes it difficult for students to add and subtract algebraic forms (Alfiliansi, 2014). In the learning process, students also seem not used to asking for help from their group friends when they have difficulty working on the problems given.

From the research that has been done, it can be seen that after the implementation of learning with PMRI and LSLC, the ability of students' mathematical representation has reached verbal representation, symbolic representation and visual representation. So that learning mathematics using the PMRI and LSLC approaches can be applied in schools.

CONCLUSION

Based on the results of research in class VII.1 SMP Pusri Palembang, from the results of tests supported by observations and interviews, it was found that students' mathematical representation skills in learning using LSLC and PMRI approaches on the subject of addition and subtraction of algebraic forms in all students have arrived at verbal representation, symbolic representation. , and a visual representation. For teachers, it is hoped that they can use the LSLC and the PMRI Approach as alternatives in mathematics learning. And for other researchers, in order to be able to design learning tools maximally with subject teachers.

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