USEJ 6 (2) (2017)

Unnes Science Education Journal

http://journal.unnes.ac.id/sju/index.php/usej

THE IMPLEMENTATION OF INQUIRY LEARNING MODEL TO IMPROVE SELF-CONCEPT AND LEARNING ACHIEVEMENT OF THE STUDENTS OF SMA LAB UNDIKSHA

Ni Made Pujani✉

Department of Science Education FMIPA Universitas Pendidikan Ganesha, Singaraja, Indonesia

Article Info

Received April 2017
Accepted June 2017
Published July 2017

Keywords:
Learning achievements, inquiry, and self-concept.

Abstract

This study aims to (1)improve students self-concept, (2) students learning achievement of physics, and (3) describe the response of students towards inquiry learning model implementation. This study was an action research conducted in two cycles. Subjects were student class XI.A2 of SMA Lab Undiksha academic year 2012/2013, which consist of 39 people. Data collected by administering tests, questionnaires and observation sheets. The data that obtained, analyzed by descriptive statistics. The results shows that (1) there are improvement in students self-concept from first cycle (M = 102.4) to second cycle (M = 113.2), medium categorized, (2) an improvement in the average value of students learning achievement from first cycle (M = 75.5) to second cycle (M = 80.5) good categorized, and (3) students responses to the implementation of inquiry learning model is positive.

p-ISSN 2252-6617
e-ISSN 2502-6232

✉Corresponding author:
Ni Made Pujani
Jurusan Pendidikan IPA FMIPA Universitas Pendidikan Ganesha, Singaraja, Indonesia
E-mail: pujanim@yahoo.co.id

INTRODUCTION

In order to improve the quality of primary and secondary education in general, or the quality of Physics lessons in particular it was necessary to change the mindset used as the basis for the implementation of the curriculum. In the past, the teaching and learning process for Physics subjects was less focused on the students. As a result, teaching and learning activities emphadize more on teaching rather than on learning. Besides focusing on the students, the learning mindset needed to be changed from simply understanding the concepts and principles of science, the students must also had the ability to do something by using the concepts and principles that had been mastered.

There was a kind of signal that the hope of growth of creative and anticipatory qualities in the Physics teachers in the learning practices to maximize the students' participation. This seemed to happen since the lowest level of formal education until collage. This was suspected as one factor causing the low quality and quantity of the Physics learning process and products. Nowadays the quality of Physics learning process could be seen from the regular learning activity. On the other hand, Physics learning products could be articulated from the result of Senior High School National Final Exam in Physics from year to year which was still low and Physics grades in the report book were still relatively low as well. Particularly at SMA Lab Undiksha Singaraja with good input row, facilities and infrastructure was quite supportive nonetheless the result of Physics learning was not in accordance with the expectation. This was indicated by the average grade of National Examination for the academic year of 2011/2012 for class XI.A2 only reached 67 with the Minimum Criteria of Learning Mastery 70 (Document of Undiksha Lab High School).

The results of interviews with several the students and discussions with Physics teachers showed that: (1) Many the students who had process skills in the adequate category could be seen from their low ability to formulate hypotheses, to design experiments, to measure, to communicate the results of experiments, and to draw conclusions from the experimental results, (2) Many the students who had scientific attitudes with the low category could be seen from their behavior such as they rarely criticized the opinions of other the students, secondly they often manipulated the data so that the goal of their experimental results did not deviated from the concepts and principles described by the teacher, third in carrying out the Physics experiments many the students were less diligent, and fourth, they had low curiosity, (3) many the students who had self concept with adequate category could be seen from their dependence on other the students at the time of repetition; their low creativity; their low responsibility nature to group tasks; their thought that Physics was very difficult.

