FINAL REPORT

HIBAH PENELITIAN PGMIPABI

Increased Mastery Of Conceptual And Procedural Knowledge Through Problem Solving Application Of Learning Strategies In Wave Subjects Physics Education Study Program Fkip University Of Bengkulu

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ABSTRACT

This study aims to improve the quality of teaching physics, especially in the wave subjects this research is a classroom action research using a minimum of three cycles and performed with the application of learning strategies Problem Solving. At each cycle of analysis and calculations using the N-gain, the analysis of the cycle compared to the next cycle to obtain improvement when compared with the cycle of learning before. A good learning quality be the ultimate goal of this research.

Keywords: Learning Physics, Action research, Problem Solving

CHAPTER I INTRODUCTION

A.Background

Educational institutions have made various reforms and improvement in education system as whole so that this nation can compete in an increasingly competitive global era. Renewal and improvement of such education has been done through curriculum changes in higher education that the 2004 curriculum called competency-based curriculum (CBC). Curriculum changes this time to understand not only the substance of the material and format adjustment to the demands of the curriculum, but a paradigm shift from input-oriented approach to education (input) to a results-oriented approach to education (outcome) or standard. Simply put it means that what should be defined as a curricular policy shifted from the question of "what should be taught (curriculum)" to the question of "what should be controlled by the child (standard kompetansi)" the extent and level of education. Implications of the implementation of standards of competence is assessment process conducted by professors in the classroom, both formative and summative criteria should use reference and learning to apply the principles of learning more thoroughly. Furthermore, to ensure the achievement and mastery of competencies necessary to develop classroom assessments that are authentic (authentic assessment). One of the characteristics of classroom assessment is formative assessment, with the aim of assessment is to improve the quality of student learning. As a team of professors of physics, we observe that the learning outcomes of students in learning basic physics from year to year is still less than satisfactory. Therefore, efforts are needed to realize such improvements (innovations) are constantly in learning physics. A treatment (treatment) should be placed so that the process of learning physics in college went well and students can learn optimally, in order to reach the ultimate goal is produce a satisfactory quality of learning outcomes.

In connection with the above, the one that probably is selecting appropriate learning strategies to be used in the learning process. For that action research (PTK) was performed. Learning strategies that will be used in this research is the application of problem solving learning model. By using this model are expected mastery of conceptual and procedural knowledge students will increase.

The idea of developing an understanding of concepts (conceptual knowledge acquisition) and problem solving skills (procedural knowledge) based on some theoretical conceptions: 1) The

concept of physics is subject to continuous change (Wenning, 2006); 2) Learning physics requires learning to do the problems (Oman & Oman, 1997); 3) Problem solving is a fundamental part of learning physics (Heler, Keith, & Anderson, 1992), and 4) The results of a survey conducted by the American Institute of Physics in the U.S. showed that the skills most often used by workers physics graduate S2 and S3 are in the problem-solving skills (problem solving), working groups, and communicate (Van Heuvelen, 2001). Based on the theoretical explanation, understanding is the key to learning. Some theoretical conception underlying this conclusion are as follows. First, the conception of learning refers to the constructivist view, that the understanding of construction becomes more important than memorizing fact (Abdullah and Abbas, 2006). Second, understanding is a mental process that allows the adaptation and transformation of science (Gardner, 1999). Third, an understanding emerged from the results of self-evaluation (Wenning, 2006). Thus, understanding the representation of the learning outcomes to be very important. Theoretical foundation as an alternative basis for understanding learning in packaging (learning for understanding) and also in the development of physics problem solving ability is as follows. First, it is recommended to reduce the physics teacher tells a story of learning, but more invites students to experiment and problem solving (Williams, 2005). Second, physics teacher recommended providing more context-rich problem-poor and reduce the problem in the context of learning. Third, learning with problem solving to foster problem-solving skills, act as problem solvers, and in the process of learning built thinking, teamwork, communication, and exchange of information (Akinoglu and Ozkardes, 2007). The theoretical foundation emphasizes the need for teachers to make changes in the paradigm of facilitating student perspective: "teaching is a report concerning the concept of" being a theoretical scientific perspective: "teaching is a learning environment composed and prepared stimulus to students to do problem solving (Problem Solving)" (Wenning & Wenning, 2006). Teaching instead of focusing on how to teach but should be oriented on how to stimulate learning (Bryan, 2005; Novodvorsky, 2006; Popov, 2006; Wenning, 2006) and learning how to learn (Novak & Gowin, 1985).

The importance of the development of thinking skills that are supported by the results of a survey conducted by the American Institute of Physics (AIP) in the U.S.. The survey results showed that the skills most commonly used by workers physics graduate S2 and S3 are in problem solving skills (problem solving), working groups, and communicate. Knowledge of

the subject matter the frequency of use in the workplace on average only about one-fourth of the use of problem solving ability (Van Heuvelen, 2001).

