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Pattern of interaction problem based learning with self regulated learning on coffee plant area

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Abstract. Education in Indonesia is currently experiencing many problems that have an impact on the low quality of education seen from the achievements or student learning outcomes at every level and education unit. As a result of the TIMSS2015's survey, Indonesia's position was ranked 45th from 48 in the field of science with an average of 397. In addition, Indonesia was also faced with other problems that known uneven education. For example, in urban areas, educational facilities and infrastructure are very advanced. Whereas in plantations area is only rely on makeshift facilities and infrastructures. So the learning is needed that can overcome the difficulties of teachers in delivering learning materials to students that are based on these problems with learning from real-world situations of students and encourage students to make a relation between the knowledge they have and the application of student's life. A suitable learning activity is using *Problem Based Learning* (PBL) and *Self Regulated Learning* models that are related to problem-based learning and learning independence. This research is a development research using the development model of Borg and Gall (1983). The pattern of learning interactions is measured using N-Gain which measures the increase in the extent to which the target is reached from the beginning before the treatment to the target of learning outcomes after being treated. The results that obtained from cognitive learning outcomes that average of pretest is 48 while the average of posttest is 78.15, so the N-Gain score is 0.70 with the category of high increases.

1. Introduction

The progress of a nation can be measured by the quality and existing education system [11]. To advance a nation, education plays a very important role in ensuring the continuity of the life of the nation and state, because education is a means to improve the quality of human resources as well as a way to achieve the objectives of nation-building [7]. Education in Indonesia is currently experiencing many problems, one of it is the low quality of education at every level and education unit [8].

The low quality of Indonesian education can be seen from the PISA (*Program for International Student Assessment*) 2015's study which showed that Indonesia experienced an increase from 2012 to 2015, that is from the three aspects assessed in science competencies, from 382 points in 2012 to 403 points in 2015. The increase raised Indonesia's position 6 ranked upwards when compared to the second position from the bottom in 2012, which ranked 69th of 71 countries and in 2015 was ranked 66th out of 72 countries. The rank is not a pride for Indonesia, but is a motivation for education in Indonesia (Ministry of Education and Culture, 2016). The results of another international study that measures the level of achievement of students' scientific abilities is the *Trends in International Mathematics Science Study* (TIMSS). On TIMSS 2015, position Indonesia is rank on 45th from 48 in the field of science with an average value of 397. The TIMSS assessment information shows the scientific abilities of Indonesian students experiencing a decline in achievement. The scientific ability of Indonesian students in TIMSS is still below the average value (500) and in general is in the lowest stage (*Low International Benchmark*) so Indonesia is still included in developing countries [3].



In addition to the problem of the low quality of education, Indonesia is also faced with another problem, that is uneven education. At present the condition of education in Indonesia is not evenly distributed. For example, in urban areas, educational facilities and infrastructures are very advanced. While on plantations area, the learning is only rely on makeshift facilities and infrastructures [6]. Based on preliminary studies conducted by researchers that is through the distribution of questionnaires to sciences teacher of junior high school in Jember regency consisting of schools in urban areas and among them also schools in coffee plantation areas. From the results of the questionnaire, the problems of junior high school's science teachers in cities with plantation areas are different, that are schools in urban areas, facilities and infrastructures were adequated. Whereas the problems faced by junior high school in coffee plantation areas, that were facilities and infrastructures were inadequated, so often difficulties in delivering learning materials to students. Therefore, from the results of the preliminary test only 33.3% of the teachers who taught in the school of plantation area that were connected the learning materials with the context in the school environment with the result that the contextual approach helped students to understand the concept of scince learning materials.

