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File name:	Improvement_of_Students_Process…
File size:	291.73K
Page count:	11
Word count:	3,278
Character count:	18,788
Submission date:	05-Jul-2020 05:01AM (UTC-0700)
Submission ID:	1353593852

Macrothink Institute™
Global Journal of Educational Studies
ISSN 2377-3936
2018, Vol. 4, No. 2

The Application of the *Ryleac* Learning Model in the Concept of Electricity and Magnet towards the Improvement of Students' Process Skill at Physics Department

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Received: November 18, 2018 Accepted: December 25, 2018 Published: December 26, 2018
doi:10.5296/gjes.v4i2.14153 URL: https://doi.org/10.5296/gjes.v4i2.14153

Abstract

The purpose of this study is to improve students' process skill at Physics Department by applying the *Ryleac* learning model in the concept of electricity and magnet. This classroom action research is significantly able to produce *Ryleac* learning media that can enhance the aforementioned skill of the students. The study involved 21 students of the second semester at Class A of Physics Department, Faculty of Mathematics and Natural Sciences, Universitas Negeri Gorontalo. The results reveal that the cycle 1 reaches various categories of the process skill, consisting of 4.76% with the high category, 90.48% with the moderate category, and 4.76% with the low category. In contrast, cycle 2 arrives at 95.24% with the high category, 4.76% with the moderate category, and 0% with the low category. Therefore, the Ryleac learning model is able to improve students' process skill.

Keywords: China insurance industry, Foreign fund, Challenge

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Keywords: China insurance industry, Foreign fund, Challenge

1. Introduction

According to Regulation of The Minister of National Education Number 22 of 2006 on Contents Standard (in Sujana; 2012, p. 14), Natural Sciences have something to do with how to find the essence of nature systematically, so that it is not only about mastering facts, concepts, or principles, but also a process of discovering one of the essences of Natural Sciences which is a process.

Natural Sciences subject in 2013 Curriculum plays a vital role in developing whole aspects of the level of students' ability in the learning process because this subject is developed based on the achievement of knowledge, attitude, and skill aspects.

Process skill (Abdjul, 2009, p. 23) is a treatment in the teaching and learning process by using thinking capacity and creation effectively and efficiently to reach learning objectives. Samatowa (in Purwandari, 2015, p. 25) argues that science process skill is an intellectual skill of scientists and utilized in researching natural phenomena. Physics process skill enables students to experience the essence of physics as well as making them skillful in doing several activities of physics. Dimyati and Moedjiono (2002, p. 141) state that process skill consists of basicskill and integrated skill. The basicskill includes the observation, classification, communication, measurement, prediction, and drawing conclusions skills. Further, the integrated skill comprises the skills of identifying variables, creating tables, making graphics, describing the relationship between variables, collecting and processing data, analyzing data, makinghypotheses, defining variables, and experimenting.

Process skill can lead students to be more creative, active, skillful in thinking and gaining knowledge (Avianti et al., 2015, p. 225). To achieve these qualities, a leaning model that is specifically designed to emerge students' critical thinking is essential.

Nevertheless, some facts show that the learning process has not been going as expected. Based on the data, the learning process skill of Basic Physics subject still encounters various obstacles. The result of an interview with one of the Basic Physics lecturers indicates that student' skills in observing, interpreting the data tendency, determining variables, drawing a conclusion, and processing and analyzing data in the Basic Physics subject are still dissatisfactory.

For this reason, a leaning model that is specifically designed to emerge students' critical thinking is required. The *inquiry* learning model is a series of learning activities emphasizing on the process of critical thinking and analysis to figure out the answer to a problem (Sanjaya, 2008, p. 194). Besides, this model prepares students in a situation to widely experiment by themselves to see happening phenomena, doing something, giving questions, and finding answers along with connecting and comparing the findings with other ones.

Sanjaya (2012, p. 208) also reveals the advantages of the *inquiry* learning model, such as 1) emphasizing on the development of a balanced cognitive, affective, and psychomotor aspects, so that the learning process will be more meaningful; 2) providing spaces for students to study as in accordance with their learning style; 3) in line with the development of modern psychology that considers learning a process of behavior changes caused by experiences; 4) fulfilling the needs of students with the above-average ability.