Begins the problem solving. Problems is a situation that was clearly way to solve that confront individuals or groups to find answers. Problem solving is an individual or group effort to find answers based on the understanding that has been previously owned in order to meet the demands of the situation are not familiar / commonplace (Krulik & Rudnick, 1996 in Carson, 2007). So the problem-solving activity begins and ends with a confrontation when a reply has been made in accordance with the conditions of the problem. Learning by problem-solving strategies become very important, because in learning, learners quickly forgotten if only verbally described. They can be given if the given instance, and understand if given the opportunity to try to solve the problem.

Based on the above background required the application of a learning model that is able to provide useful information and programs to enhance the learning of physics. Problem solving ability is part of the skills are very important in physics. The importance of problem solving ability was not only for the concept of the optics, but also for the whole concept in physics, including mechanics concepts. Mechanics is a subject matter that is the subject Physics Wave course is a prerequisite course for advanced physics course (Mechanics, Waves, Electricity Magnetism, Modern Physics). Monitoring and evaluation of the results of that learning Wave still use the lecture method is aided by using a power point show. Based on these reasons, it is deemed necessary to do research on the application of learning strategies Problem Solving (PS learning strategies) on learning physics in a lecture on mechanics, especially about its application in the design of integrated interaction between lecturers and students, and the design of the instructional materials used. Both the design of the study aimed to develop an understanding of concepts (conceptual knowledge) and problem solving skills (procedural knowledge) with the subjects of the study were student teachers of physics. Therefore this study is entitled: "Improved Conceptual and Procedural Knowledge Mastery through Application of Learning Problem Solving Strategies In Subjects Wave Physics Education Study Program Guidance and Counseling University of Bengkulu".

B. **Problem Formulation**

By conducting a comprehensive and open discussion by a team of teachers, in general problems faced by students is a lack of mastery of competencies disciplines namely (a) the

acquisition of conceptual knowledge (concepts, principles, and laws of physics) and procedural knowledge and strategic thinking to work in solving the problem) which affects the inability to apply them in problem situations. As a result, the problem is not the answer as the answers should be. Hence, the proposed formulation of the problem to be investigated in a study with PS learning strategies are:

1) Is the acquisition of conceptual knowledge of students participating in college Wave with learning can be enhanced through learning strategies PS?

2) Does the mastery of procedural knowledge students participating in Wave with learning can be enhanced through learning strategies PS?

3) How did the students after being taught to use learning strategies PS?

CHAPTER II LITERATURE REVIEW

A. Theoretical Description

1) Learning Physics for Prospective Student Teachers

Physics is not just a collection of science, but also in the form of a scientific method. Teaching physics is essentially the use of scientific methods to cultivate an ability / skills required in carrying out his duties in life. The implications of the nature of teaching physics for prospective teachers that learning physics physics is directed to grow two things: understanding of the subject matter of physics and work discipline or procedural skills. Direction of emphasis depending on which parts are preferred to be grown, so the model or the applied learning strategies will vary. Basically all the topics in the physical sciences, whether simple or complex, can be used according to its nature. But in learning, success is not only determined by the approach on the part of the aspect which is more emphasized, but also depends on the components and domains which are supposed to get treatment. Brotosiswojo (2000a) suggested that the learning components that need to be addressed are (1) the communication components, (2) component form of information, (3) the component skills, (4) components of sequence learning activities, and (5) evaluation component of success. While the realm of learning in question is the realm of reasoning. In this study, the direction of learning physics is based on the above description, the more emphasis on the conceptual and procedural aspects of capability that is how the physics lesson that can be played to develop conceptual understanding and problem solving ability of students.

2). Problem Solving and Problem Solving Strategies

Gagne (1985) provides limits that problem solving is a process in which students determine the combination and the rules that have been previously studied which can be used to solve problems. Limitation of problem solving, as noted above refers to the limit as a problem solving process. Limitation of problem solving as a strategy commonly use the word strategy, road, stage, or methods. Strategy is a tool that can be used to find or develop a method or procedure for achieving certain goals. Problem solving strategies designed to assist the process of solving the problem. As such problem solving strategies can be interpreted as a way of solving the problem or procedure steps designed to facilitate

