The Application of Guided Inquiry Model On Physic Learning To Improve Scientific Attitude And Students' Analysis Ability

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ABSTRACT

This research aims to improve scientific attitude and students' analysis ability at class XI MIPA 2 of Senior High School Batik 2 Surakarta academic year 2015/2016 on Physic learning. This research used a Classroom Actoin Research with Kemmis and Mc. Taggart model that was held in three cycles. Each cycle was started with prearation stage and implementation stage consisting of planning, acting, observing, and reflecting. Based on study and data analysis of this research, it can be concluded that: (1) the application of guided inquiry model on Physic learning can improve students' scientific attitude. Moreover, it can be seen from observation cycle I to cycle III students' scientific attitude improve and all indicators have reached the target of succes in cycle III. The percentage students' have entered into good category are 44,5 % in cycle I, 70,5 % in cycle II, and 91,9 % in cycle III; (2) the application of guided inquiry model on Physic learning can improve students' analysis ability. The percentage of students' analysis ability improve from 28,6 % in cycle I to 60 % in cycle II, and 77,1 % in cycle III.

Keywords: Guided Inquiry, Scientific Attitude, Analysis Ability

1 INTRODUCTION

One of the educational problems that occurred in Indonesia is caused by the education system that has not been fully good. One of them is the implementation of curriculum changes. This leads to the implementation of the curriculum at each school is not optimal. One school that has not been optimally implementing the curriculum in 2013 is SMA Batik 2 Surakarta. It is one of the private schools that has students with varying abilities. Based on observations, when learning takes 45.70% of students do not pay attention to the teachers' explanation, 65% of students had a way of sitting is not healthy, and 65% of students are not ready at the beginning of learning. During the learning takes place, the scientific attitude of students is still very low. This is indicated by the seven indicators of the 12 indicators that have not seen a scientific attitude in learning activities. Scientific attitude is wisdom to arrive at personal decisions based on the objective and evidence based evaluation of the situation [1].

In addition to the scientific attitude of students is low, the test results for category analysis ability also indicate that most students have a low analysis ability. In differentiating indicators, only 20% of students were able to answer correctly. Indicators analyzed, only 40% of students were able to answer correctly. While the indicator estimates, only 39% of students who can answer correctly. The results showed that the students' analysis ability are still very low. The analysis emphasizes to the main subject into the detection of each section correlation arranged systematically [2]. Moreover, the analysis is the tools and techniques used to direct, build a conclusion of communication.

The results of the interview had been conducted with teachers, and the learning

Proceeding The 2nd International Conference On Teacher Training and Education Sebelas Maret University
Volume 2 Number 1 2016 ISSN : 25002 – 4124

605

model used in every meeting is not varied. In addition, the material which is difficult for students to understand is Fluid Dynamic and Kinetic Theory of Gases. Teacher said that the difficulty of these material is in the amount of mathematical equations. The material becomes abstract to understand unles it is followed by a doing a practicum. The difficulties in implementing the learning in the classroom are not available of lab equipments that support the learning process.

There are many learning models that can be used in learning activities. One of them designed to overcome these problems is applying a guided inquiry model. This is a learning activities that the choices of the problems are still determined by the educator [3]. Steps of guided inquiry model are observe and learn 'stuff', formulate inquiry question, develop hypothesis, design and conduct investigation, analyze data, and argue [4]. The purpose of this research is the application of guided inquiry model that can improve the scientific attitude and analysis ability of students at XI MIPA 2 SMA Batik 2 Surakarta.

2 METHODS

The research method applied in this research is the Classroom Action Research (CAR). Based on the implementation process, using the model of CAR Kemmis and Mc. Taggart consisting of four components, namely: an action plan (planning), action (acting), observation (observing), and reflection (reflecting).

This research was conducted in classes XI MIPA 2 SMA Batik 2Surakarta Jl. Sam Ratulangi 86, Kerten, Laweyan, Surakarta, Central Java. Subjects were students of class XI MIPA 2 SMA Batik 2 Surakarta academic year 2015/2016 consisting of 35 students. The subject of this research is based on the consideration that the subject has the problems that have been identified during the initial observation. Results of preliminary observations indicate that students' have scientific attitude and analysis ability are low. The object of this study is a scientific attitude and analysis ability of students.

