



## The use of Microscope Flash Media in Biology Practical Experiments

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### Info Article

*History Article:*

*Received : December 2017*

*Accepted : Maret 2018*

*Published : April 2018*

**Keywords:**

*Flash Media; The Use of  
Microscope*

### 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 and discussion concluded that the use of microscope flash media developed feasible in optimizing the activities of Biology practicum.

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p-ISSN 2252-6579

e-ISSN 2540-833X

## **INTRODUCTION**

Biology can be seen as something simple, but it can also be seen as a complex. Teaching biology require the media learning to facilitate the students in receiving the lessons. Biology is one of the subjects that can not be separated from lab activities (Hasrudin 2009). Biology is a subject that requires proof through experiments in the laboratory, so practicum skills absolutely necessary to obtain the correct result. According to Arnita (2011), some lessons in biology require verification through practical activities to support the theory that has been studied. practical activities related to the way of finding out about nature and survival of living beings systematically, so that biology is not just a collection of knowledge in the form of facts, concepts or principles, but also a process of discovery through biology lab activities.

There are many factors that influence the practical activities, both from the students themselves as well as other factors such as faculty, facilities, environment and facilities. Students are actors who have a very important role in the success of learning activities and practicum activities. According to Tiwan (2011), in learning and practicum is largely determined by the willingness and seriousness of the students. However, to achieve maximum results need to support the environment, both in the form of means and ability of teachers to prepare, design and implement practical activities.

It is important that affect the success or failure of Biology lab activities in addition to knowledge of the concept is the psychomotor abilities of students in operating the microscope for observation, because most of the practicum in Biology need skills in using a microscope. Psychomotor skills of students in practical activities actually the skills to manipulate objects Biology who want to be observed so that observations can be observed during the process of the desired object, in this case generally use a microscope.

Based on observations at SMA N 5 Magelang when PPL, almost 75% of students do not know how to use a microscope with the correct. 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 difficult 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, 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 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 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

Results of microscope flash media development research in the biology lab include field observations, the implementation of flash media development, media validation, and implementation of media (small scale and large scale).

In the field observations conducted interviews to determine the initial conditions and problems in school. The results of interviews with teachers and students revealed that in the teaching and learning activities the procedure of using the microscope students using tools / learning resources in the form of book packages, modules, LKS pictures, photos, slide PPT. The microscope materials in the module and the LKS used in the learning are in accordance with the SK and KD. Some of the disadvantages of instructional media, among others, described more lessons with a little picture even without animation. Students also experienced some difficulties in using the module, such as the use of macros and micrometers are not easily understood and module / LKS contains more text than the use of the image / illustration as an example.

Based on preliminary observation data obtained from interviews with science biology teachers in SMAN 5 Magelang, it is necessary to develop flash media using microscope as one of the biology learning media. The next data collected is the data in the form of microscope material, material supporting images, video about the procedure using a microscope. The next step after field observation is the development of flash media using 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
	$\sum$ skor	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 of content	8	12
2.	Aspect of content presentation	23	32
3.	Another aspect	8	12
	$\sum$ skor	39	56
	%	69%	100%
	Criteria	Good	Very Good

Media designs are validated by experts. Saiful Ridlo, M. Si as a media expert and Dra. Ely Rudyatmi, M. Si as a microscope expert. In Table 1 and Table 2 the validation results of both validator indicate good criteria with percentage of 82% and 69%. The developed media design meets the criteria of good media.

The results of the assessment of material experts, there are improvements in the addition of bibliography, adding content and reduction of terms that give rise to double perceived. Based on validation result from both validator showing good criteria, then flash media developed can be applied to trial usage.

The next stage after the flash media declared good 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 responses of students and teachers to assess the weaknesses in the use of flash media microscope and pass them on to any feedback or suggestions.

The result of questionnaire of students' responses to flash media of microscope usage in small-scale test shows that most of the students of class XI MIA-1 give excellent response (> 80%) on 8 aspect of 8 aspect questioned about flash media tested. Students believe that the flash media is interesting, the picture or the photo is clear and easy to understand, the media can be used easily, and most students agree if the flash media use 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 can also attract students to learn so that students are 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.

Phase conducted after conducting small-scale trials that use flash media microscope in biology lab tested on a larger scope. Large-scale trials were conducted 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 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 interact and work 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 is also directly faced with the microscope so that, when the simulation of the learning media can be practiced directly. Classroom learning makes embarrassed students more freely to ask questions and exchange opinions about material that has not been understood with a group of friends. The existence of group discussion also makes students more active and enthusiastic in learning. In accordance with the opinion of Amri and 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 regulating microscope lighting. The same thing happens on the aspect of students' activity in set magnification lens, only 65.5% of students who are skilled in arranging a lens magnification microscope.

The effectiveness of learning media flash 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 Adri (2007) that multimedia has a special 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 was applied in the form of a simulation game using a microscope, making

learning fun and not boring. Based on the research 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 maximal use. Wahyu research results and 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 contribute to the effectiveness of instructional media flash microscope in biology lab. Teachers in the process of learning to act more as facilitators and motivators that can provide convenience to the students so that students can learn optimally. 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 contents contained in the media learning and students who do not understand the operation of learning media. Incomprehension of students in the operation because the students are learning media pay less attention to the instructions for use of instructional media. Majid (2009) states that one element that plays an important role in the success of the learning process is how the teacher conducts the learning process. Learning to use media that is developed requires the teacher as a facilitator, because human interaction with the computer can not replace human interaction with humans (Ismail 2006).

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

Student response data were obtained during both limited-scale and large-scale trials. Based on 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 awarded 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 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 in learning. The addition of time during the lesson can not be fully realized because the hours of instruction have been determined. These problems are 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 material, in addition students can 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 other material is also more fun in learning. Dani (2008) reveals 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 absorbance is higher than the conventional way. The reasons that underlie this opinion are: (1) students quickly absorb information and knowledge of the content presented, (2) images, video, and animation in media more interesting than text, (4) interactive, and (5) problem-oriented.

According to the teacher's response the use of flash media using microscope makes it easier for teachers in the learning process to achieve the expected goals, because in it there is a complete and

interesting material coverage. The material in the learning media meets the KD and KI that must be achieved, in accordance with the development of science and technology, easy to understand, and the presentation and language used is good. The advantages of learning media is to increase students' interest in learning because it can show contextually the cells and parts, learning is not monotonous because it involves computer technology and create variations of learning methods. Learning using learning media improves student self-reliance and ability to use technology in learning.

## CONCLUSION

Based on the results of research and discussion of the research conclusions can be stated as follows: Instructional media flash microscope in biology lab is very fit for use as a medium of learning.

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