



The use of Microscope Flash Media in Biology Laboratory Works

Dheny Prasetya[✉], Lina Herlina

Biology Department, Mathematics and Natural Science Faculty, Universitas Negeri Semarang, Indonesia

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Abstract

This research aims to optimize the learning activities and test the effectiveness of the use of flash media microscope in biology lab. Research using a design research and development that includes four stages, namely field observations, the implementation of media development, media validation, and implementation of the pilot (small scale and large scale). Small-scale trials were conducted at SMAN 5 Magelang class XI MIA-1 and large-scale trials were conducted at SMAN 5 Magelang XI MIA-1 and XI MIA-3 classes. Validation results from media experts and microscopes experts were 82% and 69%, respectively, with good criteria. The results of the small-scale trials showed a positive response to the flash media using the microscope, while the large-scale trials showed results of 82% of students with criteria skilled in using a microscope. The result of questionnaire of student responses shows very good criteria to flash media learning of microscope usage and good on all aspect asked, while teacher give very good response. Based on the results of research, it is concluded that the use of microscope flash media developed feasible in optimizing the activities of Biology lab works.

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[✉] Correspondence:
Gedung D6 Lt.1 Jl Raya Sekaran Gunungpati Semarang
E-mail: telkombca@gmail.com

INTRODUCTION

Biology is simple as well as complex thing. Teaching biology requires the media learning to help students in receiving the content. Biology is one of the subjects that cannot be separated from lab activities (Hasruddin 2009). It requires laboratory experiments to verify the knowledge, so lab work skills are absolutely necessary to obtain the correct results. According to Arnita (2011), some lessons in biology require verification through practical activities to support the theory that has been studied. The lab works are the way of finding out about nature and survival of living beings systematically because biology is not only a collection of knowledge as facts, concepts or principles, but also a process of discovery through lab activities.

There are many factors affects the practical activities, both from the students themselves as well as other factors include faculty, facilities, environment and facilities. Students are actors who have a significant role in the success of learning activities and lab works. According to Tiwan (2011), the success of learning and lab works are primarily determined by the willingness and seriousness of the students. However, to achieve maximum results, it needs supports of the environment, both in the form of means and the ability of teachers to prepare, design and implement lab works.

The crucial aspects that affect the success or failure of Biology lab activities instead of students' content knowledge are their psychomotor abilities in using the microscope for observation, because most of the lab works need the skill. Psychomotoric skills of students in lab works are actually the skills to manipulate expected Biology objects to be studied by microscopes.

Based on observations at SMA N 5 Magelang, almost 75% of students do not know how to use a microscope correctly. In addition, based on the findings in the field, when the teacher teaches how to use a microscope, the teacher just explain in front of a microscope without assisted a medium so the results of students who understand only some students sitting in the front, while students sitting behind still do not understand because it is challenging look at the parts of the microscope as well as how to use the microscope with the right one.

An explanation of how to use a microscope without the help of the media seems to cause students still do not understand how to use a microscope correctly. Students tend to be less attention to the teacher who was explaining because without the media aided simulation. From the data of these observations, it is necessary to the development of media simulation using the microscope. Media that will be developed is flash media the use of the microscope so that practicum activity can be done without repeating explanation manually. Media that will be developed include parts of the microscope, a tutorial on how to use the microscope and simulation exercise the use of the microscope.

Media that will be developed are designed such that attractive and easier to understand students. The development of flash media using a microscope, is expected to make it easier for students to understand the parts of the microscope and how to use the microscope.

RESEARCH METHOD

The research was conducted in SMA N 5 Magelang in odd semester 2014/2015 academic year, on August 2014 to March 2015. The study design was a Research and Development (R & D). The research was conducted based on a modification of Research and Development method according to Sugiyono (2010). Steps that research conducted field observations, the implementation of flash media development, media validation, and implementation of the test. The data captured includes student performance data through

observation sheet of students, student and teacher response data on the use of flash media microscope through a questionnaire.

RESULTS AND DISCUSSION

This study followed some steps include field observations, the implementation of flash media development, media validation, and implementation of media (small scale and large scale).