student thinking to find the right pattern. Strategic Problem Solving (PS strategy) is not designed to explain directly how to solve a problem, but a strategy designed to help the process of solving the problem with the steps it has. This means that by using a PS strategy, students will be guided in accordance with the procedures or steps that exist in that strategy. Therefore learning physics with PS strategy has consequences that go through these learning stages or steps that must be taken to lagkah problems encountered can be solved. Problem solving (problem solving) is seen as a fundamental part of learning physics (Heler, Keith, & Anderson, 1992; Reif, Larkin, and Brackett, 1976). Problem solving is one of the learning strategies that can be used in accordance with the teaching of physics as physics of content (Gok & Silay, 2008). But many physics teachers found that their students do not solve the problem in accordance with the desired level of proficiency (Redish, Scherr, & Tuminaro, 2006; Reif, 1995; Van Heuvelen, 1991). Newell and Simon (1972) states that a person is faced with a problem when he wants something and does not know immediately that a series of actions he can perform. In the same way, Martinez, 1998 (in Docktor & Heller, 2009) states that problem solving is the process of achieving the goal when the path to that goal into uncertain. The above definition depends on their subjectivity. What is a problem for someone might not be a problem for others. The definition depends on the acceptance of hardship duty (Hsu et al., 2004). According to Salami (2000) (in Adesoji, 2008) problem solving in science depends on the level of students' cognitive abilities. This statement indicates that students who succeed in solving scientific problems, turns using reasoning strategies that are often higher than students who did not work and use low reasoning. Adesoji (2008) have observed that the problem solving strategy is effective in teaching students with different ability levels. Problem solving not only find the correct answer but also is an act that covers a broad mental abilities (Altun, 2002 in Gok & Silay: 2008). Structure of problem solving (by Maloney, 1994 in Gaigher, Rogan & Braun: 2006) expressed as a way to improve performance and conceptual understanding dig. Research conducted by Gaigher (2004) showed an increase in performance (performance) as well as an increase in conceptual understanding (Gaigher, Rogan & Braun: 2006). Specific strategies for physics has been developed by Reif (1995) in his book Understanding Basic Mechanics, and by Heller & Heller at the University of Minnesota (Heller & Heller, 2000; Redish, 2003). Steps according to Reif taken from the book are: 1) Analyze the Problem, 2) Construction of a Solution, and 3) Checks (a[illegible] if need) (Yousuf & Chaveznava, 2006).

While the steps of problem solving strategies at the University of Minnesota consists of five steps, which are 1) Focusing problem (Focus the Problem), 2) Describe aspects of physics (Describe the Physics), 3) Plan a solution (Plan a Solution), 4) Running solving plan (Execute the Plan), and 5) evaluating the answer (Evaluate the Answer) (Kyurshunov: 2005; Yousuf & Chaveznava, 2006). PS strategy that will be used in this research is to implement the strategy by taking these five steps above. The fifth step is operationalized in the following student learning activities. First, to move focus problems, students develop a qualitative description in the form of pictures or words that help students to find the subject matter (Heller & Heller, 2000; Redish, 2003). Second, the steps outlined aspects of physics students simplify the problem if possible and apply useful relationships. Third, students create a plan solving. In this step, students create a common framework based on relationships that have been proposed in the previous step. Fourth, students carry out the plan that is manipulating the equations, include numbers that are known, and solve algebraic problems. Fifth, in the last step, the students evaluate the answer, namely by examining the mistakes and make sure that the answer is satisfactory.

CHAPTER III RESEARCH OBJECTIVES AND BENEFITS

The purpose of this study is:

a) To see an increase in conceptual knowledge taught to students after learning strategy problem solving in waves topics.

b) To see an increase in procedural knowledge taught to students after learning strategy problem solving in waves topics.

c) To see the difference in increasing student conceptual knowledge on the topic of waves between the upper, middle and lower?

d) To see the difference in the increase of knowledge on the topic of student procedural waves between the upper, middle and lower?

D. Benefits of Research

Benefits of this research are:

a) Provide a learning experience for student teachers in learning the strategies of Problem Solving.

b) Expected to develop problem solving skills, which is very useful to understand the concepts of physics and solve the problems it faces.

c) For the lecturer is able to use learning strategies that apply the PS strategy in learning mechanics on student teachers.

d) For the Development of Science Education: empirical data found in the form of implementation strategies for learning physics mechanics topics that can be used to develop problem solving skills, through the application of problem solving strategies.

CHAPTER IV RESEARCH METHODOLOGY

A. Research Methods

This research method is a form of action research (PTK). This study uses a minimum of three cycles.

