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The Effectiveness of Problem based learning Model to improve the understanding Concept of Students prospective in Fractional Count

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Abstract— *The aim of the study is to find out the ability to understand mathematical concepts of teachers prospective in Mathematics Education Program FKIP University Nommensen in the fractional count operations material. This research is a descriptive study with the aim of the study describing the effectiveness of the Problem Based Learning Model. The results of the second trial described that the effectiveness of the Problem Based Learning Model was concluded: (i) the percentage of the students who understood the concept at least 85.29% or 29 students out of 34 students who took the test. (ii) the achievement of the ideal percentage of time for each category of student activity, (iii) the average of the lecturer ability to manage learning is 3.54, including the good category, (iv) student responses to the components and learning activities are positive is 90%.*
Keywords— *Learning Model, Problem, Concept, Students, Fractional.*

I. INTRODUCTION

Mathematics lessons always get the number one attention, this is evidenced by the emergence of mathematics in level of education starting from kindergarten to the level of tertiary education. In mathematics concepts arranged in a hierarchical, structured, logical, and systematic manner starting from the simplest concepts to more complex concepts, therefore to learn mathematics, the previous concepts that become prerequisites really be mastered in order to understand the concepts. But in reality, concepts in mathematics are often not fully mastered by students. This is caused by the weakness of the learning process which focuses on the mastery of concepts, often concepts that should be formed based on their own understanding are actually the concepts that are informed. For example, when sitting in elementary school, the teacher informs us when carrying out a calculation operation on fractions, we are reminded that the operation can be changed to operation times with the condition that the fraction to the right of the times the numerator must be changed to the denominator and vice versa, without knowing the reason why the process. This is one example of the cases that occur about learning concepts in the process of learning mathematics. So, The understanding is always carried over until the student sits on

the lecture bench. I proved this research by finding some seventh Grade students of Mathematics Education Study Program students at FKIP HKBP University Nommensen Pematangsiantar in Academic year 2018/2019 had low mastery of the concept in fraction counting operations. When I entered Elementary School Mathematics Capita Selekta lectures, I found that most students if asked what the meaning of $\frac{1}{2}, \frac{3}{5}$, or $2\frac{1}{3}$ they can't do the test. In other hand $\frac{1}{2}+\frac{2}{3}=\frac{7}{6}$, or $\frac{1}{2}:2=\frac{1}{2}\,x\,\frac{1}{2}=\frac{1}{4}$, they are also unable to provide a logical explanation of the problem, the students who are really not able to provide solutions to the problems of calculating fraction operations. Even though the fractional material always has a relationship with various other materials.

II. REVIEW OF LITERATURE

Problem based learning Model is a emphasize on the cognitive aspects of students, learning is centered on students and always begins with giving a real problem to find a concept. The focus of teaching not clearly on students do but they think when doing the learning. The teacher's role in

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learning sometimes involves presenting and explaining things to students, but in essence in learning based on problems the teacher acts as a guide and facilitator students learn to think and solve problems in their own way. The stages applying the learning model based on the problem are used the stages proposed by Ibrahim and Nur (2000: 13), namely: 1) Students' orientation to the problem; 2) Organizing students for learning; 3) Guiding individual and group investigations; 4) Develop and present the work; 5) Analyze and evaluate the problem solving process. Effective learning requires the teacher to know how students perceive the phenomenon that is the object of learning or in other words how the child's ideas about the topic will be discussed before the topic begins. Learning is developed from existing ideas that may be through simple steps, and ends with ideas that have been modified. Furthermore, teaching is to be effective when achieving the desired goals, both in terms of learning objectives and maximum student achievement (mastery of content and performance). Teaching is effective when achieving the desired goals, both in terms of learning objectives and maximum student achievement, so that which is an indicator of the effectiveness of learning in the form of:

1. Students have understood the concept about 80% of students who take the test and the ability to understand the concept of a minimum of moderate (getting more than or equal to 2.66 or a minimum of B-).
2. The Achievement of the ideal percentage of student activity time specified.
3. The achievement of the teacher's ability to manage learning at least good enough,
4. At least 80% of the subjects studied (for each trial) provide a positive response to the components and learning activities.

Learning activities are forms of activities carried out by students during the learning process. Student learning activities examined in this study are: 1) listening, paying attention to teacher explanations, 2) reading / understanding contextual problems in LAS, 3) solving problems / finding ways and answers to problems, 4) writing problem solving, summarizing and concluding a procedures / concepts, 5) displaying results / presentations, 6) discussing / asking friends or teachers, 7) drawing conclusions of a procedure / concept, 8) recording things that are relevant to teaching and learning, 9) student behavior with teaching and learning activities.