Students in the plantation areashave low independence to learning, so there is a need for learning independence in learning that guided by the teacher can foster a scientific attitude in students. So that learning is needed to overcome these difficulties, are the *Problem Based Learning* (PBL) learning model with *Self regulated learning* (SRL) which is a learning model that trains and develops the ability to solve problems oriented to authentic problems from student's actual lives, to stimulate high-level thinking skills with student's learning independence, student's self-regulation in learning, and student's self-management in learning [2]. To overcome the problem and to improve student learning outcomes in science learning, especially in the area of plantations, so using of learning model *Problem Based Learning* (PBL) with *Self-regulated learning* (SRL) and with pattern interaction learning.

2. Method

The place of study was in the Islamic Junior High School 11 Jember which was a school in the coffee plantation area of Jember. The research subjects in this study were VII A grade students and the interaction pattern used is the difference in gender and closest friends. The procedure steps in this research can be seen in the Figure 1.

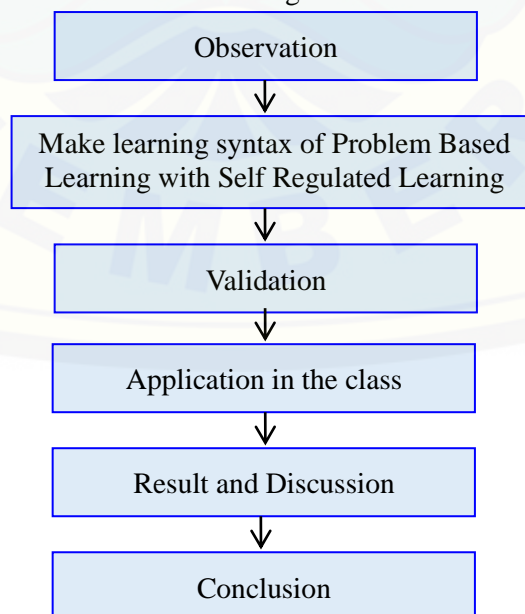


Figure 1. The procedure steps

The explain of the procedure steps, there are:

2.1. Observation

In the observation step, the researcher analyzed the lack of learning in schools in the plantation area. Then the researchers formulated and proposed a good learning model to be applied to plantation schools, student motivation and interest in learning also increased. If motivation and interest in learning increases, student learning outcomes will increase

2.2. Make learning syntax of Problem Based Learning with Self Regulated Learning

Make learning syntax adapted to problems that have been analyzed by researchers at the observation step. The syntax makes it easier for users to implement the recommended learning model. If the user / teacher agrees, the learning model recommended by the researcher will be applied to the class.

2.3. Validation

The validation step is to ensure that the model developed is valid and well used in learning. the validation step is carried out by the validator namely expert validator and user.

2.4. Application in the class

If the product validation step is valid, it can be used in learning in the classroom. In this study there were 3 meetings with different interaction patterns at each meeting. Meeting 1 is learning with a random pattern that is not determined by the interaction pattern. Meeting 2 is learning with patterns interaction of gender differences that is in learning to form groups according to their gender. Meeting 3 is learning with pattern interaction by the closest friend that is in learning to form groups according to their closest friends. Each the meeting was given a pretest and posttest in the form of a mastery of the concept to find out whether applied learning improved student learning outcomes.

Then obtained cognitive learning results obtained from the value of the *pretest* and *posttest* and the tests used in the form of essay tests to measure the increase in the extent to which the target is reached from the beginning before the treatment (*pretest*) to the target of learning outcomes after being given treatment (*posttest*). To test the effectiveness between learning models, manual calculation is used, that is the formula of the effectiveness of N-Gain. The following is the *Normalized gain* formula(g) [5].

$$N - gain = \frac{Skor\ posttest - skor\ pre\ test}{Skor\ ideal - skor\ pre\ test}$$

Table 1. *Normalized Gain Criteria*

<i>Normalized Gain Score</i>	<i>Normalized Gain Criteria</i>
0.70 < <i>gain normalized</i>	High
0.30 < <i>normalized gain</i> < 0.70	Medium
<i>normalized gain</i> < 0.30	Low

3. Result and Discussion

3.1 Research Result

The following is a syntagmatic of problem based learning with self regulated learning model.