B. Action Research Procedures

Implementation of actions performed on three stages, namely (a). Diagnostic phase, and (b) Phase Therapy (c) Post-Treatment Phase

(A) Diagnostic Phase

Lecturers to diagnose the learning process and student learning outcomes at the course Physics I TA 2012/2013 based on the achievement of learning outcomes (documentation) as well as interviews with several students. Interviews were conducted at 20 study participants to determine student learning conditions. Information from the interviews necessary to identify and formulate the learning problem and apply the learning problem-solving strategies for successful student learning can be influenced by the way teachers manage learning. From the results of carefully conducted studies deketahui that (a) is active in the learning partisifasi relatively low, (b) has not occurred on student self-relevant learning, (c) lectures take place klassikal and verbal, and (d) assessment of learning outcomes are emphasized in cognitive aspects. Study of the literature on quality learning in Higher Education conducted to determine the model of learning that is relevant to the course objectives Physics I and who can support the goals of improving the quality of learning as one of the research objectives Learning Quality Improvement (PPKP) in 2013. Learning models to problem solving strategies implemented in the first half of the lecture because the model has advantages and is quite relevant to the learning objectives Physics I. Advantages of this model can (a) students are actively membelajarkan the intellectual and emotional involvement, the freedom to explore the learning experience and learning resources, and put the lecturer as facilitator, (b) create a constructivist learning aktivias that set itself in a problem-solving plan, and to interpret in various ways to the situation of the problem, (c) encourage students to learn cooperatively together to reach the goal and sharing knowledge to achieve the answer the problem, and (d) stimulate the students to learn creative and divergent thinking and the confidence to try different ways to solve problem.

(B) Phase Therapy

At this stage, learning straegi repairs done three cycles and each cycle is implemented in accordance with the changes to be achieved on the basis of the factors that would like investigated. Implementation of the actions described below will dilakasanakan for each cycle and made changes according to their achievement.

A. FIRST CYCLE

1). Planning

Teaching team who acted as subjects perform actions: a) analysis as a basis for instructional design learning scenarios as outlined in the RPP. The learning scenario includes a series of activities planned, structured and systematic that serve as guidelines for faculty in the implementation of the action and is flexible so that lecturers can improvise in learning. Structure the learning activity consists of three stages: the early stage activities (preliminary), stage of core activities (presentation), and the final processing step (cover). Early stages of activity: Phase motivational presentation and apperception and aims to prepare students mentally so that subsequent learning activities can be considered and followed seriously. Core activities Stage: Stage is presenting an intervention model of learning with strategic application of PS in the lecture. Activity final stages: stabilization of the follow-up phase of the next lecture. b) Prepare an evaluation tool to measure the learning outcomes of students and faculty in the implementation of the action (a) initial tests to determine mastery of the course material before, (b) student worksheets (problem sheet) to assess how students solve problems, and (c) questionnaire (Likert scale) to assess student responses given in the last cycle. c) Prepare shaped formative test multiple choice and essay test with based on lattice point test set to measure the learning outcomes of students in each cycle. Multiple-choice test to measure understanding of concepts and essay tests to measure student procedural knowledge. d) Prepare observation sheet used as a guideline for the implementation of the observer during each cycle.

2). Implementation Measures (Acting)

Activities to be carried out in stages ni is the implementation of learning designed by the teachers / researchers are the other members of the role of observer and data recorder.

Implementation of the actions carried out during a meeting in accordance with the subject and the achievement of learning objectives as well as the passing grade set.

3). Observations (Observing)

Classroom observations conducted during this phase to observe the process of learning and teaching that takes place in the classroom observation checklist guide for lecturers and students. This type of observation is observation structured so that the factors that are the focus of observation was determined by observation of variables and sub-variables. And, krieria assessment using a Likert scale (1 = very poor, 2 = less, 3 = moderately, 4 = good, 5 = excellent). To reach agreement focused observation, actor and observer discuss aspects of the targeted observations on (a) the structure of learning, (b) the accuracy of the stage model of learning with strategic PS, (c) interaction for learning, (d) classroom management . Observations on student learning is monitored on behavioral changes in students applying to work in groups, creativity and the ability of students to apply conceptual and procedural knowledge and student interaction with faculty.

(4) Reflection (Reflecting)

All the information, data and records concerning the implementation of measures obtained during the observation phase was collected and analyzed comprehensively. Results of classroom observations and student performance assessments used by teachers for reflection and to evaluate whether the learning activities can improve mastery of conceptual and procedural knowledge in problem solving. Data (kuantitaf and qualitative) was used to measure the success of Cycle I as a starting point for the next cycle merencanaka action. Quantitative data were analyzed to determine the improvement of learning outcomes through the calculation of the normalized gain (N-gain) between the initial test results by the end of the test cycle. Implementation of measures designed for one semester with three cycles (minimum) or according to the implementation of mastery learning quiz will be conducted three times, in addition to UTS. In addition, qualitative analysis performed to describe the percentage change (measurable and observable) to the response and the learning experience of students and faculty each cycle to determine the success of any action. If the success factors investigated can not be achieved, through discussion and literature, teaching team

locate and identify the elements of the cause and formulate alternative solutions for further follow-up in Cycle II

