Unnes.J.Biol.Educ. 10 (2) (2021)

Journal of Biology Education

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

The Implementation of Guided Discovery Learning Method towards Science Process and Students' Creative Thinking Ability on Fungus Material

Nisrina Khairunisa[1]✉, Siti Harnina Bintari[1], Ibnul Mubarok[1]

[1]Biology Department, FMIPA, Universitas Negeri Semarang, Indonesia

Article Info

Article History:

Received: May 2021
Accepted: July 2021
Published: August 2021

Keywords:
creative thinking, fungus material, Guided Discovery Learning method, science process skill

Abstract

Learning on 21 centuries is not only focused on improving students' learning achievement but also focused on developing students' skills and abilities. One of them is to develop the students' science process and creative thinking skills. Guided discovery is one of the learning methods that is suggested for showing those students' skills. This research is aimed to know the result of achievement on students' science process and creative thinking skills on fungus material. The method used was pre-experimental by using a One group pre-test post-test design to conduct the research. The population of the research was all students of class X MIPA SMAN 8 Semarang in the academic year 2019/2020. The sample of the research used the purposive sampling technique. The result found that students' science process skills in this research showed the result of each aspect got very good criteria in two experimental classes. The result of students' creative thinking got classical achievement that was 94.36% by the number of students that reached it was 67 students of 71 sample. The improvement in students' creative thinking result got an improvement by N-gain score 0,73 with high criteria. Based on the result of analysing the research, it can be concluded that the Guided Discovery learning method can improve students' achievement of the science process and creative thinking skills.

✉ Correspondence Address:
D6 Building 1st Floor Jl. Raya Sekaran, Gunungpati, Semarang
E-mail: nisrinak7@gmail.com

p-ISSN 2252-6579
e-ISSN 2540-833X

INTRODUCTION

21st century learning is a learning that not only focus on knowledge aspect. 21st century learning more focus on developing 4C (Communication, Collaboration, Critical thinking & Creativity) abilities (Anderson et al. 2001). Education is currently experiencing a paradigm shift towards the 21st century which is on the doorstep with all its problems and challenges in technological progress. The 2013 curriculum states that the competence of graduates of education units at the primary and secondary education levels applies three dimensions, such as attitudes, knowledge and skills. The implementation of biology learning in the 2013 curriculum, its competence requires students to be able to find and build their own concepts, and be able to analyze problems related to everyday life in real terms. Science is closely related to scientific work, therefore students are required to work scientifically. Teachers need to provide opportunities for students to develop curiosity and find their own answers to science problems. Science (biology) cannot be separated from several basic components including biology as a product (scientific knowledge), processes (scientific processes), attitudes (scientific attitudes) and technology (Carin, 1997).

The teacher able to act as a guide for students in order to achieve the graduate competencies set out in the 2013 Curriculum. A teacher should carry out learning according to Permendikbud number 22 of 2016. One of the suggested lessons is Guided discovery. Guided discovery learning has a significant influence on fluency, creativity and meaning development when compared to traditional methods. Guided discovery learning is a learning model that helps students develop mastery of skills in cognitive processing so that students acquire knowledge independently. The teacher's activity in the guided discovery model of learning is to guide students in creative thinking in solving a problem. Students are required to carry out various activities to collect information, compare, categorize, analyze, integrate, reorganize materials and make conclusions guided by the teacher. (Gholamian, 2013) and constructing the concepts they discovered by themselves. Guided discovery emphasizes the importance of learning creativity in facilitating the achievement of concepts in students. Students are directly involved with student-centered practice (Udo & Effiong, 2010).

Learning mushroom material is more effectively carried out through activities that are not only focused on improving student learning outcomes, but are also focused on developing students' abilities in 4K (Communication, Collaboration, Critical Thinking, and Creative). Because the education system in the 21st century requires students to develop skills abilities. In addition, students' science process skills are a requirement to provide students with a learning experience. Science process skills need to be developed through hands-on learning experience. Through the experience given, students can develop their science process skills in carrying out investigations or phenomena in the surrounding environment. Science process skills are divided into two, namely basic science process skills and integrated process skills. Basic science process skills are fundamental activities in scientific investigation, while integrated science process skills are process skills that form actual methods and activities that extend from basic science process skills to problem-based (Martin, 2009). The results of observations and interviews with biology class X subject teachers at SMA Negeri 8 Semarang, that biology lessons, especially mushroom material in the learning process of students are less involved in the process of observing, discovering, interpreting data about everyday phenomena so that students' creative thinking skills are less trained. For this reason, students should be more involved in the observation process so that students' science process skills can develop.