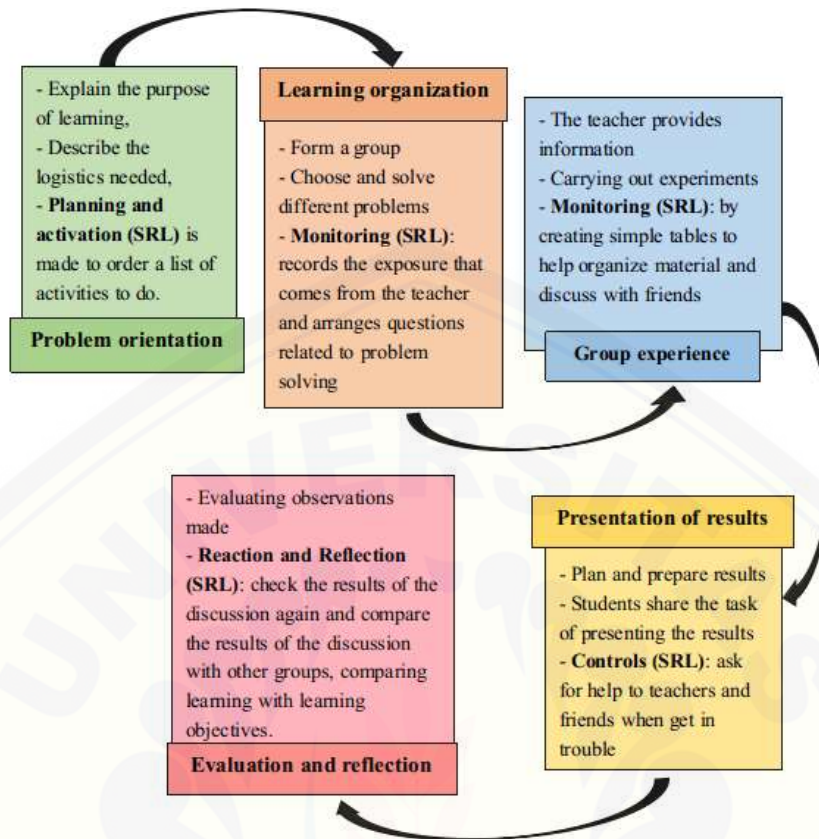


Figure 2. Step of Problem Based Learning with self Regulated Learning Model
Based on Figure 2. It can be seen in the syntax above, at the step of problem orientation, the teacher gives problems to students. these problems can encourage students to think at a high level and can encourage students' self potential, especially in the plantation area. The problem for example can be seen in Figure 3.

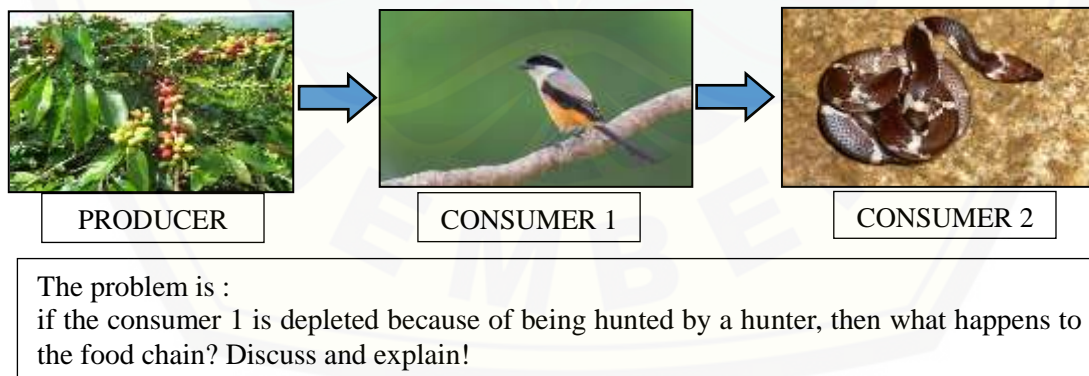


Figure 3. One Example of a Problem and Student Discussion Sheet

Based on Figure 3 is a description sheet of the problem raised by the teacher to students, where students will analyze the problem and make questions about problem solving, then they discuss with each other, analyze the answers and will present the results of the discussion.