Data collection techniques used in this research is test and non-test. Giving the test is intended to measure students' analysis ability acquired after giving activity of action, that is, after the application of guided inquiry learning model of Physic. This test uses an instrument to assess the matter demonstrated analysis ability of students. Tests were carried out at the end of each cycle. Non- test technique consists of observation, document review and interviews. Observations made at the time the student were doing and learning activities using guided inquiry model. The observations used in this test are participatory observation. In the Participatory Observation, observers participate in activity that taking place. Observations are based on the observation sheet, while the observations that are not found in the guidelines for observation field notes written on the sheet. Observations on the teacher focused on the activities of teachers in implementing the learning by applying the model of guided inquiry. Meanwhile, observations of the students focused on teaching and scientific attitude. Documentary studies in this study is an attempt to provide an overview of a classroom action research conducted. Video documentation of learning activities, student worksheets, test results midterm, field notes, photographs during the learning process, and the student's answer sheets are for analysis ability. Interviews were conducted at the time pre-cycle to teachers and at the end of each cycle to students. Pre-cycle interviews conducted for teachers to gather information on the

ICTTE
FKIP UNS 2016

Proceeding The 2nd International Conference On Teacher Training and Education Sebelas Maret University   606
Volume 2 Number 1 2016 ISSN : 25002 – 4124

implementation of Physic learning in class XI and analyze initial needs for guidance in planning actions in cycle I. At the end of the cycle interviews was done again with students' heterogeneously about their appreciation of the application to the model guided inquiry that had been implemented, the benefits gained by the students, problems were found during the study, the impression of the students with the Physic of matter that is presented with a model of guided inquiry, suggestions for improvement of the student as a reflection for the next cycle, and the difficulties in terms of the evaluation given. After that, researchers and teachers discuss strategies undertaken to solve the barriers that occur at a previous meeting to improve the learning activities that will come as a reflection for the next cycle.

Analysis of the data in this study using triangulation techniques validation techniques (methods). This classroom action research used a triangulation technique because the more valid the data obtained thus more credible anyway when compared with triangulation and time. Source of data used in taking the scientific attitude and analysis ability are students.

Data obtained from the scientific attitude observation and then checked with the study of documents and interviews. If the credibility of the three testing techniques produces different data, the researchers conducted further discussions to the data source or the other to ensure the data is assumed to be true. It is the same with analysis ability. Data obtained from the written test then checked with document review and interviews. If the credibility of the three testing techniques produces different data, the researchers conducted further discussions pertinent to the data source or the other to ensure the data is assumed to be true.

3   RESULTS

The study began with interviews of the teacher of Physic. Observation Physic learning process conducted over two sessions to find out the real situation in the class. Observations show that when learning takes 45.70% of students do not pay attention to the teacher's explanation, 65% of students have sat unhealthy way, and 65% of students who are not ready at the beginning of learning. During the learning takes place, the scientific attitude of students is still very low. This is indicated by the seven indicators of the 12 indicators that have not been seen in the learning activities. Seven indicators are prioritizing asked to face the new situation; observe and record the facts as appropriate; interpret observations in accordance with the facts; similarity between the data with the facts to draw conclusions; to report the observation contradicts the hypothesis though; to considers all available information or data necessary to draw up conclusions; and complete the scientific activities completely. As for the   indicators seek information through multiple sources or media to know "what" and "how" of a phenomenon could occur 85.71% of the students into the poor category. On the indicator has a desire to renew the knowledge to optimize all the senses 34.29% of the students into the poor category. On the indicator "does not directly reject the opinions of others" 85.71% of the students into the poor category. On the indicator "willingness to renew their opinions and conclusions" 57.14% of the students come into the category of less and for indicators of "accepting the facts before it supported any convincing evidence (accurate)" 45.71% of students belong to the category enough.

The results of analysis on the documents taken from the test results of midterm 2 to category analysis ability indicated that most students have a low analysis ability.

In differentiating indicators, only 20% of students were able to answer correctly. Indicators analyzed, only 40% of students were able to answer correctly. As for the indicator estimates, only 39% of students who can answer correctly. The results showed that the students' analysis ability are still very low.

The results of the interviews that have been conducted with teachers, learning model that is used during the learning process does not vary. In addition, the material is difficult for students to understand the material Fluid Dynamic and Kinetic Theory of Gases due to having a lot of mathematical equations and very abstract. The material becomes abstract to be understood when it is not followed by doing a practicum.The difficulties in implementing the learning in the classroom is not enough available lab equipment that support for learning activities and materials Fluid Dynamic Kinetic Theory of Gases.