As a first step to find the factors that caused the students' low learning outcomes and low self-concept, then the researcher conducted a preliminary study at SMA Lab Undiksha Singaraja. This study was a direct observation in the classroom during Physics lesson for 2 times, discussion with high school Physics teacher Lab Undiksha Singaraja, and interview with the students. From this preliminary study the following findings were obtained:

1) Physics learning methods used by teachers had been dominated by lecture methods, and only occasionally applied experimental methods, discussions, and demonstrations. Based on the results of interviews with the teachers, it revealed that teachers had not felt teaching if they had not lectured the students, the lab equipments were limited, and the teachers felt pessimistic that they would had short of time if the learning used experimental methods.
2) In Physics learning, the teachers hah been less concerned with the initial knowledge of the students.
3) Performance of the students in Physics learning was still not good enough, it marked by the students' inactive involvement in answering questions raised by the teachers, the students were less active in asking questions, and less initiative in learning.
4) The teaching strategies applied by the teachers thus far, were that the students were first presented with a number of concepts or principles, after which the students were given some questions or problems, and learning more emphasis on Science products.
5) The student responses to learning models implemented by the teachers were less positive characterized by many the students

who felt bored and felt that the Physics lesson was very difficult.

6) Interaction in learning was less multidirectional.
7) The results of their experiments were made in the form of reports nonetheless were rarely discussed, this did not provide an opportunity for the students to communicate and discuss what they got through the experiment.
8) Physics Learning had never been designed and implemented with the inquiry learning model
9) The learning process was not a student-centered learning, it was not able to help the students develop self-concept
10) The assessment was more focused on the cognitive domain

The packaging of the above learning was not in line with the nature of the learned person and the nature of the person teaching according to the constructivist view. Learning according to the constructivist was an active process of the learners constructing the meaning of either text, dialogue, physical experience, or others. Learning was also a process of assimilating and connecting experiences or materials learned with a sense that already belonged to a person so that understanding developed (Suparno, 1997: 61). According to the constructivist, teaching was not the activity of transferring knowledge from teacher to student, nonetheless an activity that allowed the students to build their own knowledge. Teaching meant participation with learners in shaping knowledge, making meaning, seeking clarity, being critical, and conducting justification (Betten Court in Suparno, 1997: 65).

On the other hand, Physics learning which emphasized only aspects of the product such as memorizing concepts, principles or formulas did not provide an opportunity for the students to be actively involved in the processes of science. Such learning could not grow the students' self-concept.

Learning Physics in schools should not be directed solely to prepare the students to continue to higher education level, nonetheless what was more important was preparing the students to: (1) be able to solve problems encountered in everyday life using the Science concepts they had learned, (2) be able to make correct decisions using scientific concepts, this could be done if the students had good self-concept and (3) had a scientific attitude in solving problems encountered thus as to enable them to think and act scientifically (Ndraka, 1985)

The notion of studying Physics that was not merely learning a series of facts had long been proclaimed and explicitly introduced since the 1975 Curriculum. This idea had implications for the strategy of Physics learning, with the shift of the orientation of telling science to the doing science orientation. One of the reasons for this orientation change was the strong would that the outcomes of graduates had a synergistic performance that was a hook-linking process to three aspects of ability: cognitive-affective-psychomotor. The attitude developed in Physics was a scientific attitude commonly known as scientific attitude (Karhami, 2001).

According to Harlen (1992: 97) to cultivate the students' scientific attitude, there were three main types of teacher roles: showing examples, giving reinforcement with praise and approval, and providing opportunities for developing attitudes. When the students still showed the desire to do, they should be given the opportunity to move. Giving new objects was giving the students the opportunity to develop an inquisitive attitude. Discussing experimental results gave the students the opportunity to think critically. According to Magno (in Karhami, 2001: 5) one way to develop a scientific attitude was to treat a child like a young scientist as a child followed a science learning activity. The active involvement of the students both physically and mentally in the laboratory activities would had an effect on the formation of the student action patterns that were always based on scientific matters.

