

# Improving Creative Thinking Ability of Class X Students Public High School 59 Jakarta through Guided Inquiry Learning Model

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**Abstract** The purpose of this research is to know whether guided inquiry learning model can improve student's creative thinking ability of class X-1 Public High School 59 Jakarta. This research is a classroom action research according to Kurt Lewin model: (1) planning, (2) acting, (3) observing, and (4) reflecting. Research was conducted from January 2017 to June 2017 with 36 students at Public High School 59, class X-1, Jakarta, Indonesia as experiment subject. Data was collected through observation, written test and documentation. The result of student's creative thinking ability obtained by 52,00% for fluency aspect in cycle 1 and 60,57% in cycle 2. Flexibility aspect increased from 44.29% in cycle 1 to 55.71% in cycle 2, originality aspect increased from 49, 52% in cycle 1 to 59,05% in cycle 2, and elaboration aspect increased from 45,71% in cycle 1 to 58,57% in cycle 2. According to the obtained data, it can be concluded that guided inquiry learning model can improve student's creative thinking ability in fluency, flexibility, originality, and elaboration aspects.

**Keywords:** *creative thinking ability, guided inquiry learning model*

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## 1. Introduction

Nowadays, learning must be a student-centered, so students are expected to expand all potentials they have in learning activity. However, the learning process that often occurs in the real class demands students to master the subject matter only. The emphasis is more on memorizing and looking for the right answer to the questions that are given. High-thinking processes have not been widely applied. One type of high-level thinking is creative thinking. In fact, the progress of science and technology demands a human resource that not only has knowledge but also must have the skills (life skill) in creating something creatively.

Ability to think creatively is the ability to understand problems and find solutions with varying strategies or methods. In creative thinking, the basic process of thinking is used for the discovery of new things, works of art, constructive ideas relating to perceptions or concepts, which emphasize the intuitive or rational aspect of thinking. Creative thinkers deliberately practice their imagination, partly by looking at things from an unusual point of view.

Based on observations and supported by interviews with some students and teachers, it's indicated that students still feel the learning conditions that tend to be

passive so that they can't explore the creative ideas to solve the problems presented. Based on interviews with teachers in the field of study, it is known that the lecture method is the most frequently used method in physics learning process, this means that the learning process is still dominated by teachers. When the learning process of students tend to be passive, only limited to sit, hear, record and only few students who want to ask a question about the material was being taught. Learning methods and models have not been able to explore student's creative ideas in solving the problems presented. The results of interviews with teachers also indicate that many students still can't solve the problems that were given with different viewpoints. Experiment activities in laboratory also rarely to conduct.

In order to achieve results according to the planned objectives, teachers need to consider teaching and learning strategy that is creative, effective, and efficient (Serevina, Maulana, & Suprastiyono, 2017). A learning model that enlivens the learning atmosphere in the classroom so that the students are involved more in the learning process is necessary. The guided inquiry learning model provides students with freedom during the learning process but accompanied by teacher guidance in sharpening creative thinking skills through problem and problem solving during the learning process and able to generate new ideas in finding concepts and knowledge.

## 1.1. Formulation of the Problem

Can guided inquiry learning model improve creative thinking ability of class X- 1 students in Public High School 59 Jakarta?

## 1.2. Research Purposes

Based on the formulation of the problem, the classroom action research aims to know whether guided inquiry learning model can improve student's creative thinking ability of class X-1 Public High School 59 Jakarta.

## 2. Materials and Methods

### 2.1. Creative Thinking

Thinking is defined as a creative process that deals with problem solving [1]. In Indonesian General Dictionary, creative is defined as having the ability to create; for example, a job that requires addition to intelligence as well as imagination [2]. Creative thinking is a habit of the mind trained by paying attention to intuition, enliven the imagination, revealing new possibilities, opening up amazing perspectives, and generating unexpected ideas [3]. In other words, creativity or creative thinking can be interpreted as a spontaneous and imaginative pattern of thought or idea, characterizing artistic results, discoveries of scientific, and mechanical creations [4].

Ibid defines creativity as follows [5]:

- Creativity is the ability to create new combinations, based on data, information, or elements that exist. Usually, people interpret creativity as creativity, as the ability to create new things. Indeed what is created is not necessarily new things at all, but is a combination of things that already existed.
- Creativity (creative thinking or divergent thinking) is the ability to find many possible answers to a problem, where the emphasis is on quantity, usability, and diversity of answers. The more possible answers that can be given to a problem the more creative one is. Of course, the answers should be in accordance with the problem. So, not just the number of answers that can be given that determines one's creativity, but also the quality or level of the answer.
- Operationally, creativity can be defined as an ability that reflects fluency, flexibility, and originality in thinking, as well as the ability to elaborate (develop, enrich, detail) an idea.