Based on the above problems, it is necessary to research the application of the guided discovery modelon science process skills and students' creative thinking skills on mushroom material. There is an application of the modelguided discovery science process skills in teaching and learning activities are expected to increase the level of creative thinking of students.

RESEARCH METHODS

The research was conducted at SMAN 8 Semarang. The research used Pre-Experimental Design with One Group Pretest Posttest Design. The study population was all students of class X MIPA SMAN 8 Semarang. This study used a purposive sampling technique that took two classes X MIPA 1 and X MIPA 2

as the experimental class. The data of this research include, the results of the observation of students 'science process skills, the results of students' creative thinking abilities, the results of student responses through questionnaires, and the results of interviews with teachers. Data on science process skills and students' creative thinking abilities are the main data. The results of science process skills were obtained from the observation sheet and the results of students' thinking abilities were obtained from the calculation of classical completeness and the N-gain test.

RESULTS AND DISCUSSION

RESULT

This research was conducted at SMA N 8 Semarang, this study used two samples, namely class X MIPA 1 and X MIPA 2 as the experimental class. The two experimental classes received the same treatment using the guided discovery learning model.

The study was conducted for three meetings, the first meeting contained one guided discovery stage, namely start by explaining the learning objectives (preparing students). At the first meeting students are given worksheets that require students to think creatively. At the second meeting make observations. In mushroom observations made by students to assess the process skills possessed by students. In the assessment of science process skills, it also uses the phases of the guided discovery learning model. The third meeting was carried out in one stage of the guided discovery model learning, which was presenting the results of the discovery activities. After carrying out the learning with these stages, the results obtained include the achievement of science process skills skills and students' creative thinking abilities.

The results of students' science process skills were obtained use the observation assessment sheet when students carry out learning activities. ResultStudents' thinking abilities are obtained from the pretest-posttest results, classical completeness analysis on the pretest and posttest, n-gain test analysis. While the supporting data in the form of student responses and teacher responses were analyzed descriptively qualitatively.

Achievement of Science Process Skills

The science process skills of students in this study include the skills of observing, classifying, predicting, communicating. Science process skills in this study were measured when students did practicum activities. Students' science process skills can be seen during observations, discussions, and presentations on Mushroom's material. Students' science process skills were assessed using observation sheets.

Table 1 The results of the Science Process Skills Assessment in the two experimental classes.

Aspects of Science Process Skills	Score (%)	Criteria
Observe	82.02%	Very good
Classify	77.74%	Good
Predict	80.39%	Good
Communicate	84.99%	Very good
Average score (%)	**81.21%**	**Very good**

Table 1 shows that the score of science process skills for each aspect observed and measured has met the minimum criteria very well. The average score obtained has met the criteria very well. The order of KPS scores obtained from the highest to the lowest scores is in the aspects of communicating, predicting, observing, classifying.

Achievement of Creative Thinking Ability

Table 2 Analysis of Achievement of Creative Thinking Ability.

Source of Variance	Creative Thinking Ability	
	Pretest	***Posttest***
Total students	71	71
The highest score	77.5	95
Lowest Value	35	65
Average value	43.66	86.51
Classical Completeness Percentage	**7.04%**	**94.36%**

Based on the description table, it shows that the average score of 71 students on the creative thinking ability test has increased after experiencing Guided Discovery learning. The mean score of the pretest on the creative thinking ability test was 43.66 while the posttest average score for the ability to think was 86.51. Individual classical completeness on the creative thinking ability test is obtained from the KKM that has been determined by the school, which is to ask thoroughly if the value obtained by students in learning is ≥ 75, meaning that the student has reached the minimum completeness criteria with a presentation of classical completeness of 96.36% and is considered to have occurred increase.

Table 3 Analysis of N-gain Test Results

Criteria	Creative Thinking Ability	
	amount	Percentage (%)
High	51	71.83%
Moderate	17	23.94%
Low	3	4.22%

The average N-gain was 0.73

Based on the table, the results of the calculation of the increase in the achievement of creative thinking abilities of 71 students in two classes at SMA Negeri 8 Semarang obtained n-gain in the "High" category with a percentage of 71.83%. "Medium" category with a percentage of 23.94% and in the "Low" category with a percentage of 4.22%, so that the data above shows an increase in the achievement of creative thinking skills from the results of the pretest and posttest.

