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The Aplication of the Guided Inquiry Model on the Fungi Practicum Activities for the Students' Science Process Skill

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Abstract

Zygomycota and Ascomycota Classesare classified as the Fungi Kingdom groups It is needed to hold a practicum activity in the fungi grouping learning. Nevertheless, the tools and materials at school to observe the fungi are inadequate. Therefore, it is necessary to hold a fungi practicum which accompanied with a students worksheet that is able to develop the students' science process skills so that the teachers and the students are able to achieve the learning objectives of the Fungi material. This study aims to analyze the students' science process skills after the application of guided-inquiry learning model in the fungi practicum activity. The study used pre-experimental design method with one-shot case study design as the research method. Furthermore, the students' understanding level is obtained based on the results of the students' skill score, such as the ability to observe and to conduct an experiment which able to reach the defined completeness criteria. The result shows that the observation skills score of class X.MIA.1 and class X.MIA.3 were 85% and 91% and the experimental skills score of class X.MIA 1 and class X.MIA.3 were 85.7% and 88.5%. The understanding of fungi material is classified successful in Fungi practicum learning activity due to the classical completeness that reaches above 85%.

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INTRODUCTION

Based on the interview with one of the Biology teacher at SMA Negeri 1 Blora, she said that the Fungi material is in the X grade. In the MIA (Mathematics and Science) class, there were no practice activities because of the limited time due to the Final Examination implementation, so that the Fungi material was filled with theory activities only. Based on the observation result from 61 respondents, 44.26% of them agree with the statement that they were more pleased with the practical learning activities than theory and 40.9% of them agree that the fungi material was an elusive material.

The fungi observation activity is mostly only observing the types of fungi that have a hood; the *Basidiomycota*, while according to KD 3.7, the students must be able to classify the fungi based on its characteristics. Therefore,the students need to classify the various kinds of fungi that are capable of representing each class of the fungi kingdom and the students need the fungi, especially the propagationof the micro-fungi group. The 2013 curriculum emphasizes that the students should have cognitive, affective, and psychomotor skills. In the practicum activity, the students' skill or the students' psychomotor is important in achieving the learning purposes. One of the skills is the Science Process Skills (KPS). The KPS involves other skills in it, such as cognitive, manual, and social (Rustaman, et al., 2003).

The experimental and investigationactivities can be done in the practicum learning withan observation method. The students are able to do the practicum to examine the hypothesis of a problem then draw a conclusion. On the experimental method, the students are expected to participate actively and take part in the learning activities for themselves; learn to examine the hypothesis and not draw conclusions too quickly (practice scientific thinking); as well as being familiar with various tools for practicing and possessing the skills of using such tools (Putra, 2013).

Learning by practicum-based learning will improve students' scientific attitude and make the students more active. It is in line with a research resultconducted by Hayat et al. (2011) who stated thatthe students' scientific attitude after learning with practicum-based learning is better than students who are learning conventionally and practicum-based learning can make students more active and happy.

Shofiyah (2014) asserted that the students' activities increase both individually and in groups because of the various learning that they participated in. One of the lessons that motivate the learners to actively participate is the guided-inquiry learning model. The guided-inquiry model is one of the teaching models in which the teacher gives students specific examples of topics and guides the students to understand the topic.

The guided-inquiry model is able to improve the students' science process skills (KPS). It is in line with a research result conducted by Tangkas et al. (2012) who stated that the conceptual understanding and the science process skills among students who follow the guided-inquiry learning model is better than the students who follow the direct learning model. It is also supported by Ambarsari et al., (2013) who said that the application of guided-inquiry studies has a significant effect on students' science process skills.

Therefore, based on the introduction of this study above, it can be concluded thatthe aim of this study is to know the students' science process skills in the fungi practicum activity with the guided-inquiry model.

RESEARCH METHOD

The method used in this study was a pre-experimental design method with one-shot case study design. This research was conducted in SMA Negeri 1 Blora in the academic year of

2017/2018. The subjects of this study were the X.MIA.1 and X.MIA.3 classes which consisted of 70 students. In this study, there were two stages: The first stage was the process of making temporary preserved slides made by the researcherherself in the microbiology laboratory. The function of the temporary preserved slides was as the media of observation learning activities in the fungi practicum. However, the temporary preserved slidesconsisted of the fungi from the *Zygomycota* and *Ascomycota* groups. The slides were validated by a biology lecturer of FMIPA UNNES who is an expert on media and fungi. The second stage in this research was the data collection by taking the students' KPS data with one-shot case study method. Moreover, the learning activities were divided into two meetings.