In general conclusions from the results of observations are: (1) learning model used at each meeting, and the material has not varied; (2) the scientific attitude of students is still low; and (3) the analysis ability of students is still low. Therefore, it is necessary for action to improve the scientific attitude and analysis ability of students.

The first cycle act was conducted in two meetings. Furthermore, the second cycle conducted during three meetings. In the second cycle of learning activities was done in class at the time giving aperception and motivation then continued in the laboratory at the time of practical implementation. Whereas the third cycle measures implemented in four meetings. One meeting consisted of 2 sessions (2 x 40 minutes) to Friday and 2 sessions (2 x 45 minutes) on Monday. The third cycle began with the planning stages for preparing a lesson plan, prepare tools and materials lab, preparing the observation sheet, and valuation analysis ability.

Learning activities begins with students watch the video or demonstration of that was exhibited by teacher. Then students formulate problem of observation. Then students make hypotheses on the formulation of problem. After that students design and carry out experiments. Then students analyze data and communicate the results of observations and measurements that have been done. After the interview students get more information on the observation of the scientific attitude and about the evaluation of analysis ability that have been done. Achievement analysis capabilities seen from the percentage of completeness value written test conducted at the end of the cycle.

The Increased achievement of scientific attitude of students in the first cycle, second cycle, and third cycle can be seen in Figure 1.
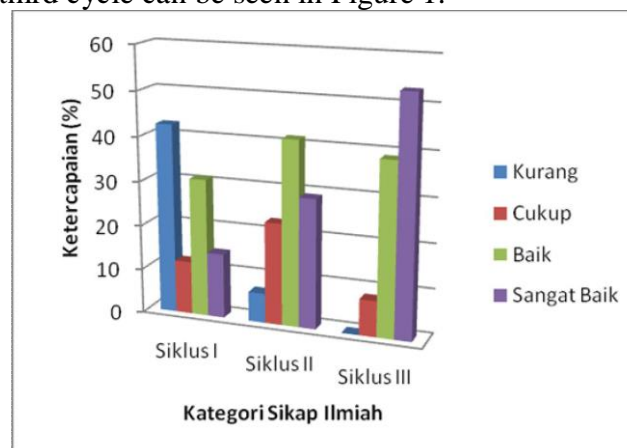

Figure 1. Chart Observations Scientific Attitude

Figure 1 shows that there is increasing scientific attitude of students from the first cycle to cycle II and cycle III. There are 12 indicators on classroom action research that has been done. Indicators one until indicator three are included in the dimensions of curiosity (curiosity) in sequence prioritizing asked to face the new situation, seek information through multiple sources or media to know "what" and "how" of a phenomenon could occur, and have the desire to update knowledge to optimize all the senses. Indicators of four and five are included in the objective dimension (Objectivity) of observing and recording facts and interpret observations in accordance with the facts. Indicators of six and seven are included in the dimensions carefully before making a decision (willingness to suspend judgment) that similarity between the facts with facts to draw conclusions and accept the facts before it supported a rigorous proof. Indicators of eight and nine were included in the dimensions of being open to broaden willingness to renew the opinions and conclusions and not directly reject the opinions of others. Indicators ten and eleven are included in the dimensions of honest (honesty) that reported observation contradicts the hypothesis though, and assume all of the information or data provided is important for deducing. Twelve indicators were included in the dimensions of completing diligent scientific activities completely.

In the first cycle of observation results showed that there are four indicators have reached the target of success are indicators of the third, seventh, tenth, and eleventh. The average percentage of the value of the scientific attitude for the first cycle was 45,5%. In the second cycle there are eight indicators have reached the target of success. Eight indicators are indicators of the third, fifth, seventh, eighth, ninth, tenth, eleventh, and twelfth. Furthermore, the average percentage of the value of the scientific attitude for the second cycle was 70,5%. While the third cycle, all indicators have reached the target of success. This scientific attitude has also achieved success indicators set performance. The average percentage of the value of the scientific attitude to this third cycle was 91,9% The results of the analysis of the above data, it can be stated that through implementation of guided inquiry model can improve scientific attitude graders.