Self-concept (self-concept) that could grow and develop through inquiry activities would affect student learning outcomes. According to Amin (in Sadia: 1992) stated that each individual had a self-concept, and if the student had a good self-concept, then psychologically the students would feel safe, open to new experiences, eager to always take and explore existing opportunities, creative and generally had a healthy mentality. Self-concept which was the view of a person about himself, was not something that brought from birth, nonetheless formed through individual interaction with the social environment, including the school environment where the students gained knowledge.

Based on the description above it could be concluded that one of the factors causing the learning result was the student's self-concept was low, and the less positive student responses to the learning was the lesson model implemented by the teacher giving less opportunity for the students to move like scientist and less multidirectional interaction. Based on the description above, the result of learning, self concept, and student's response to learning model needed to be revealed through a class action research, and needed to be designed and implemented a learning model that could improve the learning result, the students' self concept, and the students' response to learning model .

Based on the background description of the problems above then the formulation of the problems to be searched for answers through this experimental research was:

1) Was the implementation of inquiry learning model could improve self-concept of XI.A2 class of SMA Undiksha Lab?
2) Was the implementation of inquiry learning model could improve student Physics learning result of XI.A2 class of SMA Lab Undiksha?
3) How did the XI.A2 class of Undiksha Labs High School respond to the implementation of the inquiry learning model?

Alternative actions that could be taken to solve the problems above included adding the Physics Lab tools, improving the quality of teachers, improving the scoring system, adding Physics lessons, and applying learning models that enabled more on the student-centered learning. The chosen alternative was through the implementation of a learning model that enabled more on the student-centered learning and a more thorough assessment system. Learning model that would be implemented in this research was inquiry model of learning. This selection was based on the inquiry learning model allowing the students to construct their own knowledge and move like a scientist. In addition, through the inquiry learning models the students could shape and develop their self-concept, increase expectancy levels, avoid them from learning ways by memorization, and give them time to assimilate and accommodate information (Trowbridge and Bybee, 1973).

It was also supported by several constructivist-based research results that could improve the students' self-concept and Physics learning result, such as the research by Sadia (1992) which found that the discovery-inquiry method influenced the students' Physics and self-learning achievement; Intensification of the implementation of laboratory activities in science learning could improve the students' scientific attitude (Mardana et al, 1998: 26); Optimization of laboratory activities oriented to the STM approach could foster the students' scientific attitude (Rapi et al, 2000); The approach of process skills could change the scientific attitude toward the better (Subratha et al, 2000); and the Inquiry Learning Model could improve the students 'better the students' scientific attitudes compared to the Deductive Hypothesis-Learning Learning Cycle Model (Neat, 2005).

The purposes of this study were to improve the students' self-concept and Physics learning outcomes and to analyze the responses of the XI.A2 class the students of SMA Undiksha Lab against the implementation of inquiry learning model.

METHOD

This study was a classroom action research that was planned for two cycles with each cycle consisting of stages: 1) planning stage, 2) action implementation stage, 3) observation / evaluation stage, 4) evaluation / reflection stage. The syntax of the inquiry self-learning model used was described in Table 1. The data types, data collection methods, data collection time, and instruments are like Table 2.

Table 1. The syntax of the inquiry self-learning model

Phases	Teacher's Activities	Students' Activities
1) Facing the problem Phase	• Teachers explore the initial ideas / ideas of students relating to the topics to be studied, by asking questions • Assign students to make hypotheses related to the questions asked	• Make a hypothesis based on the initial knowledge possessed

Phases	Teacher's Activities	Students' Activities
2) Testing data collection phase	• Assign students to collect information relating to problems encountered through various sources	• Students seek information to solve problems encountered
3) Testing phase through experiment	• Teachers facilitate as long as students do inquiry activities	• Students perform testing activities against hypotheses submitted through experiments, demonstrations, and discussions guided by student worksheet • Students conduct a group discussion on the outcome of the investigation
4) Formulation phase	• Guiding students in discussions • Directing students to make conclusions	• Students conduct class discussions related to investigation results • Students draw conclusions on the results of their observations and reflect on their learning progress.
5) Concept implementation phase	• Provide practice questions	• Working out problems in groups