Creative thinking skills that are developed in learning according to Munandar [6] include aspects of fluency, flexibility, originality, and elaboration.

#### 2.1.1. Fluency Thinking Skills

Fluency thinking skills is the ability to spark a lot of ideas, answers, and problem solving, give many ways or suggestions to do many things and always think of more than one answer. Fluency thinking skills that students have is reflected in their behavior, as following:

- a) Ask a lot questions.
- b) Answering with a number of answers if there is question.

- c) Have many ideas about a problem.
- d) Express ideas fluently.
- e) Work faster and do more rather than other students.
- f) Can quickly see the errors or deficiencies in an object or situation.

#### 2.1.2. Flexible Thinking Skills (*flexible*)

Flexible thinking skills (*flexible*) is an ability to generate ideas, answer and variety question, can see a problem from different point of view, looking for many different alternatives or directions, and can change ways of approach or way of thinking. Flexible thinking skills that students have is reflected in their behavior, as following:

- 1) Give a variety of unusual usage of an object.
- 2) Give various interpretations of an image, story or problem.
- 3) Apply a concept or principle in a different way.
- 4) Give consideration to situations that are different from those given by others.
- 5) In discussing a situation always have a different or contradictory position of the majority or group.
- 6) If given a problem they usually think of different ways to solve it.
- 7) Categorize things according to different divisions (category).
- 8) Able to change the direction of thinking spontaneously.

#### 2.1.3. Original Thinking Skills

Original thinking skills is an ability to give new and unique expression, think about unusual ways to express yourself, able to create unusual combinations of parts or elements.

Original thinking skills that students have are reflected in their behavior, as following:

- 1) Thinking about issues or things that others do not.
- 2) Questioning about old ways and trying to think of new ways.
- 3) Select a-symmetry in drawing or design.
- 4) Have a different way of thinking than others.
- 5) Looking for a new approach from the stereotype.
- 6) After reading or hearing ideas, work to find a new solution.
- 7) Preferably synthesizing rather than analyzing the situation.

#### 2.1.4. Elaboration Skills (*Elaborate*)

Elaboration skills (*elaborate*) is an ability to enrich and develop an idea or product, adding or detailing the details of an object, idea, or situation so that it becomes more interesting. Elaboration is defined by modifying the reaction by adding some other reactions. It's like taking a simple thought, then modify and make it more interesting. Or, increase the details of a particular thought, provided that these details fit the main idea. Detailing skills that students have is reflected in their behavior, as following:

- 1) Looking for deeper meaning for answers or troubleshooting by taking detailed steps.
- 2) Develop or enrich other's ideas.
- 3) Try and test the details to see the direction to be taken.
- 4) Has a strong sense of beauty so they are not satisfied with the empty or simple appearance.
- 5) Add lines, colors, and details to the pictures themselves or others.

## 2.2. The Guided Inquiry Learning Model

Kuhlthau, Leslie, and Caspary [7] stated that the guided inquiry learning models can help students to think creatively and find creative solutions to problems. The guided inquiry learning model is a learning model that motivates students to learn through the proving of topics or issues by conducting investigative activities. The aspects of creative thinking can be enhanced through the stages of the guided inquiry learning model.

Orlich [6] says, there are several characteristics of guided inquiry must be considered :

- 1) Develop student's thinking skills through specific observations to be able to make inference or generalization.
- 2) The goal is learning the process of observing events or objects and compiling appropriate generalizations.
- 3) The teacher controls a certain part of the learning, such as events, data, materials and acts as a class leader.
- 4) Each student tries to build a pattern that is based on observation in the classroom.
- 5) Class is expected to function as a learning laboratory.
- 6) Usually a number of generalizations will be obtained from the students.
- 7) Teachers motivate all students to communicate their deliberate habits so that they can be utilized by all students in the class.

Gulo in Trianto ([8]: 137-138) states that the capabilities needed to implement self-learning are as follows:

- 1) Asking questions or problems

Inquiry activities begin when questions or problems are raised. To make sure that the question is clear, the question is written on the board, and then the student is asked to formulate the hypothesis.