The n-gain results of the achievement of students' creative thinking abilities calculated from the pretest and posttest scores were mostly in the "High" category and a small part in the "Medium" category, while the rest were in the "Low" category. The amount of n-gain achievement of students' creative thinking abilities is calculated into the n-gain mean, the n-gain mean of 0.73 is categorized into the "High" category.

Achievement of Students' Creative Thinking Ability in Each Indicator

The ability to think creatively in this study includes four indicators of creative thinking skills, namely fluency, flexibility, originality, and elaboration. Assessment of creative thinking abilities aims to determine how much creative thinking skills students have during the learning process of the experimental class.

In this study, the value of students' creative thinking abilities was measured when students worked on the given worksheets. The recapitulation of the results of the assessment of students' creative thinking skills is presented in table 4 as follows.

Table 4 Results of Assessment of Creative Thinking Skills for Each Indicator

No.	Indicator of Creative Thinking Skills	Achievement%	Criteria
1	Fluency	82.57%	Very good
2	Flexibility	81.33%	Very good
3	Originality	83.09%	Very good
4	Elaboration	89.26%	Very good

that the magnitude of the achievement of the creative thinking ability of 71 students in each aspect of the indicator varies in the number of percentages of each aspect but overall shows the criteria of "Very Good". The "Fluency" aspect has an achievement rate of 82.57%. Meanwhile, in the "Flexibility" aspect, it has an achievement level of 81.33%, the "Originality" aspect has an achievement level of 83.09% and in the "Elaboration" aspect it has an achievement level of 89.26%.

Student Response Questionnaire Results

Student responses are feedback given by students to the learning that has been followed. Student response data at the end of the lesson is a form of questionnaire that has a response level of "yes" and "no". The results of student responses are presented in Table 5.

Table 5 Student responses to the implementation of learning mushroom material.

No.	Question Points	∑ "Yes" Score	Score Max	Score (%)	Criteria
1.	Very interesting learning	66	71	92.96	Very good
2.	The learning that is carried out makes it close to nature	66	71	92.96	Very good
3.	Motivated to take part in learning	59	71	83.10	Good
4.	Can work together in groups well	62	71	87.32	Very good
5.	Mushroom material is easier to understand	57	71	80.28	Good
6.	Mushroom material is easier to remember	58	71	81.69	Good
7.	Can solve problems	62	71	87.32	Very good
8.	Learning atmosphere is more active and challenging	64	71	90.14	Very good
9.	Prefers the learning model that has been done	61	71	85.92	Good
10.	Learning can involve skills	62	71	87.32	Very good
11.	It is easier to pass on skills	62	71	87.32	Very good
12.	Enjoys presentation activities in learning	59	71	83.10	Good
13.	Can understand more about yourself	64	71	90.14	Very good
14.	Can do the report well	67	71	94.37	Very good
15.	Can solve problems through discussion	65	71	91.55	Very good
16.	Can present the results of observations	64	71	90.14	Very good
17.	Motivated to study biology	64	71	90.14	Very good
	Average of each question item			87.99	Very good

Based on Table 5, it can be seen that students have good responses to guided discovery learning. It can be seen that students who answered "yes" to the student response questionnaire regarding guided discovery learning had a percentage of 89.99% so that they reached the "Very Good" criteria.

DISCUSSION

Assessment of students' science process skills aims to determine the abilities possessed by students. Assessment of students' science process skills is taken when students do practicum, discussion, and presentation using observation sheets. Indicators of students' science process skills in this study include (1) observing skills, (2) classifying, (3) predicting, and (4) communicating. The results of the analysis of science process skills showed that each aspect was categorized as "Very Good" and on average all aspects of science process skills had a percentage of 81.21%. Achievement of science process skills in the aspect of observing with the indicators taken, namely students can use the sense of sight when observing objects, students can make observations with a microscope, and able to clearly find the characteristics of the object being observed. According to Yuanita (2018) the aspect of observing process skills is a fundamental thinking skill which is the main basis of direct observation practicum. The achievement of classifying, predicting, and communicating aspects that have been achieved by students is also in the "Very Good" category so it can be concluded that learning using the guided discovery method is effective in achieving students' science process skills. This is in line with the research conducted by Handayani et al (2017) that through the application of the guided discovery model can improve the achievement of science process skills with good categories. According to Yuanita (2018) the aspect of observing process skills is a fundamental thinking skill which is the main basis of direct observation practicum. The achievement of classifying, predicting, and communicating aspects that have been achieved by students is also in the "Very Good" category so it can be concluded that learning using the guided discovery method is effective in achieving students' science process skills. This is in line with the research conducted by Handayani et al (2017) that through the application of the guided discovery model can improve the achievement of science process skills with good categories. According to Yuanita (2018) the aspect of observing process skills is a fundamental thinking skill which is the main basis of direct observation practicum. The achievement of classifying, predicting, and communicating aspects that have been achieved by students is also in the "Very Good" category so it can be concluded that learning using the guided discovery method is effective in achieving students' science process