To describe the quality of self concept and student learning outcomes, the data were analyzed using descriptive analysis. The qualifications were described on the basis of the ideal average score and standard idea deviation. This research was said to be successful, in other words, this action succeeded when the self-concept of the students was highly qualified, the average of cognitive domain learning, affective domain, and psychomotor domain were completed classically (85%) with 70 for the Minimum Mastery Learning Standard (MMLS), and the students' response to the learning model implemented qualified positively.

Table 2. Data Types, Methods, Instruments, and Time of Data Collection

Data Types	Methods	Instruments	Times
Learning outcomes of the cognitive domain	Test	Physics learning result test	At the end of each cycle
Results of affective learning	Questionnaire Observation	Attitude scale Guidelines for observation	At the end of each cycle At the time of learning
Psychomotor domains	Observation and assignment	Guidelines for observation	At the time of learning
Self concept	Questionnaire	Questionnaire	At the end of each cycle
Response	Questionnaire	Questionnaire	End of second cycle

RESULT AND DISCUSSION

The results of self-concept student data analysis could be seen in Table 3. Based on Table 3, it could be explained that the distribution of self-concept values of XI.A.2. Class the students of SMA Lab Undiksha Singaraja in the high category was 7.7% (cycle 1) and 38.5% (cycle 2); Medium category was 76.9% in cycle 1 and 59% in cycle 2; Low categories were 15.4% (1) and 2.6% (cycle 2). The average score of student self-concept in cycle 1 was in medium category (M = 102.4) and in cycle 2 was also medium category (M = 113.2). Based on these categories, the research had not met the category of success.

Research was said to succeed if the value of the students' self-concept were in the high category. Nevertheless, the average self-concept score in cycle 2 was greater than cycle 1. It could be said that inquiry learning could improve student self-concept.

The learning outcomes were obtained by combining the cognitive, affective and psychomotor aspects with weight (50%, 25%, and 25%). Based on the combination of the achievement on the cognitive, affective and psychomotor aspects, the quality of the students' learning outcomes after learning could be seen in Table 4.

Table 3. the Distribution Value of the Students' Self Concept

No	Interval Score	Cycle 1		Cycle 2		Category
		f	%	f	%	
1	> 139.95	0	0	0	0	Very High
2	116.65 - 139.95	3	7.7	15	38.5	High
3	93.35 – 116.65	30	76.9	23	59	Medium
4	70.05 – 93.35	6	15.4	1	2.6	Low
5	< 70.05	0	0	0	0	Very Low
	Average	102.4 (Medium)		113.2 (Medium)		

Table 4. The Students' Learning Outcomes

No	Description	The score of Cognitive Aspects of Cycle 1	The score of Cognitive Aspects of Cycle 2
1	The students' average score	75.5	80.5
	Category	Good	Good
2	Classical Mastery	94.9 %	100%
	Category	Completed	Completed

Based on Table 4, it was known that the learning outcomes of XI.A.2. Class the students of SMA Undiksha Lab in Physics subject in both cycles were qualified Good (M cycle 1 = 75.5 and M cycle 2 = 80.5) with the classical mastery 94.9% and 100% (> 85%). Thus learning with the inquiry model could improve the students' learning outcomes. It is in line with Sulistijo et al., (2017) that states there is a difference of learning outcomes after applying guided inquiry model in the learning process.