- 2) Formulate the hypothesis

Hypotheses are temporary answers to questions or solutions to problems that can be tested with data. To facilitate this process, the teacher asks students the idea of a possible hypothesis. Of all the ideas, one of the hypotheses that is relevant to the given problem is chosen.

- 3) Collecting data

Hypotheses are used to guide the data collection process. The resulting data can be a table, matrix, or graph.

- 4) Data analysis

Students are responsible for testing the hypothesis that has been formulated by analyzing the data that has been obtained. An important factor in testing the hypothesis is right or wrong thinking. After obtaining the conclusion, from the experimental data students can test the hypothesis that has been formulated. If the hypothesis is wrong or rejected, the student can explain according to the inquiry process that he has done.

- 5) Make a conclusion

The closing step of inquiry learning is to make a tentative conclusion based on the data obtained by the students.

## 2.3. Accelerated Uniform Motion

Many practical situations occur when the acceleration is constant or nearly constant, if the acceleration does not change with time. The situation when the magnitude of constant speed and motion through straight lines is called perpendicular motion. In this case, momentary acceleration and average acceleration are the same [9].

The equations of motion on accelerated uniform motion are as follows [10]:

$$V_t = V_0 + at. \tag{1}$$

## 2.4. Parabolic Motion

In parabolic motion, objects work speed in both directions, ie vertical and horizontal [11].

The initial velocity of the object on the y-axis is  $V_{0y} = V_0 \sin\theta$ . The initial velocity of the object on the x-axis is  $V_{0x} = V_0 \cos\theta$ . When the object moves in the air the velocity component on y axis becomes  $V_y$

$$v_y = v_{0y} \pm gt \tag{2}$$

$$v_y = v_0 \sin \theta \pm gt \tag{3}$$

$$v_y^2 = v_{0y}^2 \pm 2gh \tag{4}$$

$$v_y^2 = (v_0 \sin \theta)^2 \pm 2gh \tag{5}$$

The time when the object moves upward reaches speed in the air is

$$t = \frac{v_0 \sin \theta - v_y}{g}. \tag{6}$$

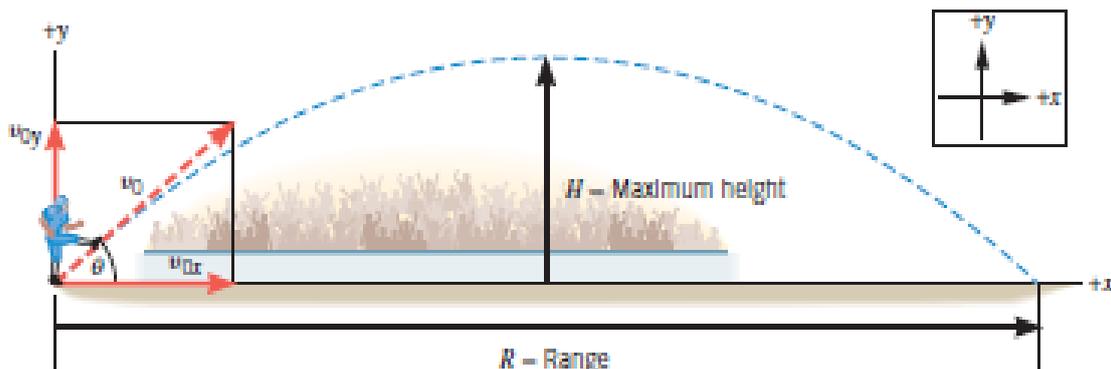


Figure 1. Parabolic Motion

The time when the object moves down, the speed in the air is as follows:

$$t = \frac{v_y - v_0 \sin \theta}{g}. \quad (7)$$

The height of the object as it moves upward as follows:

$$h = \frac{(v_0 \sin \theta)^2 - v_y^2}{2g} \quad (8)$$

The height of the object as it moves down as follows:

$$h = \frac{(v_0 \sin \theta)^2 - v_y^2}{2g} \quad (9)$$

The initial velocity on the x axis is  $v_{0x}$

$$v_{0x} = v_0 \cos \theta. \quad (10)$$

When the object moves in the air the velocity component on the x ( $v_x$ ) is not affected by gravity so that its velocity equals  $v_{0x}$

$$v_x = v_{0x}. \quad (11)$$

Distance traveled by object while moving in air of x

$$x = v_x t. \quad (12)$$

$$x = v_0 \cos \theta t. \quad (13)$$

When the object is at the highest / maximum height:

Moving objects reach the highest point when  $v_y = 0$

Maximum height of object,  $h_{maks}$

$$h_{maks} = \frac{(v_0 \sin \theta)^2}{2g}. \quad (14)$$

The time to reach the maximum height is  $t_{maks}$

$$t_{maks} = \frac{v_0 \sin \theta}{g}. \quad (15)$$

The distance the object reaches when it reaches its maximum height is  $x_{hmaks}$

$$x_{hmaks} = v_x t_{maks} = \frac{v_0^2 \sin 2\theta}{2g}. \quad (16)$$

When it reaches the farthest distance then the object hits the ground so these that

$$h_{xmaks} = 0. \quad (17)$$

Time to reach the farthest distance is twice the time to reach maximum height.

$$t_{xmaks} = 2t_{maks} = \frac{2v_0 \sin \theta}{g}. \quad (18)$$

The furthest distance ( $x_{maks}$ ) object was achieved when the object hit the ground with an interval of  $t_{xmaks}$

$$\begin{aligned} x_{maks} &= v_x t_{xmaks} \\ &= 2x_{hmaks} = \frac{v_0^2 \sin 2\theta}{g} \quad [12] \end{aligned} \quad (19)$$

## 2.5. Research Methodology

This research is a Classroom Action Research. Kurt Lewin model became a reference or basis of various models of action research, especially classroom action research. The concept of principal action research according to Kurt Lewin consists of four components: (1) planning, (2) acting, (3) observing, and (4) reflecting. The fourth component relationships are viewed as one cycle. Data that has been retrieved and collected are processed and analyzed using qualitative data analysis techniques. Qualitative data obtained from test data analysis of qualitative observation that is used to analyze data in the process of learning which is done by delivering contextually and profound meaning according to the research problem. To measure the extent to which creative thinking abilities of students through observation, then the criteria used in the observation sheet is to provide the value of 1 if the indicator appears and 0 if it does not appear. After the whole students answers were given a score, then the next step is to calculate a percentage score for each item or response from the grain problem by using the following formula:

$$\text{Percentage} = \frac{\text{answer Skor}}{\text{ideal Skor}} \times 100\%. \quad (20)$$

Furthermore the percentage score obtained is compared on the criteria of interpretation of the score on the following table:

**Table 1. Criteria for the assessment of the results of Observation of the student's creative thinking**

The percentage answer	Assessment criteria
81 % - 100 %	Very creative
61 % - 80 %	Creative
41 % - 60 %	Creative enough
21 % - 40 %	Less creative
0 % - 20 %	Not creative

## 3. Results

### 3.1. Cycle I

#### 3.1.1. Planning Phase

The activities undertaken in this planning stage are as follows:

- The result of preliminary observation or preliminary findings of teaching in class X-1 in Public High School 59 Jakarta, student's ability to think creatively is still low. This finding is a reflection material for performing cycle I by making a planning action cycle I.
- Prepare lesson plan implementation.
- Develop assessment instruments in the form of performance appraisal, student's worksheet assessment and learning result test consisting of questions based on the indicators contained in the implementation plan of learning.

#### 3.1.2. Implementation Phase of Action

Implementation of the action is done referring to the learning scenario that has been made, where scenarios are based on the guided inquiry learning guided syntax. In general, the actions performed can be seen in [Table 2](#) as follows:

**Table 2. Implementation Phase of Action**

Number	Activity	Learning Activities
1	Ask a question or issue	Students see some animations and videos about accelerated uniform motion the expected students are able to ask several question identify the problem.
2	Formulate the hypothesis	Students discuss in forming hypothesis.
3	Collecting data	Students design experiments, students sort the test steps, students experiment.
4	Data analysis	Students analyzes data in the form of tables and graphs, write experimental reports in the form of posters, and present the results of group experiments in front of the class.
5	Taking conclusions	Students take conclusions throughout the learning process.



**Figure 2.** (a) Students pose problems and (b) formulate hypotheses



**Figure 3.** Students collecting data



**Figure 4.** students analyzing data



**Figure 5.** students present the experimental results



**Figure 6.** students make conclusions

**3.1.3. Observation**

Data that were obtained from the observation sheet of the implementation phase were used to make improvements in the next learning process. Found that in the preliminary activities of students are quite active in expressing ideas and answering teacher questions in the classroom. In the core activities of most students still cannot determine the experiment variables, problem formulation, and hypothesis. Students have not seemed to think about different ways to solve them and to find new solutions to problems encountered during the experiment. Students are seemed to have this strong sense of beauty visible from the poster of experiment report that looks more interesting and creative. At the presentation of the results in laboratory, students are quite active in the question and answer session. In closing activities, some students are still not making right conclusions.