The first meeting was the activity of observing the temporary preserved slides and the second meeting wasthe experimental activity on the yeast activity. The learning activity used the guided-inquiry model.In this context,the students wereprovided witha students' worksheet which made based on the guided-Inquirythat had been validated by the validator. Furthermore, for collecting the KPS students' data, the researcher used an observation scoring-rubric which filled by the observer during the learning process ofthe fungi material in two meetings. In this research, the researcher also collected the students and teachers' responses of how they feel after using the guided-inquiry model in the fungi practicum.

RESULTS AND DISCUSSION

Validation of Guided Inquiry-based Students' Worksheet and Preserved Slides

The students' worksheet validation result by the experts shows the result of 93% in average, which consisted of material aspect (87.5%), construction aspect (91,6%), and linguistic aspect (100%). Therefore, it belongs to a very valid category. Thus, the developed students' worksheet belongs to a proper category for learning activities with improvements; which is the language used in the students' worksheet has to be improved. The expert validation results toward the temporary preserved slides have a result of 81.2% in average, whichconsisted of media usage aspects (93.7%), media display aspect (75%), and media quality aspects (75%) that belong to valid categories. In conclusion, the preserved slides belong to a proper category to be used in the learning activities with a suggestion that it will be better if the dust does not fall into the slides.

Guided Inquiry Model Application

During the learning process of this study, the students were very enthusiastic about the fungi observation activity because most of themhavenot yet known about how exactly the fungi from *Zygomycota* and *Ascomycota* groups really were. The X.MIA.1 and X.MIA.3 students were excited to use the microscope for observingthe fungi temporary preserved slides. The second meeting was theexperimental activity with the yeast activity rate that was influenced by sugar or salt with bubble balloon size indicator. On the experimental learning,the students were very enthusiastic because it was the first time they did the experiment and their curiosity on this learning was high because most of them keptasking why the result was like that to the researcher. Moreover, the study usedthe guided-inquiry model together with the guided Inquiry-based worksheet because in observation and experimental activities the students still needed guidance because that wasthe first time did the fungi practicum through observation in experimenting.

The inquiry model also has an advantage in learning, in accordance with Kuhlthau et al., (2007) who saidthat the important advantages of inquiry are the various different competencies andthe students who are able to develop their knowledge when they are engaged in the guided-inquiry.

In the guided inquiry, the students are involved in the initial investigation process, participate in the decision-making process,proposeinvestigation questions and plan all of the investigation aspects, will outperform the student who experienced guided investigation, in terms of developing the dynamic questioning show (Sadeh, 2009). Furthermore, the learning activity using guided-inquiry is able to help the students understand the material. Learning by using guided-inquiry can help the students In understanding the material. This is in accordance with Mufianoor et al. (2016) who stated that the guided inquiry-based learning is able to drill the creative thinking ability and the conceptual understanding of the students.

The Students' Science Process Skills

Based on the data collection results taken from SMA N 1 Blora, it is found that the guided-inquiry model on the fungi practicum activities has a positive impact on the students' science process skills. However, the results of the student skills assessment can be seen in Table 1 and Table 2 below.

Table 1 The Result of Students Experimental Skills Score

No	Observation Results	X MIA 1	X MIA 3
1	Highest score	95	95
2	Lowest score	66	61
3	Average	80,7	80,2
4	Students who are able to pass the minimum criteria of mastery learning	30	32
5	Students who are unable to pass the minimum criteria of mastery learning	5	3
6	Classical completeness	85%	91%

Table 2 The Result of Students Observation Skills Score

No	Observation Result	X MIA 1	X MIA 3
1	Highest score	91	91
2	lowest score	62	66
3	Average	78	80,9
4	Students who are able to pass the minimum criteria of mastery learning	30	31
5	Students who are unable to pass the minimum criteria of mastery learning	5	4
6	Classical completeness	85,7%	88,5%

The assessment of the students' skill is calculated based on the observation scores and the students' worksheet. The observation result of the students' observation skill and experimental skill at X.MIA.1 and X.MIA.3 classes have the classical completeness above 85%. It means that for the large-scale trials, the result of the students' observation and experimental skillsare able to fulfillthe media effectiveness requirements of the Fungi temporary preserved slides. It is in line with Mulyasa et al. (2002) who said that thestudents' science process skill is stated success if the percentage of students who get score more than 75% are more than 85% of all students in the class.

