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The Development of Protist Culture Medium to Improve Senior High School Student's Observation Skills

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Abstrak

Teachers and students have difficulty in observing protist spesies. The basic competence 3.5 oblige the students to apply the principle of protist grouping classification carefully and systematically. Therefore, there should be a media of culture protist along with its way and the students' observation worksheet for protists. This research is aimed to develop the valid and effective culture media of protist for class practice activities in Protist Material. This research used Research and Development (R&D) method. Small scale trials were done to 10 students using purposive random sampling. Big scale trials were done to 64 students. The validity of protist culture was scored using validity sheets by validator, then was analyzed in percentage description. The effectivity score of protist culture media was obtained based students' processing skills score. The result of the research showed that protist culture media was considered valid by experts with the average score of 90,1%. The observation of students' skills showed that both classes of the research has classical grade of 85,3% and 87,1%. Based on the results, it can be concluded that protist culture media with its guidance and students' observation worksheet was valid and effective to be used by Senior High School students.

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INTRODUCTION

The Regulation from Ministry of Education and Culture number 65 year 2013 about Process Standard suggests the use of scientific approach in all subjects. Scientific approach consists of observation, asking question, experiment, association, and communication. This approach in natural science can be applied through scientific processing skills.

The formula of Basic competence (BC) in 2013 Curriculum is developed by seeing the characteristics of every subject. Basic competence of 3.5 is applying the principle of classification to Protist based on the characteistics of general class and its role in life through conscientious and systematic observation. BC 4.5 is doing the observation of characteristics and role of Protist in human life and presenting the observation in pictures. Students are demanded to do the observation and communicate that in written report. The demand of these BC can be done by students' observation.

Based on the observation in odd semester of 2015/2016 academic year to Jatilawang State Senior High School, MA Al Irsyad Gajah Demak, and Islam Sultan Agung I Semarang Senior High School, in the teaching process of biology, especially in the material of Protist, teacher and students had difficulties in finding Protist in wild nature. It happened even if there is a way of farming Protist in students' book.

The facts showed that the sample of Protist was not always be easy to obtain in wild nature. The distribution of Protist was very fluctuative. In certain time, it could be seen easily. In other time, it was difficult to see because of the season. It made the students unable to observe Protist.

Training students to observe Protist is very important, since in BC 3.5, students are demanded to do systematic and conscientious observation. According to Martin (2006), observation is a very important step in science.Students cannot do the observation in learning about Protist since there is no any object (Protist) to observe.

The research of Lukitasari (2009) shows that the use of real media (animal specimen) is effective to be applied in sub material of *Nemathelminthes* and P*latyhelminthes*. The result of the research is in line with the opinion of Yadaf (2013) stating that laboratory activity can increase scientific process of the students.

Based on the problem, there should be a research conducted to determine and unveil the effectiveness of culture medium to train Senior High School students to do observation.

RESEARCH METHOD

This research used Research and Development (R&D) procedure. This developmental research referred to the development of Sugiyono (2009) which has been modified in its steps to produce things and evaluate the effectiveness of the product.

The research was done with the supervision of experts as the validator to culture medium of Protist, while the experiment was done in Islam Sultan Agung Senior High School 1 Semarang with the subjects of X MIA 1 and X MIA 2 class students in the odd term of 2016/2017 academic year.

The procedure of the research was digging the potential and problem, collecting data, designing product, testing product validity, revising product, big scaled product testing, andrevising final product. This research used one shoot case study design. The used samples were from X MIA 1 and X MIA 2 (big scaled experiment) and 10 X MIA students (small scaled experiment), which was determined by purposive sampling technique.

The used instrument to test the validity of culture medium to Protist was questionnaire. The scoring from validator was then analyzed in percentage description. The used instrument to examine the effectiveness of Protist culture medium was the exercises of student worksheet consisted of using sense organ (item number 1), writing object characteristics (item number 2), and finding the

similarity and difference of objects (item number 3). The instrument used to value teacher and students' responses was from questionnaires. The result of students' observation and response was analyzed in percentage descriptively and teachers' responses was analyzed descriptively.

Culture medium of Protist was considered valid as learning media if the result of the analysis was validated by experts' instrument. The effectiveness of the media was measured by students' observation score. The culture medium of Protist was effective to be seen from the score of more than passing grade of ≥75 with classical score of ≥85%.