The results of interviews conducted for scientific attitude to the three students were selected randomly convey that learning activities from the first cycle to the third cycle increased to better. Students also expressed through the model of guided inquiry as applied to Physic learning has many benefits among which students become more active in the learning activities to discover concepts on any instructional material, the curiosity of students to a problem is very large, and the enthusiasm of the students when doing the learning are also very large.

Below is the chart image analysis ability test results on the first cycle, second cycle and third cycle through Figure 2.
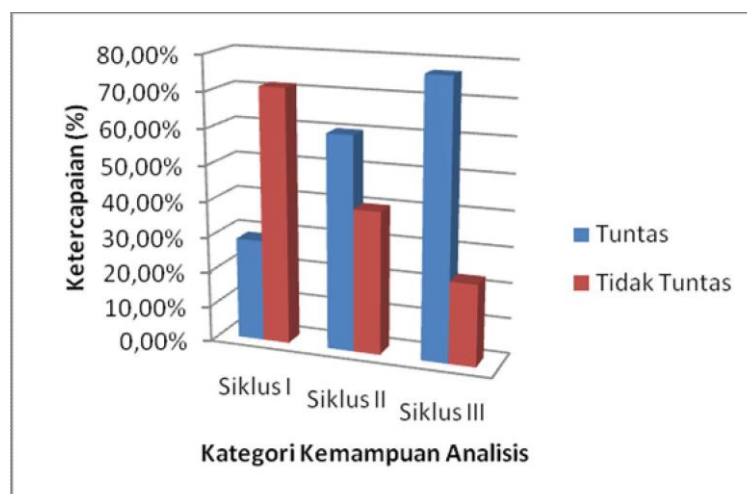
Figure 2. Analysis Ability Test Results Chart

Figure 2 shows that there is an increase in students' analysis ability test results from the first cycle to cycle II and cycle III. In the first cycle of students who achieve mastery is only 28,6%. In the second cycle has been an increase of 60% of students who achieve mastery. While the third cycle 77,1% of pupils already achieve mastery and these results have shown that the analysis ability of students in the third cycle has reached the target of success is 70% of students have achieved mastery. The results of the analysis of the above data, it can be stated that through the implementation of guided inquiry model can enhance students' analysis ability.

Results of interviews to analysis ability to the three students said that nowadays they only do the problems by memorizing equation systematically contained in Physic book, but on learning that has been done through a model of guided inquiry more students could understand the concept slowly and find the concept itself. So students do not spend the time to memorize equations systematically and can understand and pass their own learning activities with the guidance of teachers.

The results of the analysis can be concluded that the increase in the first cycle to the second cycle and third cycle due to the use of guided inquiry learning model of Physic. This is caused the application of guided inquiry model provides the opportunity for students to experience the process of IPA through direct observation of the object being studied and the processes that occur in nature Physic around. So that students are able to find concepts that teachers instilled through pengamatan or experiment with based on the concept already has.

4 DISCUSSIONS

The results of the scientific attitude and improved analysis ability of students in cycles I and II to the cycle to cycle III due to the use of guided inquiry in learning Physic. The application of guided inquiry provides opportunities to students to experience the process of natural science through observations of the object directly studied Physic and processes that occur in nature. Students are able to find the concepts that teachers instilled through observation or experiment based on the concept that had belonged to him. Guided inquiry affected students' content knowledge, science process skills, scientific attitudes and self-perceived stress [5]. Target success in detail every indicator of scientific attitudes are described in the paragraphs below.

The first indicator is asked to give priority to the face of the new situation. Cycle III on the first indicators can be achieved because the teacher allot to each student before the student is at his group. Teachers also invite students to read and ask if there are things that are not understood. So in this way the entire students more active, read the entire section and increase the curiosity of a practical work will be done. This way can also reduce errors in doing practical work. A student who has a curious attitude characterized by asking each step of the activity to be performed [6].

The second indicator is the search for information through multiple sources or media to find out what and how a phenomenon can happen. Cycle III of the second indicator can be reached because students were deployed to search for information when there are things that are not understood either seeking information through friends or teachers or of practical tools and don't think in prejudice. Cycle III of this teacher looks very excited in directing and guiding the students in doing practical work, as well as the filling. Teacher go around and monitor student learning activities at the time. This second indicators have reached the target of success. IPA guide we do not think in prejudice [7]. So with the act of such teachers can make students more actively to seek information and not silent so as to minimize the thinking of students who merely prejudice in the absence of truth.