In addition to applying the *inquiry* learning model, one of the learning models that can make students more engaged in the learning process is the Learning Cycle-based learning model. According to Sari (2013, p. 02) and Budiasih (in Rafiuddin, 2016, p. 47), *Learning Cycle* is a student-centered learning model. It can encourage students to be actively involved in the process of sciences experiment, using instruments, observing, measuring, collecting data, drawing conclusions, and the like.

The advantages of *learning cycle* as argued by Warsono and Heriyanto (2014, p. 35) are: 1) enhancing students' learning motivation since they are actively participated in the learning process, 2) developing students' scientific attitude, 3) having a meaningful learning, (4) giving an opportunity for students to think, search, discover, and explain the example of applying the concepts they learn.

Based on the above descriptions, an in-depth study on the learning process in the concept of electricity and magnet should be conducted. As a result, a learning model that should be implemented to improve learning quality and to create better physics teacher candidates is the *Inquiry-Learning Cycle (Ryleac)* Learning Model. This model can enhance the Process Skill of Physics teacher candidates in the concept of Electricity and Magnet at Faculty of Mathematics and Natural Sciences, Universitas Negeri Gorontalo.

2. Method of Study

This classroom action research was conducted at Class A of Physics Department and involved 21 second-semester students in the academic year of 2017/2018. This study employed a model of classroom action research by Kemmis and Mc Taggart (in Gayatri, 2016), consisting of planning, action, observation, and reflection with the following research design:

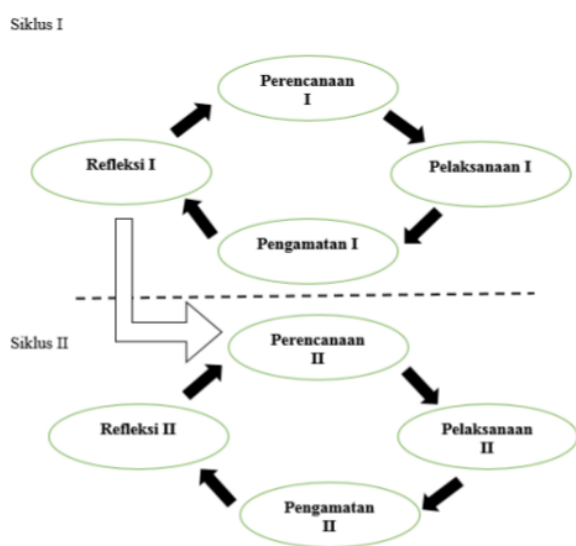

Figure 1. The cycle of classroom action research by Kemmis and Mc Taggart

Description:

- *Siklus*: Cycle
- *Perencanaan*: Planning
- *Pelaksanaan*: Action
- *Pengamatan*: Observation
- *Refleksi*: Reflection

The data were collected from observation and test in which the observation was performed to collect data about the implementation of a learning model by the lecturer and students' activities, and the test was used to measure students' process skill before and after applying the *Ryleac learning* model.

2.1 Learning Implementation

The lecturer's learning implementation was observed by another lecturer as the observer by using a learning implementation sheet, adapted from the observation sheet of a ratingscale of check marks type method (Borich, 1994). The observer provided criteria in every phase of learning by giving a check mark in the implementation column (Yes or No) and in the assessment column.

All aspects of the learning implementation were analyzed by utilizing the following equation

The Percentage of Learning Implementation (%)

$$\frac{\textit{banyak langkah yang terlaksana}}{\textit{banyaknya langkah yang direncanakan}} \times 100\,\%$$

Description:

- *Banyak langkah yang terlaksana:* the number of implemented steps
- *Banyaknya langkah yang direncanakan:* the number of planned steps

(Purwanto, 2012, p. 103)

2.2 Observation Sheet of Students' Activities

An observation technique was employed to observe students' activities. There were three observers involved in this stage.

All aspects of students' activities were analyzed by using the following equation:

$$\text{Students' Activities} = \frac{\textit{achieved aspects}}{\textit{total aspects}} \times 100\%$$

(Purwanto, 2012, p. 103)

Score criteria of the observation results of the learning implementation and students' activities were determined by referring to the assessment criteria as presented in Table 1 below;

Table 1. Percentage Criteria of Learning Implementation and Students' Activities (Arikunto, 2010, p. 44)

Percentage Range	Category
81% - 100%	Very Good
61% - 80%	Good
41% - 60%	Fair
21% - 40%	Poor
0% - 20%	Very Poor

2.3 Process Skill Results

The data of students' process skill were analyzed by employing descriptive statistics related to the *N Gain*. The *Gain* shows the concept mastery differences of the students before and after being given treatment. In this case, it reveals how far their improvement after getting the *Ryleac*learning model in the Basic Physics 2subject. The *N-Gain* equation is as follows;

$$\langle g\rangle = \frac{\langle G\rangle}{\langle G\rangle_{maks}} = \frac{\bar{X}_{post}-\bar{X}_{pre}}{X_{maks}-\bar{X}_{pre}}$$

Table 2 shows the quantity of factor <*g*>.