**3.1.4. Reflection**

Based on the analysis of the research results cycle 1 has been described above, it appears that students are still less precise in determining experimental variables, problem formulation, hypotheses and making conclusions. Based on the results of the reflection, then the action plan for cycle 2 can be designed is the students are given the task of designing the experiment in the form of daily tasks. The problems raised in class are closer to the student's daily life, and students are trained with questions to reveal a hypothesis.

**3.2. Cycle 2**

**3.2.1. Planning Phase**

Based on the reflection on cycle 1, the researcher goes on to cycle II. In this second cycle, the planned topic is about parabolic motion. These steps start from asking questions or problems, formulating hypotheses, collecting data, analyzing data, making conclusions

**3.2.2. Implementation Phase of Action**

The implementation of the action is done based on the learning scenario that has been made, where the scenario is based on guided inquiry guided instruction syntax. In general, the actions taken can be seen in [Table 3](#) as follows:

**Table 3. Implementation Phase of Action**

Number	Activity	Learning Activities
1	Ask a question or issue	Students see some animations and videos about accelerated uniform motion the expected students are able to ask several question indentify the problem.
2	Formulate the hypothesis	Students discuss in forming hypothesis.
3	Collecting data	Students design experiments, students sort the test steps, students experiment.
4	Data analysis	Students process data in the form of tables and graphs, write experimental reports in the form of posters, and present the results of group experiments in front of the class.
5	Taking conclusions	Students take conclusions throughout the learning process.



**Figure 7.** Students pose problems and formulate hypotheses



**Figure 8.** Students collecting data



**Figure 9.** Students analyzing data



**Figure 10.** Students present experimental results



**Figure 11.** Students make conclusions

**3.2.3. Observation**

In cycle 2 it's found that student's preliminary activities are more active in expressing ideas and answer questions teachers in the classroom. In the core activities most of students have been able to determine experiment variables, problem formulation, and hypotheses. Students have seemed to think different ways to solve and to find new solutions on ongoing problems during the experiment. Students seemed to have this strong sense of beauty visible from the poster of a practicum report that looks more interesting and creative. At the presentation of the results in the laboratory, students are quite active in the question and answer session. In closing activities some students are making right conclusions.

**4. Discussion**

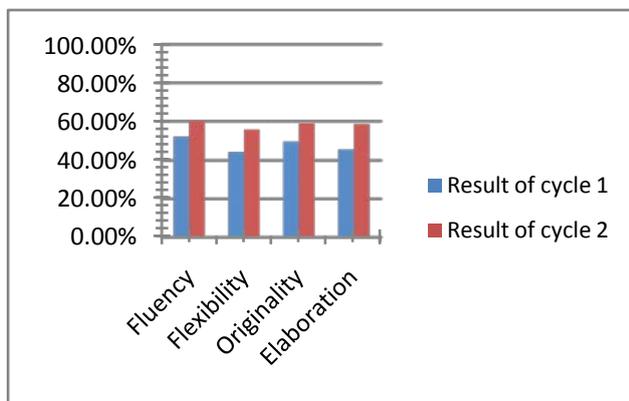
Creative thinking as a spontaneous and imaginative pattern of thought or idea, which is most likely a functioning skill, flexibility, and originality in thought, as well as the ability to elaborate (develop, enrich, detail) an idea. Nowadays, creative thinking ability is very needed in the school because in refraction will produce innovative and creative generation so that is expected learners will be able to compete in global market. One way to cultivate students' creative thinking skills in learning activities is to vary the model, approach, or method of learning. In this study used guided inquiry learning model in an effort to improve students' creative thinking ability. The reason for the use of guided inquiry learning model because this

learning model motivates students to learn through the proving of topics or issues by conducting investigation activities. Aspects of creative thinking can be enhanced through the stages of the guided inquiry learning model.