RESULT AND DISCUSSION

The process of developing culture medium of Protist was done by modifying the steps of Sugiyono (2009).

The potential of the products can be seen from the existence of biology laboratory with complete facility and enough number of microscopes. The problem came from teacher and students' difficulty in finding Protist.

The data collection was done by finding references of tools, materials, and ways to make culture medium of Protist. Besides, there was also survey by taking sample from pond water and rice fields to be checked in the laboratory. The sample of water from UNNES' pond contain some species of Protist, including *Paramecium, Stylonichia*, and *Euglena*. The sample of rice fields water contains and *Stauroneis*.

Culture medium of Protist was validated by the lecturer of biology department from UNNES with doctoral degree in animal taxonomy. The validation was done after the culture medium of Protist was completely made. The validation of Protist culture medium used the validity reference in questionnaire, including the aspects of used media, the display of media, and the quality of media. The score and validation's percentage of Protist culture from validator is delivered in Table 1.

Table 1 Validator scoring to Protitsta culture medium as a training medium of observation to Senior High School students

Aspects	Scor	Percentages
The use of media	14	87,5%
Media display	10	83%
Media quality	8	100%
Average		90,1%

The average percentage from validity test of Protist culture was 90,1%, which means the culture medium was very valid. The percentage of high validity score reflects that Protist culture medium can be developed well.

The media which had been revised by the expert was experimented in limited scale to ten students. Students in this small scaled experiment was ten best students in biology.The students were given a questionnaire to respond the culture medium of Protist.The respond is delivered in Table. 2.

Table 2 The score of X MIA students' respond to Protist culture medium as a medium to train observation skills in small scaled experiment

No	Student's Code	Score	Percentage
1	USK 001	30	75%
2	USK 002	35	88%

Lanjutan tabel 2

	[illegible]	35	88%
4	USK 004	40	100%
5	USK 005	31	78%
6	USK 006	30	75%
7	USK 007	27	68%
8	USK 008	35	88%
9	USK 009	33	83%
10	USK 010	31	78%
	Average	33	81%

Based on Table.2, the analysis of the questionnaire had an average score of 81%. This average score is considered good. The big scaled experiment was conducted in X MIA 1andX MIA 2 class of Islam Sultan Agung I Semarang Senior High School which was decided purposively based on the consideration of their biology teachers. The teachers were also invited to join the class. They were deemed as teachers with high curiosity and cooperative. The observation of Protist was done after the students get material aboutProtist.

The effectiveness of Protist culture medium can be seen from the score of students' observation with classical passing score of ≥85%. Students did student worksheet consisted of items using sense organ (item number 1), writing object characteristics (item number 2), and finding the similarity and difference of objects (item number 3-10). This is the Table showing the observation score from students in big scaled experiment.

Table 3 The score of students observation from students in X MIA 1 and X MIA 2 in the practicum of Protist with Protist culture medium.

Observation result	X MIA 1	X MIA 2
Highest score	97	97
Lowest score	57	67
Average	82	87
Students who passed	29	31
Observation result	X MIA 1	X MIA 2
Students who did not pass	5	4
Classical passing score	85,3%	87,1%

The result of students' observation score in big scaled experiment showed that X MIA 1 and X MIA 2 passed the passing grade of 75 and classical passing score of > 85%; thereby, the big scaled observation fulfilled the requirement of effective media to teach.The score was measured from students' score after doing their worksheet. The item of the worksheet was adapted to the indicator of observing ability. The indicators were using senses organ, writing object characteristics, and finding differences and similarities to certain objects. Table 4 shows the percentage of students in each indicator of observation.

Table 4 The percentage of observation which is achieved by X MIA 1 and X MIA 2 students during the practicuum of Protist using Protist culture medium.

Indicators	X MIA 1	X MIA 2	Average
1. Using senses	34,31%	48,39%	41,35%

Lanjutan tabel 4

2. Writing objects'characteristics	77,45%	90,32%	83,89%
3. Grouping characteristics of certain objects	82,60%	91,26%	86,93%

The first indicator was students are able to present their observation result using senses organ of watching by drawing the observation result. The ability of using sense organ was the smallest, which was 41,35%. It happened because of two causes. The first cause was most students drew the observation result with ballpoint with no right proportion. It would be better if the students drew with a pencil, which they can erase their drawing if there was a mistake. If they use ballpoint, they will write off the mistake which will make the score decreased.