Table 2. *Gain* test average classification

Value	**Criteria**
(<g>) ≤ 0,3	Low
0,3 < (<g>) < 0,7	Moderate
(<g>) ≥ 0,7	High

Note. Hake, 1999.

3. Results and Discussion

This classroom action research was conducted through the application of the *Ryleac* learning model with two cycles in the concept of electricity and magnet. Electric current and magnetics were the learning materials in cycle 1 and cycle 2 respectively. The research data were learning implementation by the lecturer, students' activities, and process skill results, elaborated as follows:

3.1 Learning Implementation

Below figure presents the analysis results of the learning implementation in Basic Physics 2subject, especially in the concept of electricity and magnet, by applying the *Ryleac* learning model to the students in the site area in the cycle 1 and cycle 2.

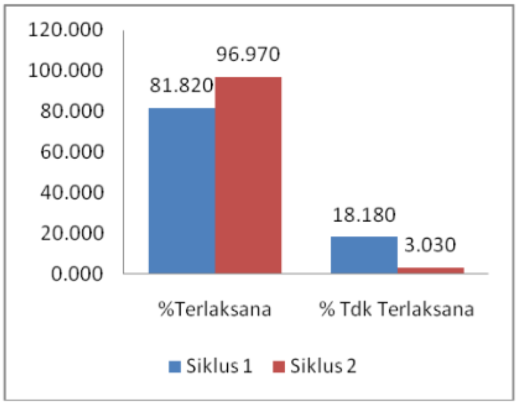

Figure 2. The Percentage of the Implementation of the *Ryleac* Learning Model in Cycle 1 and 2

Note. Description:

- *Terlaksana:* Implemented
- *Tidak Terlaksana:* Unimplemented
- *Siklus:* Cycle

Figure 1 shows that the percentage of the learning implementation to the students in the site area arrives at 81.82% and the unimplemented aspect reaches 18.18% in cycle 1. In cycle 2, the percentage of the learning implementation achieves 96.97%, and the unimplemented aspect gets 3.03%. The average value of the learning implementation attains a very good category, so that there is an improvement of the learning implementation of Basic Physics 2 subject in the concept of electricity and magnet in the cycle 1 and cycle 2. Supporting factors of the *Ryleac* learning process based on the observation results are a great performance of the lecturer in planning and conducting the learning process, group experiments, the lecturer gives opportunities for students to question and deliver their opinion, students are actively involved in the learning process, and the role of the lecturer as a supervisor in learning. A teacher does not only play a role in transferring knowledge and truth, but he is also a guide (Arends, 2012). Thus, the students will be more engaged in the classroom. The improvement of process skill is due to teaching activities that employ the *inquiry* learning model. Such a model focuses on students finding learning materials by themselves, whereas the teacher acts as a facilitator and supervisor for the students to study. Further, the *inquiry* exercise is able to increase science knowledge, generating creative thinking ability to improve skills in processing and analyzing data (Hosnan in Arista et al., 2017, p. 105).

3.2 Students' Activities

The following figure brings out the analysis results of students' activities in Basic Physics 2 subject, especially in the concept of electricity and magnet, by implementing the *Ryleac* learning model in the cycle 1 and cycle 2.