The students' responses to Physics learning with inquiry model were excavated through questionnaires given to the students at the end of cycle 2. The results of the analysis found the average score of 57.5 with SD = 6.5 through questionnaires, with a positive qualification. In more detail, the distribution of student responses can be seen in Table 5. Based on Table 5, the research had met the category of success. This showed that the applied learning model contained positive things, such as inquiry learning caused the students to be more motivated in learning, to feel the success of the group, to learn more easily and fun because the burden were thought together with the group and they were very happy if all members of the group had understood the subject matter well. Similarly, the use of inbuilt Student Worksheet in Physics learning could positively accelerate the students' understanding of the concepts studied. This was because the Student Worksheet was prepared by considering the initial knowledge that must be possessed by the students to be able to understand the basic concepts that would be studied with the application on the events in daily life. According to Septiani and Napitupulu (2016) the use of worksheet can result a different learning outcomes between worksheet class and non-worksheet class.

Table 5. Distribution of Student Response Scores

No	Interval Class	Frequency	Percentage (%)	Category
1	> 60	13	33.3	Very Positive
2	50 - 60	16	48.7	Positive
3	40 - 50	6	15.4	Positive Enough
4	30 - 40	1	2.6	Less Positive

5	< 30	0	0	Very less positive

The results show that self-concept and student's Physics learning result improved after applied inquiry model on the concept of friction and elasticity. It was found in cycle 1 that there was no student whose self concept was very high. The students with high self-concept were 3 people or about 7.7%, medium category was 30 people or 76.9% and low category was about 6 people or about 15.4%. This showed that the students' self-concept had not been satisfactory.

In the learning process in cycle 2, there was also no student whose self concept was very high. The students with high category self-concept were 15 people or about 38.5%, medium category was 23 people or 59% and low category was still 1 person or about 2.6%. It could be seen that the self-concept of the students in cycle 2 had increased from cycle 1. In cycle 2, the number of the students with high self-concept had increased, with the category of medium and low had decreased. The same could be seen in the average self-concept of the students, which numerically showed improvement, although the category was the same as medium. The average of cycle 1 was 102.4 (Medium) and cycle 2 was 113.2 (Medium).

The students' self concept was not satisfactory, because the students who had low self-concept tended to feel less confident in their ability, pessimistic in doing a task, and they tended to be reluctant in expressing the idea. In cycle 2, there was an improvement over these constraints, by more optimizing the learning with inquiry model, where this model emphasized the dating ideas of the students as the basis for inconsistency new knowledge. In addition, the teachers also motivated the students to be active in learning, for example by rewarding the students whose answers were correct, providing opportunities by pointing directly at the students to ask questions, and providing more practice tools for smaller group members (from 6 groups were made into 8 groups). Fitriani et al. (2016) states that CTL guided inquiry-based model is effective to improve students' learning outcomes and activity.

After such efforts, the students who had high self-concept in cycle 2 increased compared with cycle 1, although there was no student whose self-concept was very high. Most the students had dared to express their opinions, dare to deny the opinion of his friend was wrong. This inquiry model could help the students to grow their self-confidence, so that the students could improve their self concept. The model of mercury was a learning model based on constructivism, thus the students learned to discover their own knowledge, learned to construct knowledge, learned to express opinions with logical arguments, and could link the concepts obtained with everyday life. In this model, learning was not only to know it, nonetheless also to find the identity. Thus if this model was applied to the students with low self-concept, of course over time his self-concept would be improved. With increasing self-concept, it would improve student learning outcomes.

About the students' learning result also showed improvement between cycle 1 and cycle 2. In cycle 1, the average of the student Physics learning result was 75.5 with classical completeness 94.9%. This meant that the learning in cycle 1 was complete, nonetheless not yet optimal. Some obstacles were found, among others, the learning activities seem still a bit stiff, because the students were not familiar with the application of this model. The students looked not very skilled in formulating hypothesis at the beginning of the meeting, the student still looked used to the previous learning, because when the students were invited to do practicum with the inquiry still less skilled using lab tools. Similarly, when the students were in the group discussions, they seemed to be lacking cooperation in the group.