3.1.1 Scheme and Result of Class of Learning Activity at Each Meeting

First Meeting

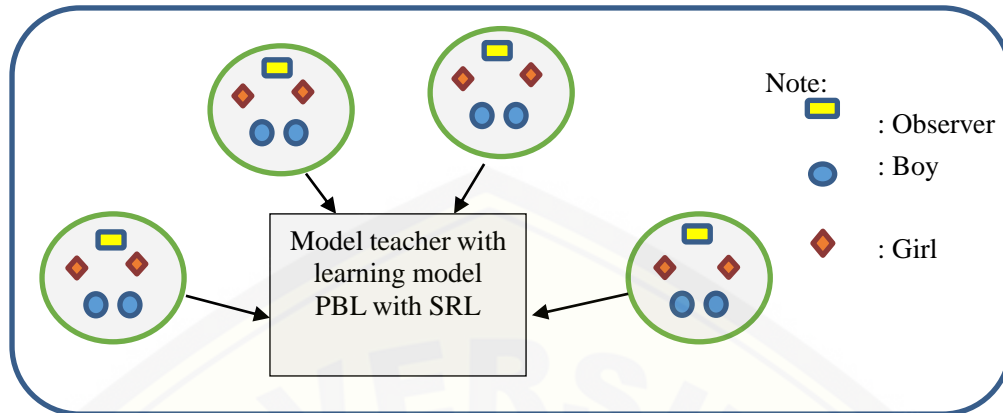


Figure 4. Scheme of Class of Learning Activity on First Meeting

Figure 4 is the scheme of class in learning activity of the first meeting which is a class without interaction or random patterns. Before learning, students were given pretest and at the end of the lesson were given posttest. After knowing the pretest and posttest scores, it can be seen the N-gain score. The N-gain score can be seen in Table 2.

Table 2. Results of the N-Gain of The First Meeting

Meeting	The number of students	Average score		N-gain	Category
		Pretest	Posttest		
M1 *	30	51.5	76.9	0.64	Medium

* M: Meeting

Table 2 shows that in the first meeting with the number of students are 30 students, the average of pretest was 51.5 while the posttest's average was 76.9. Then the N-Gain results at the first meeting are 0.64 with the category of increasing achievement on cognitive learning outcomes is medium.

Second Meeting

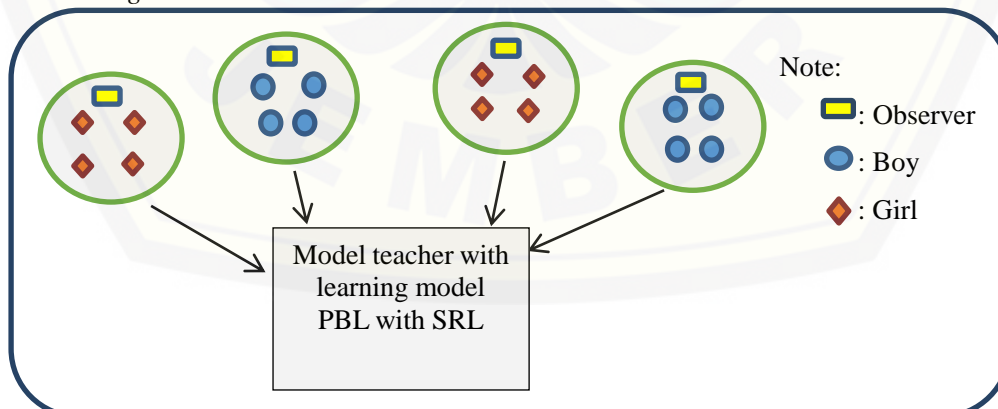


Figure 5. Scheme of Class of Learning Activity on second Meeting

Figure 5 is a scheme of class of the learning activity of second meeting which is a class with interaction patterns based on gender. Before learning, students are given a pretest problem and at the end of the lesson is given posttest. After knowingscore of pretest and posttest, it can be seen a score of N-gain. The N-gain of second meeting can be seen in table 3.