The observation skill assessment has some indicators, such as: using the sense devices, writing the observed object characteristics, grouping the fungi that have sealed hyphae, categorizing the fungi which have not any sealed hyphae, grouping the fungi that have bifurcated hyphae, grouping the

fungi that have not any bifurcated hyphae, grouping the fungi that belong to the Zygomycota group, and grouping the fungi that belong to the Ascomycota group. The first indicator, which isable to use the sensory organs,get the score of 77.5% for there are some obstacles in the observation process on the use of the sense devices skills, such as some students who do not know how to operate the microscope.

For the second indicator, the students write the characteristics of the observed objects, get the lowest score of 77.1% due to some obstacles in writing the characteristics of the object. Some students still find it difficult to write down the characteristics of the object and need a clearer explanation about it. However, theobstacle can be solved by giving a re-explanation of what needs to be written from the observed object characteristics to the students. The third and fourth indicators are the students'ability to group the fungi that have sealed hyphae and have not any sealed hyphae. These indicatorshave a high percentage of 78% and 81.3% because most students have been able to distinguish between sealed hyphae and unsealed hyphae from the observed objects.

Furthermore, for the fifth and sixth indicators, the grouping the fungi that have bifurcated hyphae and have not any bifurcated hyphae indicators, have the score of 82.3 and 80.9. In these indicators, the students have high scores because they have already understood about the bifurcated and un-bifurcatedhyphae on the observed object.

The indicator number seven and number eight are grouping within the Zygomycota group and the Ascomycota group. These indicators are already achievable due to the scores of 79% and 81.9%.The students are able to distinguish the objects intoZygomycota and Ascomycota groups from the characteristics of sealed hyphae / unsealed hyphae, bifurcatedhyphae / un-bifurcated hyphae, as well as the object reproduction that is observed, accompanied withthe reference from the students' books.

The experimental skills were assessed by six indicators: 1) formulating the hypothesis, 2) designing the self-action, 3) Objects observable, 4) collecting data, 5) analyzing the hypothesis, 6) analyzing the data, 7) drawing conclusion.

The indicators of formulating the hypothesis have the lowest score of 77.5% because most students are still confused about what hypothesis means so it needs a separate assertion for the hypothesis so that the students will be able to understand well. Furthermore, on the formulating hypothesis indicator, most of the students have been able to determine and choose the hypothesis because in the students' worksheet there is a guide to choose between sugar and salt affects the yeast activity or sugar and salt do not affect yeast activity. The observable object indicators have the highest score of 86% because in using the preserved slides (temporary) most of the students have been able to observe the object by using the microscope.

The questionnaire recapitulation result on students' response shows the average percentage obtained is equal to 96.5% which belongsto a very good criterion (81% ≤ 100%). The high percentage of the students' response is a reflection that the preserved slides (temporary) media can be accepted by the students. Furthermore, the results of the students' responses show that 92% of the students agree that they are interested in fungi preserved slides and 86% of students are able to see the object of the fungi observed clearly. This is in accordance with the learning media principle according to Aqib (2013) that is interesting and visible. Interesting meansthat the learning media are able to attract the students' attention so that students enthusiastically follow the learning. Visible meansthe culture media can be easily seen by the students, so the students are able to observe carefully. Moreover, the score results of teachers' questionnaire responses showthat the teachers' response score is 100% which means that it is categorized intovery well criteria. The teachers' response to the learning that has been done shows that the teachers agree that the practicum activities with guided inquiry model facilitate on teaching the Fungi materials which can be used effectively in learning.

CONCLUSION

The conclusion of this study is the Students' Science Process Skills in Fungi practicum learning with the students' worksheet based on Guided-Inquiry is categorized as a competent category with classical completeness more than 85% andthe students are interested in fungi practicum learning with guided-inquiry model and agree that the learning activity that has been done make them easier in understanding the fungi material.

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