skills. This is in line with the research conducted by Handayani et al (2017) that through the application of the guided discovery model can improve the achievement of science process skills with good categories. and the communication that has been achieved by students is also in the "Very Good" category, so it can be concluded that learning using the guided discovery method is effective in achieving students' science process skills. This is in line with the research conducted by Handayani et al (2017) that through the application of the guided discovery model can improve the achievement of science process skills with good categories. and the communication that has been achieved by students is also in the "Very Good" category, so it can be concluded that learning using the guided discovery method is effective in achieving students' science process skills. This is in line with the research conducted by Handayani et al (2017) that through the application of the guided discovery model can improve the achievement of science process skills with good categories.

The application of the guided discovery learning model that was applied at SMA N 8 Semarang was effective in the creative thinking ability of students on mushroom material because it was able to achieve indicators of success, namely the first in classical completeness. Classical completeness on the pretest that has not reached the KKM value ≥ 75 with a percentage of 7.04% while the classical completeness in the posttest reaches KKM ≥ 75 with a percentage of 94.36%, both indicators of success in increasing the pretest and posttest (N-gain) scores are in the high category with a percentage of 71.83% and an average n-gain of 0.73. The average score of 71 students from the two experimental classes X MIPA 1 and X MIPA 2 shows that on the test the ability to think creatively has increased after experiencing guided discovery learning.

CONCLUSION

Based on the results of the research and discussion descriptions that have been stated above, it can be concluded that the application of the guided discovery model to science process skills and students 'creative thinking skills in mushroom material is able to improve the achievement of science process skills and students' creative thinking skills in class X MIPA 1 and X MIPA. 2 as an experimental class. On the achievement of science process skills, it can be seen that all students in the experimental class obtained an average percentage of "Very Good" on each indicator of the process skills that were assessed.

In addition, learning with a guided discovery model This can be proven by an increase in the average score of students before and after being given the application of applying the guided discovery model, before being given the treatment the average value was 43.66, while after receiving the treatment it reached an average value of 86.51 in the aspect of students' creative thinking abilities.

REFERENCES

Anderson, LW & Krathwohl, DR. 2001. Taxonomy of Learning Teaching and Assesing: A Revision of Bloom's Taxonomy of Educational Objectives. New York: Allyn & Bacon.

Carin, AA. 1997. Teaching Modern Science. New Jersey: Merril Publishing Company.

Gholamian, A. (2013). Studying the effect of guided discovery learning on reinforcing the creative thinking of sixth grade girl students in qom during 2012- 2013 academic year. Journal of Applied Science and Agriculture, 8 (5). 576-584.

Handayani, B. T., et al. 2017. "Meningkatkan Keterampilan Proses Sains Melalui guided discovery model Learning". Pdf. Jurnal Ilmiah Pendidikan Fisika. Volume 1 No 3.

Martin, DJ. 2009. Elementary Science Methods: A Constructivist Approach. Canada: Nelson Education.

Permendikbud. 2016. Peraturan Menteri Pendidikan dan Kebudayaan Republik Indonesia Nomor 22 Tahun 2016 tentang Standar Proses Pendidikan Dasar dan Menengah. Jakarta: Menteri Pendidikan dan Kebudayaan Republik Indonesia.

Rohim, F et al. 2012. Penerapan Model Dicovery Terbimbing Pada Pembelajaran Fisika Untuk Meningkatkan Kemampuan Berpikir Kreatif. Unnes Physics Education Journal. 1(1). 1-5.

Udo., Effiong, M. 2010. "Effect of guideddiscovery student centred demonstration and the expository instructional strategies on students performance in chemistry". African research Review. An International Multi-Disciplinary Journal.Department of Science Education, University of Uyo, Uyo Cross River State, Nigeria.Vol. 4 (4).

Yuanita. 2018. Analisis Kterampilan Proses Sains Melalui Melalui Praktikum IPA Materi Bagian-Bagian Bunga Dan Biji Pada Mahasiswa PGSD STKIP Muhammadiyah Bangka Belitung. Jurnal Pemikiran dan Pengembangan Sekolah Dasar. Vol, 6(1).