To solve this problem, in cycle 2 the teacher explained again about the inquiry model and how to formulate the hypothesis. In order for the students to be able to test the hypothesis he compiled. To further activate the students, the teacher reiterated that all activities in the laboratory were observed by the researcher and would be assessed for their psychomotor attitudes and skills. After doing the improvement through the effort, then in cycle 2 of classical completeness reach 100% with the average of 80.5 (bigger than MMLS value = 70). Thus the results obtained had met the criteria of success. This was because the inquiry model trained the students to actively find their own, construct hypotheses, collect data for testing and find solutions to problems encountered. This meant that the inquiry model could improve the students' Physics learning outcomes.

Viewed from the aspect of the students' learning achievement, the achievement of cognitive aspect showed improvement, it was proportional to the achievement of result of learning in general. The cognitive aspect value in cycle 1 was 77.2 (good) with 89.7% classical completeness, in cycle 2 it was 82,4 (fine) 100% classical mastery. This meant that the inquiry model improved the students' cognitive aspects. Meanwhile, the achievement for attitude aspect in cycle 1 mostly categorized as adequate (51.3%), good category 46.2% and none of that attitude was very good. In cycle 2, there was an increase in the student attitudes, in which the attitude of the students who categorized as good increased to 76.9% from 46.2%, and adequate category was still 15.4%. This meant that the inquiry model improved the students' attitudes. For psychomotor aspect, the students' achievement category in cycle 2 was better than cycle 1. There was an increase of psychomotor percentage with very good category from 59% (cycle 1) to 64.1% in cycle 2. This meant that the inquiry model could improve the students' psychomotor aspect.

Regarding the students' responses, there were positive responses to the application of inquiry models. This could be seen from the result of the students' response analysis obtained the average score of 57.5 which was quite positive, with a very positive response amount of 33.3%. From the data, it could be said that the students' response was very positive if the inquiry learning was applied to the learning of Physics.

In general, this research was said to be successful because it could improve self-concept and Physics learning result of class XI.A2 the students Of SMA Lab Undiksha in the academic year of 2012/2013. This was caused through the implementation of the inquiry learning model, in addition to providing opportunities for the students to construct their own knowledge and provide opportunities for the students to link concepts that had been understood with the concepts to be learned so that there was a meaningful learning process and the inquiry model provides model learning in such a way that the students were able to express their own ideas and test and discuss the idea openly. This would help the students to construct concepts constructively, thereby reducing misconceptions in the students and increasing scientific conceptions, which would ultimately contribute to improving the students' self-concept and learning outcomes. The inquiry model also gave the students opportunity to work like a scientist, so that the students' curiosity was growing and gave the students the opportunity to use the science process skills. In other words, through the inquiry model the learning was centered to the students, thus it provided opportunities for the students to develop the self concept, cognitive ability, and scientific attitude and science process skills.

Several efforts had been made in the implementation of this research to achieve optimal results. Nonetheless there were still obstacles that were experienced, including the number of the students who were quite a lot (39 people) caused the researcher a rather difficult time in making observations and perform appraisal appropriately to each student even though the researcher had been assisted by two observers. There were some the students who had not been able to formulate their own hypotheses and carry out experiments well.

CONCLUSION

Based on the results of data analysis and findings in the development of this learning, some conclusions could be drawn as follow. First, through the implementation of inquiry learning model in Physics learning the students could improve their self concept. In cycle 1, the average value of the students' self-concept was 102.4 including medium category, and in cycle 2 the average score was 113.2 including medium category. Second, the implementation of inquiry learning model in Physics learning could improve the students' Physics learning outcomes. In cycle 1, the average score of 75.5 learning outcomes was included in either category with 96.9% classical completeness. In cycle 2, the average value of the students' learning outcomes was 80, 5 including good category with 100% classical completeness. Third, the students' responses to the inquiry learning model with an average score of 57.5 were positive.