(C) Post-Treatment Phase

Strengths and weaknesses in the implementation of learning serve as a guideline transform and minimize the weaknesses and maintain strengths and improve the quality of learning in the next cycle. A comprehensive study on the implementation of actions by actors and observers with reference to the analysis of data and information and the observer notes. This study used as a guide for designing and implementing corrective action in the next cycle. CYCLE II AND III This cycle carried out in accordance with the procedure first cycle but subject adapted to the lecture plan. Learning scenarios have been prepared on the basis of the results of a reflection on the first cycle and the achievement of the factors investigated. C. The time and place of study

The research was carried out for 5 months in Physical Education Studies program JPMIPA FKIP UNIB, 4 topics include materials, namely: Harmonic vibration, wave, the Doppler effect, light.. The method used is action research applying learning problem solving strategies implemented for at least three cycles and each cycle consists of four acts D. Subjects Research

The subjects of this research are the student of Physics Study Program semester V E. Data Collection Techniques

Data source implementation of the action are all students and members of the teaching team and PTK instrument consisting of tests and non-test. The data obtained from these instruments are used to prove the hypothesis of the action.

1). Conceptual Knowledge mastery is measured from:

The written test learning outcomes in the form of multiple choice with regard to the application of concepts, principles and laws of physics and the understanding of the course material I studied Physics. Items were taken from the reference class (Physics Tippler) and issues related to the field of mechanics. Capability assessment criteria as measured by the scale 100 and penskorannya based answer key that was created teaching team. 2). Procedural knowledge is measured mastery of:

Student Worksheet (MFIs) are used to determine whether each individual member of the group perform troubleshooting steps with correct and appropriate and relevant to the situation of the problem.

3). Intervention Measures of success

a). Questionnaire to determine student opinion on intervention measures in the course Physics I and the resulting changes in learning situations such as the structure of learning, instructional strategies, and clarity of the material.

b) Observation sheet used to determine the learning situation for intervention.
F. Data Analysis

Data on each cycle were analyzed in the following way:

a. To see an increase in student conceptual knowledge as taught by teaching problem solving strategies on the topic mechanics calculated by the formula N-gain

b. To see an increase in procedural knowledge taught to students after learning problem solving strategies on topics waves. calculated with N-gain formula
c. To determine the response of students towards learning with problem solving strategies, the questionnaire will be made percentage.

d. Qualitative data analysis process described in the qualitative study. Results of analysis and interpreted the data compared between one cycle and the next cycle.
G. Indicators of Success

Indicator of the successful implementation of measures for each cycle is measured from a) Mastery of conceptual knowledge in the process of thinking and working to solve the problem. Maximum Ratings (scale of 100) awarded if the criteria were met and the correct answer. If a student successfully reached a value> 75.00

b) procedural pengetahuaan Mastery in the process of thinking and working. The assessment focuses on the clarity and ketepaan thought indicated in the answer sheet (the MFI). Assessment is done by using a rubric created by the author.

H. Research output

Research output is:

a) Data on improving conceptual knowledge taught to students after learning strategy problem solving in mechanics topics.

b) Data on increasing procedural knowledge taught to students after learning strategy problem solving in mechanics topics.

c) Data on the differences increase student conceptual knowledge on the topic of mechanics between the upper, middle and lower?

d) Scenario learning with problem solving strategy.

e) teaching materials to suit the learning problem solving strategies.

CHAPTER V RESULTS ACHIEVED

Table V.1

No.	NPM	Name	Score		
			Cycle 1	Cycle II	Cycle III
1	A1E011001	Fajar Indah Pratama	47	50	60
2	A1E011003	Vifta Natalia	83	85	87
3	A1E011007	Fades Br. Gultom	70	78	80
4	A1E011009	Refpo Rahman	83	85	86
5	A1E011011	M. Reza Dwi Saputra	79	80	86
6	A1E011013	Ghozi Abdul Jabbar	35	38	37
7	A1E011015	Aulia Phuspita Indah	59	60	60
8	A1E011019	Sasti Yuliafitri	60	64	73
9	A1E011021	Fitri Zalenah	50	56	72
10	A1E011023	Nanda Deka Elpano	50	50	59
11	A1E011025	Rahdi	40	50	53
12	A1E011027	Asmida Herawati	76	77	87
13	A1E011029	Ofta Nofitasari	74	79	77
14	A1E011031	Selviany Rusiadi	75	65	70
15	A1E011033	Ediyanto	43	73	78
16	A1E011035	Sri Peni	61	40	51
17	A1E011037	Suhartiza	55	60	60
18	A1E011041	Angga Pradita	48	50	55
19	A1E011043	Herdimia Mayang Sari	63	64	64
20	A1E011045	Chintiya Oktafira	47	50	50
21	A1E011047	Fidia Ditasari	45	50	51
22	A1E011049	Dedy Kosasih	39	40	50
23	A1E011051	Leni Antasary	58	60	65
24	A1E011053	Deri Febrianto	62	73	68
25	A1E011055	Adek Justiticia Sulbasari	59	60	60
26	A1E011057	Esra Leniwati	40	50	55
27	A1E011059	Triana Sugiarti	33	40	45
28	A1E011061	Novri Yance	26	22	24
29	A1E011063	Rika Kartika Sari	54	50	46
30	A1E011065	Elisa Kristiani	60	30	55
31	A1E011069	Eka Puspitra Rahayu	23	35	29
32	A1E011070	Widayati	40	40	32
33	A1E011071	Antriana C. Manik	29	36	33
34	A1E011073	Faiza Maizora	37	40	39
35	A1E011075	Noviyan Doris	25	30	26
Average			52,2286	54,5714	58