III. RESEARCH METHODOLOGY

The collected data analyzed through descriptive qualitative method, Research design is applied to describe the effectiveness the problem based learning model to improve the ability to understand the concepts of the Seventh grade students of Mathematics Education Study Program FKIP HKBP Nommensen University on fraction count operations material. This research was conducted at the Mathematics Education Study Program FKIP odd grade in Academic year 2018/2019.

IV. FINDING AND DISCUSSION

The Analysis of Research Data on Trial I, The results of the pre-test and post-test ability in understanding the mathematical concepts of Seventh grade students in Group A.

Categories	Pre-test	Post-test
The Highest Score	2,08	3,56
The Lowest Score	0,44	1,36
Average	1,07	2,73

Based on the average value above, it was concluded that the ability to understand mathematical concepts of students increased by 1.66. The Level of Mathematical Concept Understanding Ability in Seventh Grade Student in Group A based on the results of the pretest and posttest

Score	Pre-test			Post-test		
	Students Number	Percentage	Predicate	Students Number	Percentage	Predicate
$0,00 <$ Score $\leq 1,00$	16	47,06%	D	0	0%	D
$1,00 <$ Score $\leq 1,33$	10	29,41%	D$^+$	0	0%	D$^+$
$1,33 <$ Score $\leq 1,66$	5	14,71%	C-	2	5,88%	C-
$1,66 <$ Score $\leq 2,00$	2	5,88%	C	3	8,82%	C
$2,00 <$ Score $\leq 2,33$	1	2,94%	C$^+$	4	11,76%	C$^+$
$2,33 <$ Score $\leq 2,66$	0	0%	B-	2	5,88%	B-
$2,66 <$ Score $\leq 3,00$	0	0%	B	10	29,41%	B

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Score	Pre-test			Post-test		
	Students Number	Percentage	Predicate	Students Number	Percentage	Predicate
$3,00 < Score \leq 3,33$	0	0%	B$^+$	8	23,53%	B$^+$
$3,33 < Score \leq 3,66$	0	0%	A-	1	2,94%	A-
$3,66 < Score \leq 4,00$	0	0%	A	4	11,76%	A

The results of the pretest ability to understand the concepts of students, show that students who get a minimum grade of B-. Furthermore, the results of the posttest showed that the number of students who had understood the concept of fraction counting operations or students who received a minimum value of B- was 25 people (73.52%) out of the 34 students who understand the ability of mathematical concepts. This percentage is referred to the established criteria, it can be concluded that the percentage of students who have understood the concept has not been reached.

The Results of Data analysis of student activity
The results of observations student activities during teaching and learning activities (KBM) are expressed as a percentage.

Number	Student Activity Category	The Everage of PWI (%)	The Tolerance Limits of PWI (%)
1	Paying attention / listen to the explanation of the lecturer / friend.	20,16	$9 \leq P \leq 19$
2	Reading, understanding contextual issues in a Worksheet.	17,76	$6 \leq P \leq 16$
3	Solving problems / finding ways and answers to the problems.	28,96	$33 \leq P \leq 43$
4	Discussing / asking friends or lecturers.	20,04	$19 \leq P \leq 29$
5	Drawing conclusions from a procedure or concept.	11,62	$8 \leq P \leq 18$
6	Student behavior that is not relevant to KBK.	1,46	$0 \leq P \leq 5$
	Total	**100**	

The level of active activity of students who find the tolerance limit is discussing or asking friends / lecturers, and drawing conclusions about a procedure or concept. While those who do not find the tolerance limit are: listening / paying attention to the explanation of the lecturer / friend, reading / understanding the problems in the Worksheet, and solving problems and finding ways or answers to problems. Based on the explanation above, from 3 categories of active student observation activities, there are 2 categories of observations that find the time tolerance limit and 1 category of observation that does not find the specified tolerance limits.

The Teacher's Ability to Manage Learning
Overall the average value of ecturers ability to manage learning is 3.02. The value is referred to the established criteria, it can be concluded that the ability of lecturers to manage learning is quite good.

The Student Responses in Learning Devices
Student responses to all aspects of learning components and activities above is 80%. The results of analysis are referred to the established criteria, it can be concluded that students' responses to the components and learning activities by using learning tools oriented towards PBM models are positive. Based on the results of the trial I explained that the criteria for the effectiveness of a learning by using a learning model based on the problem has not been achieved properly so that it is necessary continue test II.