Interviews was conducted in the field observations to determine the initial conditions and explore problems in school. The interviews with teachers and students revealed that book packages, modules, student's worksheet, photos, slide PPT were used in learning microscope. The microscope materials in the module and the LKS used in the learning are in accordance with the standart and basic of competences. But, it has limitation since it gives long explanation with insufficient or animation. Students also got troubles in using the module, such as the use of macros and micrometers which were illustrated as complex explanations without any illustration. Based on preliminary observation data obtained from interviews with biology teachers in SMAN 5 Magelang, it is necessary to develop flash media using a microscope as one of the biology learning media. The further data collected was the data of microscope material, material supporting images, a video about the procedure using a microscope. The next step was the development of flash media using a microscope.

Table 1. Results of media validation developed by media experts

No.	Indicator assessment	Assessor score	
		Expert	Max Score
1.	Aspects of software engineering	18	20
2.	Aspects of audio-visual communication	22	28
3.	Another aspect	13	16
	\sum score	53	64
	%	82%	100%
	Criteria	Good	Very Good

Table 2. Media validation results developed by a microscope expert

No.	Indicator assessment	Assessor score	
		Expert	Max Score
1.	Aspect of eligibility for content	8	12
2.	Aspect of content presentation	23	32
3.	Another aspect	8	12
	\sum score	39	56
	%	69%	100%
	Criteria	Good	Very Good

Media designs were validated by media experts and the content was validated by the microscope expert. Table 1 and Table 2 shows that both validators gave good criteria for the media with 82% and 69%. The developed media design meets the requirements of good media.

The results of the assessment of material experts, there are revisions by adding bibliography, adding content and reduction double perceived terms. Both validator gave good criteria results, then the flash media developed could be applied to trial usage.

After the flash media was assessed by the experts, then conducted small-scale trials on 25 students of class XI MIA-1 SMAN 5 Magelang. Assessment of the media taken from the questionnaire of students' and teachers' responses was to find the weaknesses in the use of flash media microscope and passed them on to any feedback or suggestions.

The result of the questionnaire of students' responses to flash media of microscope usage in small-scale test showed that most of the students of class XI MIA-1 gave excellent responses (> 80%) on 8 aspects out of 8 aspects questioned about flash media tested. Students believed that the flash media is interesting, the picture or the photo is clear and easy to understand, the media also could be used easily, and most students agree if the flash media use a microscope as a medium of learning. Based on the students' responses, all aspects asked in the questionnaire of student responses have met the eligibility criteria of the media to be applied.

The results of the teacher's questionnaire responses indicate that the developed media meets the biology learning objectives of the microscope. The media developed as a whole has also made students more active. the media could also attract students to learn so that students were more enthusiastic in the learning process.

The results of small-scale trials show that there is no improvement based on the assessment of teachers and students on media developed, then the flash media developed is feasible applied to large-scale trials.

After conducting small-scale trials in biology lab, the flash media microscope then applied on a broader scope. Large-scale experiments were done on 50 students of class XI MIA-1 and XI MIA-3 at SMAN 5 Magelang. Based on student performance data in a microscope, 82% of students showed the skillful use of a microscope.

One of the things that cause the increase of student performance in learning is the learning done in groups. During the process the students interacted and worked together to discuss the material in the learning media, visible from the activities of students in working with a group of friends to discuss and answer questions given are included in the criteria very well. Each group was also directly faced with the microscope so that, when the simulation of the learning media could be practiced directly. Classroom learning made the inferior students freely ask questions and exchange opinions about concept that had not been understood by a group of friends. The existence of group discussion also made students more active and enthusiastic about learning. In accordance with the opinion of Amri & Ahmadi (2010) the discussion helps to make the lessons developed continuously or arranged gradually and stimulate the spirit of individual questions and interests.

Student skills in using microscope meet the "skilled" criteria but there are still some students who belong to the "fairly skilled" criteria and have no increased activity. Percentage of skills using the lowest microscope on a large-scale trial class on aspects of student activity in regulating microscope lighting, ie only 61.5% of students are skilled in controlling microscope lighting. The same thing happened in the aspect of students' activity in set magnification lens, just 65.5% of students who are skilled in arranging a lens magnification microscope.