The third indicator is to have the desire to renew knowledge by optimizing all the senses. Cycle I had already reached the third target indicators of success. This can be accomplished because the teacher already designed a learning using teaching so that students can find a concept through practical that they design. Learning using teaching can enhance students' desire to renew their knowledge by optimizing all the senses. Students will be more active and the curiosity of students against a phenomenon can be increased. In the guided-inquiry approach, students' were asked to design and set up their own experiment and to answer a pre-defined research question [8].

The fourth indicator is to observe and record the appropriate facts. Cycle III of the fourth indicator can be achieved because at the beginning of a learning teacher has ordered students to read the first practical procedure carefully and ask if there are things that are not well understood. After all the reading procedure, teacher ordered students to put themselves in their respective groups and take a practical tool. Then the students perform the data retrieval, teachers get around guide students when there are groups that do the errors in measurement. If there are students who commit an error in measurement, the direct teacher of directing and guiding the students to repeat the data retrieval. Students write down all data based on observations without any manipulation. In cycle III of this teacher more rounds to each group and guide students in analyzing and interpreting the results of the observations. Students work in small groups in class or laboratory on the instructional modules that present information or data, followed by a question that leads are designed to guide the student towards the formulation of conclusions [9].

The fifth indicator is interpreting the observations in accordance with the facts. Cycle II of the fifth indicator can be achieved because the teacher always guides the students to interpret the observations in accordance with the facts. Students participated in guided-inquiry investigations with direct instruction from teachers to promote increased learning and develop scientific skills [10].

The sixth indicator is the similarity between the facts with the data to draw conclusions. On cycle III the sixth indicators can be achieved because before

doing the practical work, the teacher provides information for students to do practical work in turns and performed repetitions. The information which is given continuously can help and remind the students in the process of data capture. So the conclusion written by students already in accordance with the facts or in accordance with the data obtained from the repetition and take turns. While completing a guided inquiry assignment, students may employ various research strategies as they progress towards an evidence-based conclusion, otherwise referred to as "the answer" [11].

The seventh indicator is to accept the fact before convincing evidence supported (accurate). On cycle I the seventh indicator can be achieved because the teacher always provides guidance from beginning to the end of the study included in the concluding observations. So students do not feel abandoned and knowing the direction of the learning objectives are reached. In the guided inquiry, the teacher is the key person to guide almost the whole process [12]. The teacher never gives the answer nor presents the steps of scientific inquiry to the students but provides clues to follow the required steps. It is expected that during the discussions, the students achieve the correct direction in the scientific process.

The eighth is the indicator of willingness to renew the opinions and conclusions. In cycle II of the eighth indicator can be achieved because the teacher gave the form values if there are students who give responses, says agree or do not agree to the results of the discussions that accompanied the decision a logical reason and evidence. In guided inquiry of teachers as the rewarder i.e. rewarding achievements accomplished students [13].

The ninth indicator is not directly reject the opinions of others.In cycle II the ninth indicator can be achieved because the teacher asked the students to bring students from the confusion that students pass. So the students indirectly think that it is wrong or straying from the theory and the students want to discuss this with the teacher. Guided inquiry model of teachers as an avatar that is aware of the confusion of the students they make [14].

The tenth indicators reported the results of observations although it is contrary to the hypothesis or what it is. In cycle I of the tenth indicator can be achieved because at the moment the learning teacher strongly emphasized the students to do honest with the data retrieved. Teachers also always monitor and alert it to any group if there are groups that manipulate the data. Students should have the attitude of loving truth that can help mankind to be honest and objective [15].

The eleventh indicator is considered all the information or data available it is important to draw up a conclusion. In cycle I of the eleventh indicator can be reached because students are required to write the data in accordance with the facts and use all such data in the process of the analysis by the teacher. When in the learning activities the teacher often uses honest words to the students and monitor activities of students in doing practical work. Students should have the attitude of loving truth that can help mankind to be honest and objective [16].

The twelve indicators was completed thoroughly scientific activities. In cycle II of the twelve indicators can be achieved because the teacher already permits to teachers of subjects next to ask for a little time for students completing practical. In addition teachers also always give morale and motivation to students not to despair and always meticulous even though the time is up. The usual people dabbling in the IPA, the fact they're digging or searching for the truth so they never despair and they

have the attitude of scrupulous and careful scientific method should be implemented in a manner that carefully both in rasionalnya, as well as experimentation in taking decisions [17].