Table3.Results of N-Gain of Second Meeting

Meeting	The number of students	Average score		N-gain	Category
		Pretest	Posttest		
M2*	30	44.5	79.4	0,78	High

* M: Meeting

Table. 3shows that in the second meeting with the number of students are 30 people, the average of pretest was44, 5 while the average of posttest was 79,4.Then the results of N-Gain onsecond meeting are 0,78with the category of increasing achievement in cognitive learning outcomes is high.

Third Meeting

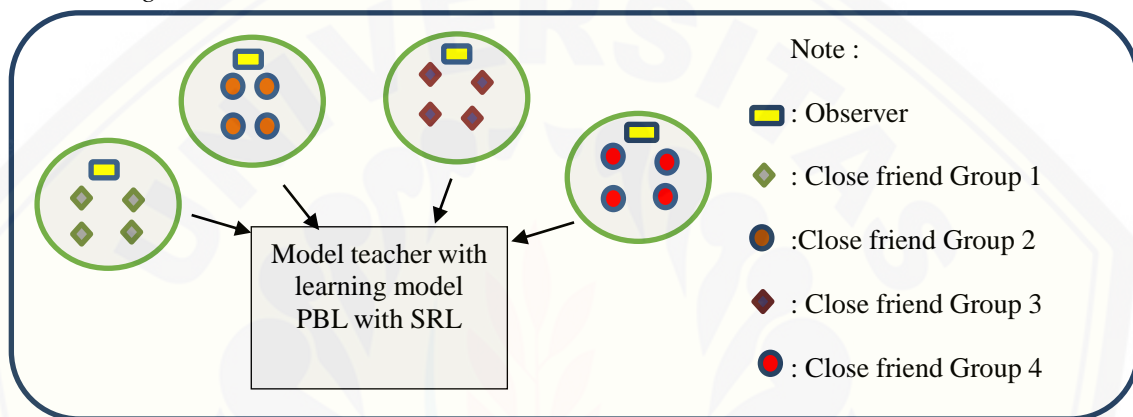


Figure 6.Scheme of Class of Learning Activity on Third Meeting

Figure 6 is a scheme of class of learning activity on third meeting which is a class with interaction patterns based on the closest friend. Before learning, students were given pretest questions and at the end of the lesson were given posttest. After knowing the pretest and posttest scores, it can be seen the N-gain score. The N-gain of third meeting can be seen in table 4.

Table4.Result of N-Gain Meeting Score3

Meeting	The number of students	Average score		N-gain	Category
		Pretest	Posttest		
M3*	30	45.2	88.5	0.79	High

* M: Meeting

Table 4 shows that in the third meeting with the number of students are 30 students, the average of pretest was 45,2while the average of posttest was88.5.Then the results of N-Gain on third meeting is 0.79with the category of increasing achievement on cognitive learning outcomes is high.

The results of this study indicate the existence of cognitive learning outcomes through N-gain using the *Problem Based Learning* (PBL) with *Self regulated learning* (SRL) model, which has different interaction patterns that can improve student’s cognitive learning outcomes. If viewed in graphical form, it will be seen in Figure 5.