Creative thinking skill consists of aspects of fluency, flexibility, originality, and elaboration. These four aspects of creative thinking are measured through observation in each stage of the guided inquiry learning model. In cycle 1, the learning material of Accelerated Uniform Motion found findings about the materialized of guided inquiry learning such as students were quite active in expressing ideas and answering teacher's questions in the classroom, creative in designing experiments, but most students still cannot determine the research variables, formulation of the problem, hypothesis, and make a conclusion. Students were serious and enthusiastic in doing practicum. At the presentation of the results of practicum, students were quite active in the question and answer session. Observation result of students' creative thinking ability in the form of data as follows:

**Table 4. Comparison Between Observation Results of Creative Thinking Skill Students of Cycle 1 and Cycle 2**

Rated Aspect	Result	
	Cycle 1	Cycle 2
Fluency	52,00%	60,57%
Flexibility	44,29%	55,71%
Originality	49,52%	59,05%
Elaboration	45,71%	58,57%



**Figure 12.** Graph of the Enhancement of Student's Creative Thinking Skills

From Table 4 above, in the cycle 1, the fluent thinking ability is 52.00% with quite creative category, flexibility skills is 44.29% with quite creative category, original thinking skills (originality) is 49.52% with quite creative category, and ability to think in detail is 45.71% with quite creative category. Result of reflection of cycle 1 still has not reached the expected goal, then cycle 2 was implemented. In cycle 2, fluent thinking ability (fluency) increased by 8.57%, from 52.00% to 60.57% with creative category. This enhancement was seen from the more students who asked questions, the students worked faster, and the students began to express their many ideas. Flexibility skills increased by 11.42%, from 44.29% to 55.71% with creative enough category. This enhancement

was seen from more students who provided various interpretations of a problem and think of different ways to solved it. Most students have been able to determine experiment variables, formulation of the problem, and hypothesis. Students were serious and enthusiastic in doing experiment. Some students were making right conclusions. At the presentation of practicum results, students were quite active in the question and answer session. Original thinking skills (*originality*) increased by 9,53 % from 49,52% to 59,05% with moderately creative categories. This increase is proved by more students having different ways of thinking, and working to find new solutions. Detailing thinking skills (*elaboration*) increase by 13,16% from 45,71% to 58,57% with moderately creative categories. This increase is proved by more students who seek deeper meaning for answers or problem solving by taking detailed steps, and have strong sense of beauty. Thus obtained the average result of student creative thinking ability improvement of 10,75% from cycle 1 to cycle 2. Based on the data above, it can be concluded that the guided inquiry learning model can improve students' creative thinking ability.

## 5. Conclusion

Based on the result and discussion that has been described previously, it can be concluded that students' creative thinking ability can be improved through guided inquiry learning model.

## References

- [1] Bono, E. D. (2007). *Revolusi Berpikir*. Bandung: Kaifa.
- [2] Poerwadarminta, W. J. (1976). *Kamus Umum Bahasa Indonesia*. Jakarta: PN Balai Pustaka.
- [3] Johnson, E. B. (2006). *Contextual Teaching and Learning Menjadikan Kegiatan Belajar Mengajar Mengasyikkan dan Bermakna*. Bandung: MCC.
- [4] Amien, M. (1987). *Mengajarkan Ilmu Pengetahuan Alam (IPA) dengan Menggunakan Metode Discovery atau Inquiry*. Jakarta: Departemen Pendidikan Nasional.
- [5] Munandar, U. (1999). *Mengembangkan Bakat dan Kreativitas Anak Sekolah Penuntun Bagi Guru dan Orang Tua*. Jakarta: PT Grasindo.
- [6] Munandar, U. (2009). *Pengembangan Kreativitas Anak Berbakat*. Jakarta: Rineka Cipta.
- [7] Kuhlthau, C. C., Leslie, M. K., & Caspary, A. K. (2007). *Guided Inquiry: Learning in The 21st Century*. London: Libraries Unlimited.
- [8] Trianto. (2007). *Model-model Pembelajaran Inovatif Berorientasi Konstruktivistik*. Jakarta: Prestasi Pustaka Publisher.
- [9] Sumarsono, J. (2009). *Fisika Untuk SMA/MA Kelas X*. Jakarta: Depdiknas.
- [10] Halliday, R. (2014). *Fundamental Physics*. USA: John Wiley & Sons, Inc.
- [11] Cutnell, J. (2014). *Physics th9 Edition*. USA: John Wiley & Sons, Inc.
- [12] Drafting Team. (2017). *Modul Pembelajaran Fisika SMA Kelas X*. Jakarta: PPG SM-3T Fisika Universitas Negeri Jakarta.
- [13] Suyanti, R. D. (2010). *Strategi Pembelajaran Kimia*. Yogyakarta: Graha Ilmu.