Tabel V.2 The Result of first cycle

No.	NPM	Name	Score
			Cycle 1
1	A1E011001	Fajar Indah Pratama	47
2	A1E011003	Vifta Natalia	83
3	A1E011007	Fades Br. Gultom	70
4	A1E011009	Refpo Rahman	83
5	A1E011011	M. Reza Dwi Saputra	79
6	A1E011013	Ghozi Abdul Jabbar	35
7	A1E011015	Aulia Phuspita Indah	59
8	A1E011019	Sasti Yuliafitri	60
9	A1E011021	Fitri Zalenah	50
10	A1E011023	Nanda Deka Elpano	50
11	A1E011025	Rahdi	40
12	A1E011027	Asmida Herawati	76
13	A1E011029	Ofta Nofitasari	74
14	A1E011031	Selviany Rusiadi	75
15	A1E011033	Ediyanto	43
16	A1E011035	Sri Peni	61
17	A1E011037	Suhartiza	55
18	A1E011041	Angga Pradita	48
19	A1E011043	Herdimia Mayang Sari	63
20	A1E011045	Chintiya Oktafira	47
21	A1E011047	Fidia Ditasari	45
22	A1E011049	Dedy Kosasih	39
23	A1E011051	Leni Antasary	58
24	A1E011053	Deri Febrianto	62
25	A1E011055	Adek Justiticia Sulbasari	59
26	A1E011057	Esra Leniwati	40
27	A1E011059	Triana Sugiarti	33
28	A1E011061	Novri Yance	26
29	A1E011063	Rika Kartika Sari	54
30	A1E011065	Elisa Kristiani	60
31	A1E011069	Eka Puspitra Rahayu	23
32	A1E011070	Widayati	40
33	A1E011071	Antriana C. Manik	29
34	A1E011073	Faiza Maizora	37
35	A1E011075	Noviyan Doris	25
		Average	52,22857
		Total Score	1828
		Absorbtion Value	52,22857
		Learning Completeness	28,57143

In the table above the value obtained in the first cycle, the average value of the wave of students in a course using problem-solving method is 52.22 with absorption values of 52, 22% and [illegible] learning completeness