The second cause was the students did not draw in accordance to microscope scale. A good drawing should be representative based on the real scale. Somehow, the students did not draw it like that, as if the magnification was 10X10, there won't be any cilia seen on *Paramecium*, somehow, students still drew cilia there.

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Second indicator of writing the characteristics of object obtained average percentage of 83,89%. Students write the characteristics including the movement, shape, color, total of cells, and species name. The score in this indicator was relatively high' as the students wrote the characteristics completely and correctly.

The third indicator was grouping the object which was the highest indicator with the score of 86,93%. The grouping included the observation of the chlorofil, the movement of the object, animal-like Protist, and plant-like Protist. This thing is in line with BC 3.5 to apply the principle of classification including differentiate and find the similarity.

In learning about Protist, one of the way to record the information is drawing the object. Like what Fox (2010) says, drawing can help the students describe the object accurately. It is a permanent recording to the observed and help students visualized the object. The learning of Protist with culture medium gave them chances to be actively involved in making the concept of material understanding in the sequence of observation. Like what Yadaf (2015) explains, the development of observation skills can be developed through laboratory approach. The observation made the students more active in learning the material.

The source of learning material was real creature which give the students chance to observe directly; thus, it increased their curiosityandmotivation. According to Ardan (2015), teachers should be able to teach observation by grouping the knowledge, changing behavior, and increase students' ability to apply the knowledge in their daily life.

Students and Teachers' Response

The result of questionnaire recapitulation showed that the average percentage of students was 81%, meaningthatitwas in goodcriterion (62,5 % $\leq$ x $\leq$ 81,25%). Table 5 portrays the data of students' responses in big scaled experiment.

Table 5 The range of percentage and qualitative criteria to sudents' response from X MIA 1andX MIA 2 class to Protist culture medium as a medium to train students' observation skills

Criteria	Interval	X MIA 1	X MIA 2
Very Good	81,25 % ≤ x ≤ 100%	24	12
Good	62,5% ≤ x < 81,25%	9	9
Average	43,75% ≤ x <62,5%	1	0
Mediocre	25% ≤ x <43,75%	0	0

High percentage of students' responses reflected that Protist culture medium can be accepted by students. Students agree to the method and see the protozoa clearly. It is in line to the principle of learning media of Aqib (2013), which should be interesting and visible. Interesting means attracting students' attention, thus, students can enthusiastically follow the lesson. Visible means the culture can be seen by students to observe. The result of teachers' responses to Protist culture can be seen in Table 6.

Table 6 The statements and score to biology teachers' responses regarding Protist culture medium

No.	Statement	Score
1.	Development of culture medium is based on the demand of BC	3
2.	Development of culture medium help and ease the students to learn about Protist	4
3.	The materials of the media are easy to obtain	3
4.	The media of culture is practical to use	4
5.	The media of Protist culture is easy to use	3
6.	The use of media is not dangerous and explosive.	4
7.	The media can attract students' intention	3
8.	The media is made based on students' intellectual	3
9.	The media can make two ways communication	3
10.	The cost to make the media is cheap and effective for learning process	4
	Total score	34
	Percentages	85%

The result of the questionnaire shows the score of 85% which is considered as very good (81,25 % ≤ x ≤ 100%). The teachers really agreed to use Protist culture medium because it was easy to use, practical, ease the teaching process, and less dangerous. It is in line to the criteria of choosing media based on Arsyad (2014), and Kwan (2009). Practial means the media can be used everytime. The safety of the media shown by the media was not easy to burn and not irritating. This culture medium was also easy to obtained with cheap price, like from rice or well water.

CONCLUSION

The product which was developed was Protist culture medium with guidance and student worksheet observation. The media of Protist obtained validity score of 90,1%, which made it very valid. The product was also interesting, cheap, visible, easy to use, and easy to maintain by teachers and students. This media was also effective to be used as learning material of Protist kingdom, shown by observation classical passing grade of more than 85%.

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