Based on the findings and discussion of the results of this study, several suggestions might be proposed. The high school Physics teacher who found the problems as mentioned in the development of learning innovation was expected to try to implement the inquiry learning model as an alternative to Physics learning, to improve the students' self-concept and response to learning which was expected to improve the students' learning outcomes. In order to achieve optimal learning outcomes, the teachers were advised to pay attention to the students' self-concept because the self concept was influential together with the inquiry learning model to the students' learning outcomes.

REFERENCES

Fitriani, N. R., Widiyatmoko, A., & Khusniati, M. (2016). The Effectiveness of CTL Model Guided Inquiri-Based in The Topic of Chemicals in Daily Life to Improve Students'learning Outcomes and Activeness. *Jurnal Pendidikan IPA Indonesia*, *5*(2), 278-283.

Harlen, W. (1992). *The Teaching Of Science.* London: David Fulton Publishers.

Karhami, A. (2001). Sikap Ilmiah Sebagai Wahana Pengembangan Unsur Budi Pekerti (Kajian Melalui Sudut Pandang Pengajaran IPA). *Jurnal Pendidikan dan Kebudayaan,* No. 027, Tahun ke-6, November 2000

Mardana, I.B.P., Sudiatmika, A. A. I. R., Suwindra, P. (1998). Intensifikasi Pelaksanaan Kegiatan Labolatorium dalam Pembelajaran IPA Sebagai Upaya Meningkatkan Minat, Sikap Ilmiah, dan Prestasi belajar IPA Siswa Kelas II SLTP Negeri 1 Singaraja. *Laporan Penelitian*. Singaraja: STKIP Singaraja.

Ndraka, T. (1985). *Teori Metodologi Administrasi*. Jakatra: Bina Aksara.

Rapi, N.K., Sujanem, R. (2000). Optimalisasi kegiatan Labolatorium yang berorientasi pada Pendekatan STM dalam Pembelajaran Fisika sebagai Upaya untuk Meningkatkan Sikap Ilmiah dan Hasil Belajar Siswa Kelas I1 SMUN 3 Singaraja. *Laporan Penelitian*. Singaraja: STKIP Singaraja.

Rapi, N. K. (2005). Pengaruh Model Pembelajaran Terhadap Hasil Belajar Fisika dan Sikap Ilmiah. *Tesis*. Singaraja: IKIP Negeri Singaraja

Sadia, I W. (1992). Pengaruh Pola Asuh Orang Tua dan Pengajaran dengan Metode Discovery-Inquiry Terhadap Konsep Diri dan Sifat Mandiri, serta Hubungannya dengan Prestasi Belajar IPA Siswa SMP Negeri Di Propinsi Bali. *Laporan Penelitian*: Universitas Udayana Denpasar.

Septiani, F., & Napitupulu, M. A. (2016). The Effect of Higher Order Thinking Question inbiology Practical Worksheets to Students Learning Achievement on Ecosystem Topic Grade X. *Jurnal Pelita Pendidikan*, *4*(2).

Subratha, I N., Mardana, I.B.P., Sudiatmika, A. A. I. R. (2000). Upaya Meningkatkan Sikap Ilmiah dan Kualitas Hasil Belajar Siswa Sekolah Dasar Melalui Pembelajaran IPA dengan Pedekatan Keterampilan Proses. *Laporan Penelitian*. Singaraja: IKIPN Singaraja.

Sulistijo, S. H., Sukarmin, S., & Sunarno, W. (2017). Physics Learning using Inquiry-Student Team Achievement Division (ISTAD) and Guided Inquiry Models Viewed by Students Achievement Motivation. *Jurnal Pendidikan IPA Indonesia*, *6*(1).

Suparno, P. (1997). *Filsafat Konstruktivisme dalam Pendidikan.* Yogyakarta: Kanisius.

Trowbridge & Bybee. (1990). *Becoming a Secondary School Science Teacher*. Ohio: Merrill Publishing Company.