Tabel V.3 The Result of second Cycle

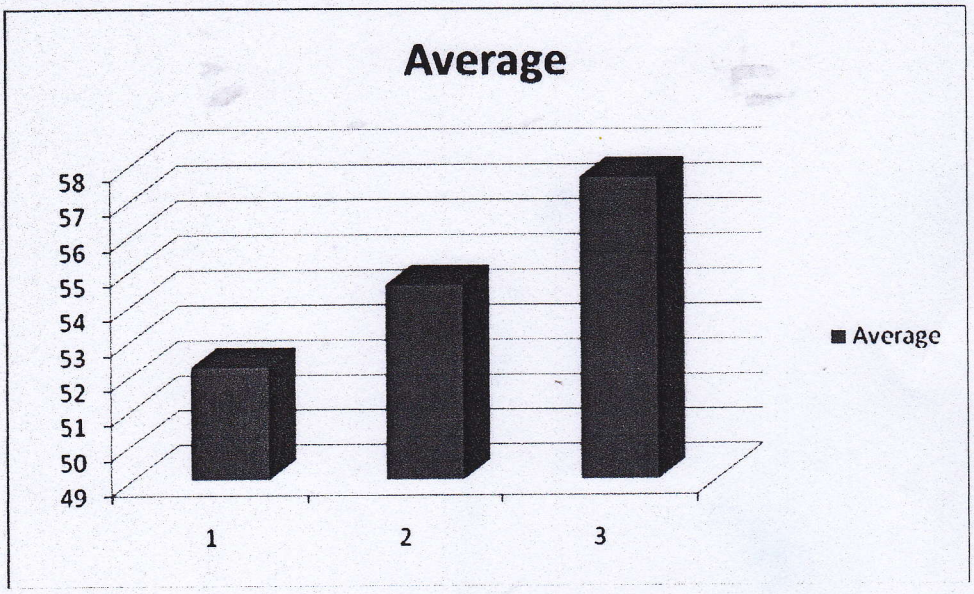
No.	NPM	Name	score
			Cycle II
1	A1E011001	Fajar Indah Pratama	50
2	A1E011003	Vifta Natalia	85
3	A1E011007	Fades Br. Gultom	78
4	A1E011009	Refpo Rahman	85
5	A1E011011	M. Reza Dwi Saputra	80
6	A1E011013	Ghozi Abdul Jabbar	38
7	A1E011015	Aulia Phuspita Indah	60
8	A1E011019	Sasti Yuliafitri	64
9	A1E011021	Fitri Zalenah	56
10	A1E011023	Nanda Deka Elpano	50
11	A1E011025	Rahdi	50
12	A1E011027	Asmida Herawati	77
13	A1E011029	Ofta Nofitasari	79
14	A1E011031	Selviany Rusiadi	65
15	A1E011033	Ediyanto	73
16	A1E011035	Sri Peni	40
17	A1E011037	Suhartiza	60
18	A1E011041	Angga Pradita	50
19	A1E011043	Herdimia Mayang Sari	64
20	A1E011045	Chintiya Oktafira	50
21	A1E011047	Fidia Ditasari	50
22	A1E011049	Dedy Kosasih	40
23	A1E011051	Leni Antasary	60
24	A1E011053	Deri Febrianto	73
25	A1E011055	Adek Justiticia Sulbasari	60
26	A1E011057	Esra Leniwati	50
27	A1E011059	Triana Sugiarti	40
28	A1E011061	Novri Yance	22
29	A1E011063	Rika Kartika Sari	50
30	A1E011065	Elisa Kristiani	30
31	A1E011069	Eka Puspitra Rahayu	35
32	A1E011070	Widayati	40
33	A1E011071	Antriana C. Manik	36
34	A1E011073	Faiza Maizora	40
35	A1E011075	Noviyan Doris	30
		Average	54,57143
		Total Score	1910
		Absorbtion Value	54,57143
		Learning Completeness	31,42857

In the table above the value obtained in the second cycle, the average value of the wave of students in a course using problem-solving method is 54,57 with absorption values of 54, 57% and 31.4[illegible]earning completeness