The Analysis of Trial Data II
The Trial II was conducted on students Seventh grade of Group B with 34 subjects. The results of the pre-test and post-test ability of students' understanding of mathematical concepts in the second trial

Categories	Pre-test	Post-tes
The Highest Score	2,04	3,84
The Lowest Score	0,28	2,12
Average	1,12	3,07

Based on the average value above, it was concluded that the ability to understand mathematical concepts of students increased is 1.95. The Level of Achievement Ability to

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Understand Mathematics Concepts of Seventh Grade   Students in Group B on Pre-test and Post-test Results

Score	Pre-test			Post-test		
	Students Number	Percentage	Predicate	Students Number	Percentage	Predicate
$0,00 <$ Score $\leq 1,00$	11	32,35%	D	0	0%	D
$1,00 <$ Score $\leq 1,33$	10	29,41%	D^+	0	0%	D^+
$1,33 <$ Score $\leq 1,66$	10	29,41%	C-	0	0%	C-
$1,66 <$ Score $\leq 2,00$	1	2,94%	C	0	0%	C
$2,00 <$ Score $\leq 2,33$	2	5,88%	C^+	5	14,71%	C^+
$2,33 <$ Score $\leq 2,66$	0	0%	B-	2	5,88%	B-
$2,66 <$ Score $\leq 3,00$	0	0%	B	8	23,53%	B
$3,00 <$ Score $\leq 3,33$	0	0%	B^+	7	20,58%	B^+
$3,33 <$ Score $\leq 3,66$	0	0%	A-	8	23,53%	A-
$3,66 <$ Score $\leq 4,00$	0	0%	A	4	11,76%	A

The results of the students' concept understanding ability above show that students who get a minimum grade of B-. Furthermore, the results of the post-test showed that the number of students who received a minimum grade of B- was 29 people (85.29%) out of the 34 students who took the post-test ability to understand mathematical concepts. The percentage is referred to established criteria, it can be concluded that the percentage of students who have understood the concept has been reached. A comparison of the results post-test of students who have understood the concept of fractions in trial I and trial II:

The Concept of Fractional Operations

Post-test	Percentage (%)
	Students who have understood the concept
Trial I	73,53
Trial II	85,29

Based on table above, the percentage of students who have understood the concept results of the first post-test was 73.53% and in the second trial was 85.29%. The percentage of students who have understood the concept of fractions has increased by 11.76%.

The Results of Data analysis of student activity
The results of Student observations activities during teaching and learning activities (KBM) are expressed as a percentage. The observations on trial II are presented in the table below:

Number	Student Activity Category	The Everage of PWI (%)	The Tolerance Limits of PWI (%)
1	Paying attention / listen to the explanation of the lecturer / friend.	10,16	$9 \leq P \leq 19$
2	Reading, understanding contextual issues in a Worksheet.	13,19	$6 \leq P \leq 16$
3	Solving problems / finding ways and answers to the problems.	34,64	$33 \leq P \leq 43$
4	Discussing / asking friends or lecturers.	25,68	$19 \leq P \leq 29$
5	Drawing conclusions from a procedure or concept.	15,79	$8 \leq P \leq 18$
6	Student behavior that is not relevant to KBK.	0,83	$0 \leq P \leq 5$
Total		**100**	

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The average percentage of student activity time in each category is referred to the criteria for determining the achievement of the ideal percentage of student activity time, so it can be concluded that the percentage of student activity achievement of the ideal percentage of time or is at the time tolerance interval of the specified student activity category.

The Teacher's Ability to Manage Learning

Overall the average value of the lecturers ability to manage learning is 3.54. The value is referred to the established criteria, it can be concluded that the ability of lecturers to manage learning is included in both categories.

The Student Responses in Learning Devices

Student responses to all aspects of learning components and activities are above 80%. The results of this analysis are referred to the established criteria, it can be concluded that students' responses to the components and learning activities by using learning tools oriented towards PBM models are positive.

V. CONCLUSION

Based on data analysis and discussion in this study, the following conclusions are presented:

1. The effectiveness of the problem based learning model, concluded based on: (i) understanding the mathematical concepts of students obtained a percentage of 85.29%, (ii) the level of active activity of students fulfilling the specified ideal time tolerance criteria, (iii) the ability of lecturers to manage learning is at good criteria, (iv) student responses to the components of learning tools and learning activities are positive.

2. Increasing the ability to understand mathematical concepts of students using problems based learning Model on the topic of fraction counting is the percentage of achievement ability to understand mathematical concepts in the first trial of 73.53% increased to 85.29% in the second trial.

3. Levels of active activities of students in the first trial , there is one active activity of students who not find the ideal time tolerance criteria, while in the second trial, all active activities of students find the specified ideal time tolerance criteria.

4. The ability of lecturers to manage learning in the first trial is quite good criteria, and in the second trial is in good criteria.

5. Student responses by using problems based learning Model are positive (The Everage is 80%).

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