In addition to the scientific attitude, results analysis ability also has increased. Broadly speaking in cycle I students still tend to memorize. Memorizing is not a good way of learning, but students still remain more like to memorize rather than understanding and experience. According to students, with memorizing they will be easier to work on a matter when there is a problem that appeared on any of the materials for example. Learning is defined as the modification or strengthening of behaviour through experiencing [18]. According to this understanding, learning is a process and not a destination, learning outcomes and not just memorize, but experienced. The results of learning is behavior change.

Although not all indicators increase in cycle II, however there are two indicators has increased. This is because in this cycle II students have learned from the experience of the cycle I, students are already changing habits that had been learned by be understanding and experience better. States that learning can be defined as a process by which an organism changed their behaviour as a result of experience [19].

Cycle III of this teacher is more concerned with the students to be more active in learning so that in this cycle III students really experience, understand, and be able to analyze each event that occurs. States that learning is a process and not a destination, learning outcomes and not just memorize, but experienced [20]. Teachers also bring more interesting teaching tool in cycle III and make students want to follow with a good learning and enthusiastic.

The application of guided inquiry can make students more easily understand and remember concepts that have been obtained through direct observation of the object examined or experimented with it myself. The lessons of science discusses the symptoms of nature are arranged in a sitematis lesson that is based on the results of experiments and observations made by humans [21].

A research can be said to be successful if it has achieved the targets that have been determined. Observations and discussion can be drawn the conclusion that the application of the model of guided inquiry model can increase the scientific attitude and students' analysis ability. Application of the model of guided inquiry model can increase the scientific attitude in students [22]. The application of guided inquiry can improve analysis ability of students [23].

Research that has been done by using the guided inquiry has drawbacks and advantages based on research results. The advantages of guided inquiry is the step from guided inquiry can assist teachers in directing students to formulate the problem of events seen at once hypothesized independently, then step from guided inquiryis obvious and direct students to make inferences from observations that do. Guided inquiry make students more active and able to improve the scientific attitude in students. During the learning process, students look very enthusiastic and eager to do the learning. The results of the interviews with students ever showed that students prefer to do the learning activities using the inkuiri model of social interactions. Students responded positively to the guided inquiry format of this exercise [24]. As noted above, students overwhelmingly adopted a near identical path to navigating this laboratory, indicating that the guiding provided is likely too explicit.

Disadvantages of guided inquiry model is that it can only be applied in certain schools that has been good learning achievement. In addition, school facilities must also be adequate teaching equipment, LCD, speaker, laboratory, and others. When it is applied to passive students are very difficult to implement. The time used to implement this learning model needs long time learning for the teachers to prepare learning instruments, teaching equipment, and at a time the learning takes place. It certainly is true that guided-inquiry experiments can and often do take more time than verification laboratories [25]. Teachers should be aware of students' individual differences to improve students' attitude toward science [26].

5. CONCLUSION

The results of a classroom action research conducted in class XI MIPA 2 SMA Batik 2 Surakarta, it can be concluded that the model of guided inquiry can improve scientific attitude and analysis ability of students. The detailed results of the study can be explained as follows: (1) the application of learning through the model of guided inquiry in Physic learning can improve scientific attitude of class XI MIPA 2 students' of SMA Batik 2 Surakarta Academic Year 2015/2016. It is shown from the observation of scientific attitude of students increased from the first cycle to the third cycle and achieve the target achievement of the third cycle. The percentage students' have entered into good category are 44,5 % in cycle I, 70,5 % in cycle II, and 91,9 % in cycle III; (2) the application of learning through guided inquiry learning model of Physic can improve analysis ability class XI MIPA 2 students' of SMA Batik 2 Surakarta Academic Year 2015/2016. It is shown from the test results analysis ability have increased from the first cycle to the third cycle is the first cycle of students who reached the KKM is only 28.6%, in the second cycle increased to 60%, and in the third cycle has reached the target achievement is 77, 1% of students reached the KKM.

ACKNOWLEDGEMENTS

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ICTTE FKIP UNS 2016

Proceeding The 2nd International Conference On Teacher Training and Education Sebelas Maret University   615
Volume 2 Number 1 2016 ISSN : 25002 – 4124