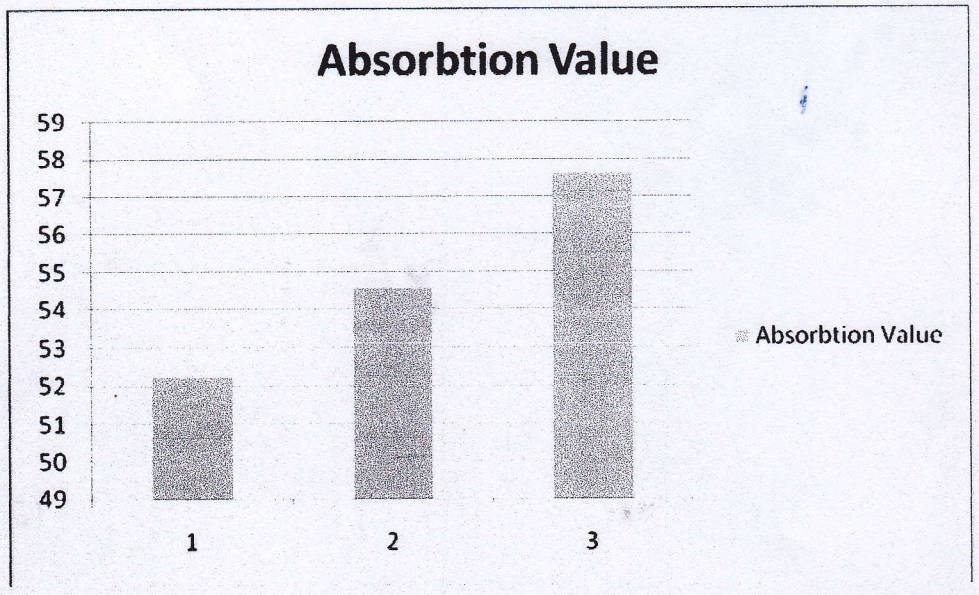
Table V.4 The result for third cycle

No.	NPM	Name	Score
			Cycle III
1	A1E011001	Fajar Indah Pratama	60
2	A1E011003	Vifta Natalia	87
3	A1E011007	Fades Br. Gultom	80
4	A1E011009	Refpo Rahman	86
5	A1E011011	M. Reza Dwi Saputra	86
6	A1E011013	Ghozi Abdul Jabbar	37
7	A1E011015	Aulia Phuspita Indah	60
8	A1E011019	Sasti Yuliafitri	73
9	A1E011021	Fitri Zalenah	72
10	A1E011023	Nanda Deka Elpano	59
11	A1E011025	Rahdi	53
12	A1E011027	Asmida Herawati	87
13	A1E011029	Ofta Nofitasari	77
14	A1E011031	Selviany Rusiadi	70
15	A1E011033	Ediyanto	78
16	A1E011035	Sri Peni	51
17	A1E011037	Suhartiza	60
18	A1E011041	Angga Pradita	55
19	A1E011043	Herdimia Mayang Sari	64
20	A1E011045	Chintiya Oktafira	50
21	A1E011047	Fidia Ditasari	51
22	A1E011049	Dedy Kosasih	50
23	A1E011051	Leni Antasary	65
24	A1E011053	Deri Febrianto	68
25	A1E011055	Adek Justiticia Sulbasari	60
26	A1E011057	Esra Leniwati	55
27	A1E011059	Triana Sugiarti	45
28	A1E011061	Novri Yance	24
29	A1E011063	Rika Kartika Sari	46
30	A1E011065	Elisa Kristiani	55
31	A1E011069	Eka Puspitra Rahayu	29
32	A1E011070	Widayati	32
33	A1E011071	Antriana C. Manik	33
34	A1E011073	Faiza Maizora	39
35	A1E011075	Noviyan Doris	26
			58
			2017
		Daya Serap	57,62857
		Ketuntasan Belajar	37,14286

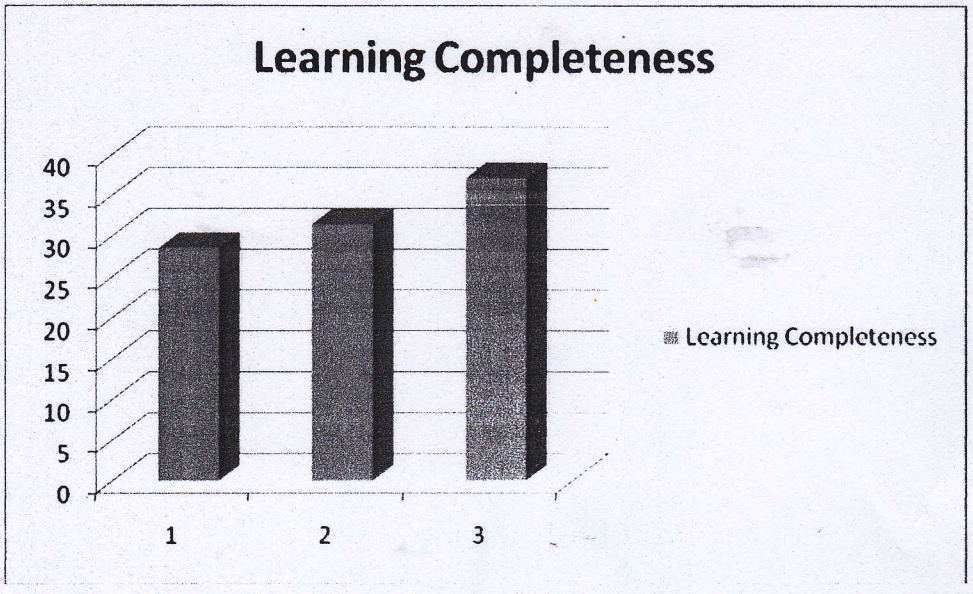
In the table above the value obtained in the third cycle, the average value of the wave of students in a course using problem-solving method is 58 with absorption values of 57, 62% and 37,14% learning completeness



Picture V.1 Average every cicle



Picture V.2 Absorbtion Value every cicle



Picture V.3 Learning Completeness every cicle

Based on the above data are the mean improvement of learning outcomes as well as absorption, but mastery learning value is relatively small. This is caused by the wave concept may still be difficult for students. In general, an increase in dominance concept, although the percentage is still relatively small.

CHAPTER VI CONCLUSION

1. The mean improvement of learning outcomes as well as absorption, but mastery learning value is relatively small
2. In the first cycle, the average value of the wave of students in a course using problem-solving method is 52.22 with absorption values of 52, 22% and 28.57% learning completeness
3. In the second cycle, the average value of the wave of students in a course using problem-solving method is 54,57 with absorption values of 54, 57% and 31,42% learning completeness
4. In the third cycle, the average value of the wave of students in a course using problem-solving method is 58 with absorption values of 57, 62% and 37,14% learning completeness

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