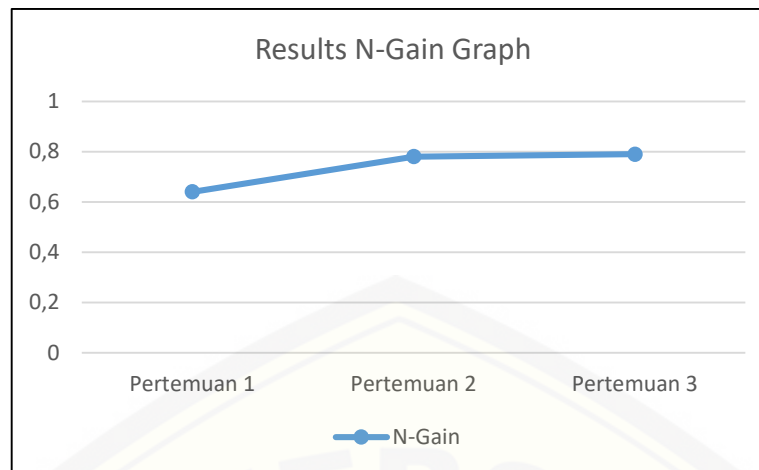


Figure 7. N-Gain Results Graph

Figure 7 is a graph of N-Gain results at each meeting. It can be seen that there is an increase in cognitive learning outcomes of students through the *Problem Based Learning* (PBL) learning model with *Self regulated learning* (SRL) with several interaction patterns. At the first meeting, the N-Gain result is 0.64, while the N-Gain of second meeting is 0.78 and the N-Gain of third meeting is 0.79. Although not too significant, there was an increase from the first meeting to the third meeting.

3.2. Discussion

School plantation area is a school located in the plantation area. The characteristics of the plantation school are that the students are still developing and being guided. Students in plantation areas also have low learning interests and motivations because students still have to help their parents in their work as farmers in the garden. So we need a learning model that helps students in the plantation area in their learning.

Learning model of *Problem Based Learning* (PBL) with *Self regulated learning* (SRL) which is a learning model that trains and develops the ability to solve problems that are oriented to authentic problems from students' actual lives, to stimulate higher-order thinking skills with student's learning independence, self-regulation of students in learning, and self-management of students in learning. The purpose of this learning model was developed to improve student learning outcomes, especially in the plantation area.

The procedure step of this study at the first is observation. Observation is needed by researchers to see student characteristics and effectiveness in learning. Then the researcher conducted interviews with students and teachers. The results of the interviews were conducted by researchers that students in the plantation area had low interest and learning motivation, so that it had an impact on student learning outcomes. From the characteristics of students in the plantation area, the researcher offers a solution to be able to increase students' interest and motivation, namely the interaction pattern of problem based learning with self regulated learning models which is expected to improve student learning outcomes, especially in plantation areas. But before it is implemented in the classroom, the learning model is validated first by expert validator and user validator. Expert validator is a validator that the master has said in education, for example is a lecturer. While the user validator is a validator who will later use the learning model that is the teacher. The learning model is said to be ready to be implemented is a learning model that at least meets valid criteria, this is in accordance with the statement [11] which states that the learning model is said to be valid if the validity is at least "valid".

After in the valid category, the learning model is implemented in the classroom. Researchers used three meetings with different interaction patterns at each meeting. The first meeting uses a random interaction pattern, the second meeting uses an interaction pattern of gender similarity, and the third pattern uses the interaction pattern of close friends. At the first meeting in this study, students had seen an increase in cognitive outcomes, namely the pretest

score against the posttest score. The result is an increase of 25.4 from the pretest score to the student posttest score. It means that with a random interaction pattern, students have shown an increase in cognitive learning outcomes. It shows that the applied learning model influences students' cognitive learning outcomes.

The second meeting shows a high N-gain category. This is due to the average pretest score and posttest score showing an increase of 34.9. Then the learning model patterns of interaction of gender similarity can improve students' cognitive outcomes. According to Eccles in [12] gender roles also influence student learning motivation. This is because boys and girls are raised in different ways even though they are in the same environment. As a result, boys and girls have different perspectives in education. Eccles also stated that with regard to the value of achievement, since high school female students did not value mathematics achievement more than male students.