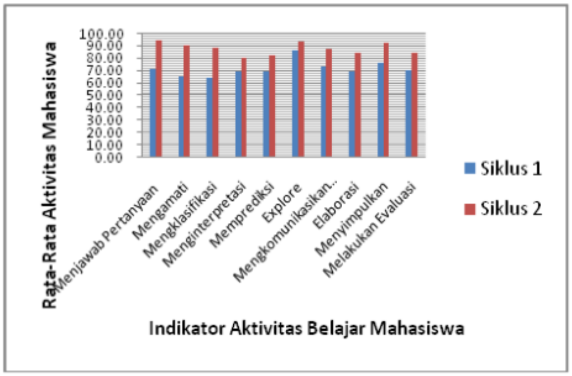

Figure 2. Students' activities applying the *Ryleac* learning model

Note. Description:

- *Rata-Rata Aktivitas Mahasiswa:* Average Percentage of Students' Activities
- *Siklus:* Cycle
- *Indikator Aktivitas Belajar Mahasiswa: Students' Learning Activities Indicators*
- *Menjawab Pertanyaan:* Answering Questions
- *Mengamati:* Observing
- *Mengklasifikasi:* Classifying
- *Menginterpretasi:* Interpreting
- *Memprediksi:* Predicting
- *Eksplore:* Exploring
- *Mengkomunikasikan:* Communicating
- *Elaborasi:* Elaborating
- *Menyimpulkan:* Drawing Conclusion
- *Melakukan Evaluasi:* Evaluating

The average percentage of students' activities arrives at 71.90% (a good category) and 88.45% (a very good category) in cycle 1 and cycle 2 respectively. On that ground, students' activities are enhanced through the application of the *Ryleac*learning model in the concept of electricity and magnet. According to Maftuhah and Rahman (2015), the stages of student-centered learning models can give opportunities for students to apply the materials, build up their knowledge, and work in groups. Therefore, it can develop scientific attitude bringing an improvement of students' concept mastery. Ideal learning is that students are actively involved in a useful and meaningful learning process (Fajriah, 2016, p. 100).

3.3 Process Skill

The management of the *Ryleac* learning model carried out by the lecturer is impactful on the outcomes of students' process skill. Below is the test result of their process skill implementing the *Ryleac* model in cycle 1 and cycle 2.

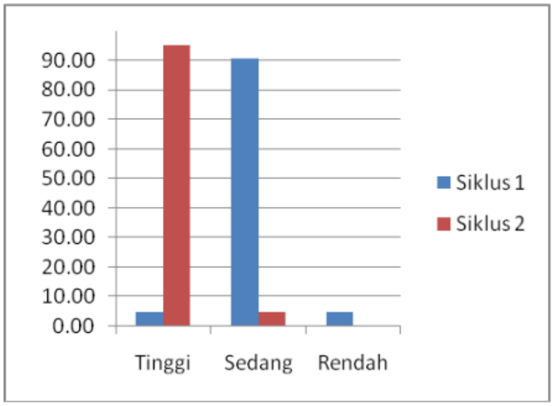

Figure 3. Category of students' process skill based on the *N-Gain* Test

Note. Description

- *Siklus:* Cycle
- *Tinggi:* High
- *Sedang:* Moderate
- *Rendah:* Low

Figure 3 indicates that the difference between the pre-test and post-test from students' process skill through the application of the *Ryleac* learning model in cycle 1 is 4.76% with the high category, 90.48% with the moderate category, and 4.76% with the low category. In cycle 2, conversely, the difference between the pre-test and post-test from students' process skill through the application of the *Ryleac* learning model is 95.24% with the high category, 4.76% with the moderate category, and 0% with the low category. This signifies that students' process skill from cycle 1 to cycle2 has been improved.

This is in compliance with Rizal (2014) that the *inquiry* model used to enhance science process skill contributes to skills as well as science concepts. Moreover, a study conducted by Larasati (2013) concludes that *5E-Learning Cycle* model can elevate process skill that consists of observing, predicting, analyzing variables, making hypotheses, designing research, experimenting, measuring, communicating, describing the relationship between variables, creating graphics, and drawing conclusions.

Process skill is very important to be developed in the learning process since it plays a role in helping students improve their thinking skill, giving opportunities for them to find information, enhancing their memory, and learning science concepts (Trianto, 2012).

4. Conclusion

Students' process skill from cycle 1 to cycle2 has been improved through the Gain test. Thisis seen from the category of process skill in cycle1 consisting of 4,76% with the high category, 90,48%with the moderate category, and 4,76% with the low category. It goes further tocycle2that arrives at 95.24% with the high category, 4.76% with the moderate category, and

0% with the low category.

Students' activities in cycle 1 and the cycle 2 achieve the percentage of 71,90% (a good category) and 88,45% (a very good category) respectively. This is because the *Ryleac*learning implementation by the lecturer has also reached a very good category. In conclusion, the *Ryleac* learning model is able to improve students' process skill in learning Basic Physics 2subject, particularly in electricity and magnet learning materials.

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