The effectiveness of flash learning media the use of microscopes in biology on the students' skills in operating the microscope because the media can visualize the material. In line with the statement of Adri (2007) that multimedia has a particular function of animation technology, simulation and visualization, students get more real information from information that is abstract so that will be able to develop aspects of cognitive. Flash media microscope in biology with information displays evaluation exercise applied in the form of a

simulation game using a microscope, making learning fun and not dull. Based on the research of Rohwati (2012) concluded that the use of education game both theoretically and empirically in learning can improve student learning outcomes and activities, because students learn with pleasure and relax, but still serious. Learning is also more lively and students enjoy more, because students learn while utilizing computer technology that had not been maximally used. Wahyuni & Kristianingrum (2008) also stated that the interactive media applied in learning can improve the learning outcomes and the active role of the students, because students love the pleasant and non-boring classroom atmosphere.

The role of teachers in learning activities also contributes to the effectiveness of instructional media flash microscope in the biology lab. Teachers in the learning process act more as facilitators and motivators that provide convenience to the students so that they can learn optimally (Prastowo, 2012). Students are trained to cooperate and compete between groups in solving cross-crossword puzzles, so that students really become learning centers and teachers as facilitators. Teachers facilitate students who want to ask if students do not understand the concept in the media and the students who do not understand how to operate the learning media. Incomprehension of students in the process because the students are learning media pay less attention to the instructions for the use of instructional media. Majid (2009) states that one element that plays an essential role in the success of the learning process is how the teacher conducts the learning process. Learning to use media requires the teacher as a facilitator, because human interaction with the computer cannot replace human interaction with humans (Ismail, 2006; Lestari, 2011).

Most of the students completed the learning using flash media microscope in the biology lab, even so there were still some students who had not completed. Factors that cause this is internal factors of the students. The internal factors could be psychological factors that exist in students, among others, motivation, attention, concentration, understanding and memory. Other causes are students' thinking skills, and not all students were accustomed to using computers to learn learning media.

Student response data were obtained during both limited-scale and large-scale trials. It can be seen that the students' responses to learning using flash media using microscopy in biology practicum obtained a positive response. The percentage of classical student responses is students with good and excellent response rates. The results of the students' responses to the limited-scale trials as well as large-scale trials are classically reached a percentage of 88%. The percentage of student responses have reached the target of research to be achieved that is $\geq 81\%$ response of students towards learning flash microscope in the biology lab in the criteria of good and very good.

Suggestions given by students of limited-scale trials of background and spelling improvement are less appropriate in the learning media. Students also suggest the addition of time to learning. The addition of time during the lesson cannot be fully realized because the hours of instruction had been determined. These problems were overcome with optimal time management and assign students to learn home learning media.

Students on large-scale trials suggest the addition of animated variations or variations of simulated games. The addition of animation variations helps students to understand the concept, in addition students could know and measure the extent to which they master the material from the exercise simulation. Students also expect other subject teachers to apply learning media such as learning media developed, so that another material is even more fun in learning. Dani (2008) revealed that education game is one of the tools in teaching both for students and teachers that is quite effective in assisting teachers (tutors) in delivering educational materials so that students' knowledge acquisition would be higher than the conventional way. The reasons that underlie this opinion are: (1) students quickly acquire

information and knowledge of the concept presented, (2) images, video, and animation in media are more interesting than text, (4) interactive, and (5) problem-oriented.

According to the teacher's response the use of flash media using microscope made teachers easier to achieve the expected learning goals, because there is a complete and exciting material coverage in the media. The concept given in the learning media had met the basic competences and core competences that must be achieved. It is also in accordance with the development of science and technology, easy to understand, and excellent presentation and language used. The advantages of this learning media are (1) increase students' interest in learning because it can show the cells and parts contextually, (2) learning was not monotonous because it involved computer technology and created variations of learning methods. Learning using learning media improves student self-reliance and ability to use technology in learning.

CONCLUSION

Based on the results and discussion, it can be concluded that : Instructional media flash microscope in the biology lab is appropriate and feasible to be used as a learning media.

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