The third meeting shows a high N-gain category. This is due to the average pretest score and posttest score showing an increase of 43.3. Then the learning model of close friend interaction patterns can improve students' cognitive outcomes. According to [9], the influence of peer groups can be seen from the daily lives of students who spend a lot of time with their friends. This can create the same attitudes and perceptions among them in everything including learning and school. Students will be more confident if they get social motivation from their fellow group members. Students with good learning achievements make their peers a place for discussion and group learning.

Several studies on *Problem Based Learning* (PBL) as well as *Self regulated learning* (SRL) can improve students' cognitive learning outcomes, that is research conducted by [4] regarding computer based Problem Based Learning models conducted in Senior High School 1 of Padang Tiji which is a school close to the plantation. The results of statistical tests show an increase in student learning outcomes taught with computer-based PBL learning models higher than students taught by conventional methods on buffer solution material. As well as research conducted by [1] with his research which showed that there was a difference in understanding of significant science concepts between students who took part in learning with the *Self Regulated Learning* model. Then the *Problem Based Learning* (PBL) learning model with *Self regulated learning* (SRL) is effectively applied in learning because it is to improve students' cognitive learning outcomes.

4. Conclusions

The low quality of Indonesian education seen from student learning outcomes in each education unit, makes educators have to explore more about how learning objectives can be achieved, so to improve student's learning outcomes. One of them is to use the right learning model in learning. *Problem Based Learning* (PBL) learning model with *Self regulated learning* (SRL) with several interaction patterns effectively applied in learning because it was seen in this study that learning outcomes on the first meeting, second meeting, and third meeting experienced an increase in student's learning outcomes as evidenced by the results of N-gain every meeting.

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References

- [1] Adnyani, *et al.* 2015. Effect of Self Regulated Learning (SRL) Learning Model on Understanding of Science Concepts in Grade IV Elementary School Students in Gudur XV, Buleleng Subdistrict. *PGSD Journal University of Education Ganesha Department of PGSD*. 3(1).
- [2] Glynn S M, L P Aultman, A M Owens 2005 Motivation to Learn in General Education Programs *The Journals of General of Education*, 54 (2): 150-170.

- [3] Ministry of Education and Culture 2016 *2015 TIMSS Results Seminar* Minister of Education and Culture's Exposition in Socialization.
- [4] Masykurni, A Gani, I Khaldun 2016 Application of Computer-Based Problem Based Learning (Pbl) Model to Improve Scientific Attitudes and Learning Outcomes in the Concept of Buffer Solutions in Padang Tiji 1 High School *Journal of Indonesian Science Education* 4(2): 83-95.
- [5] Nuraini R 2013 Application of Contextual Teaching Learning (CTL) to Improve Student Learning Outcomes at Competency Standards Cultivate.
- [6] Rizal M 2016 Equitable Education in Indonesia.
- [7] Rohim A Z 2011 Effect of Application of Information Search Strategy on Increasing Learning Achievement of SKI in Class VIII Students of MTsN Galur Kulon Progo Yogyakarta *Unpublished thesis* Tarbiyah Faculty; Yogyakarta Islamic University.
- [8] Rohmat S 2010 Application of Learning Oriented Student Activities (PBAS) in Meningkatkan IPA Student Learning Outcomes SD Class V *Unpublished thesis* Indonesian Education University.
- [9] Santrock John W 2003 Adolescence. Youth Development Erlangga Publisher. Jakarta
- [10] Santrock John W 2011 Educational Psychology Second edition Prenada Media Group. Jakarta
- [11] Santi I K L and R H Santosa 2016 Development of a Scientific Approach to the Basic Geometry Material of Middle School PYTHAGORAS: *Journal of Mathematics Education* 11 (1): 35-44.
- [12] Savery J R 2006 Overview of Problem Based Learning: Definition and Distinction *The Inter diciplinary Journal of Problem Based Learning* **1** (2): 9-18.