

Identification of Problems and Learning Media Needed by Biology Students in Learning Implementation in Microbiology Subjects

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Abstract – This research is a step to improve the lecture system through identification of problems experienced by students and the learning media needed in the Microbiology course. The initial stage carried out was identifying the constraints and learning media needed by students in the Microbiology course. The research subjects were lecturers of Microbiology and Biology Department students at Padang State University (N = 25). Collecting data using the observation method by distributing questionnaires covering the difficulties experienced in the learning process and identifying the needs of learning media. Based on the data from the questionnaire, it was found that the learning process was still constrained by students' understanding of the concept of microbiology which was fairly abstract and needed better supporting media such as animated videos to be able to describe the learning material more clearly.

Keywords – Identificaton, Problems, Media, Micobiology

I. INTRODUCTION

Teaching and learning is a complex process that is influenced by various factors, including the use of media or teaching aids, which produces the active involvement of the students and make teaching becomes more interactive. The importance of interactive learning or academic engagement is reflected in instructional activities learners should be arranged so that learners have the right opportunity to get involved in the case belajar meaningful not just rote learning. Academic involvement it will prove of how students do chores, focusing on the important topic of learning and the awareness of his own trying to learn. Students need to be seriously involved in learning to achieve a deep understanding. Academic involvement will be closely related to the commitment and motivation of students and interactions in the social system of the classroom (Killen, 2003: 19).

The use of the latest teaching sources and teaching media that are actual and relevant to technological developments should be applied to various subjects, especially in abstract biology courses. One of the abstract biology courses is Microbiology. Microbiology is a branch of biology that studies microorganisms. The object of microbiological study is all micro- scopic living things, namely living things that need to be seen with a microscope, including bacteria, fungi, microscopic algae, and archaea and viruses which, although in fact, cannot be fully considered as living things. Bacteria, viruses and archaea belong to the prokaryotic group while fungi, protozoa, and microscopic algae belong to the eukaryotic group. Based on the object of microbiology study , it can be seen that the microbiology course is an interesting subject to study.

Based on the Academic Guidelines Book of the State University of Padang (2015), basic microbiology is designated as one of the compulsory subjects in the scientific and skills subject group (MKK). Basic microbiology courses are a requirement for taking

advanced courses such as biotechnology, and other applied microbiology courses, such as soil microbiology, medical microbiology, food microbiology, and industrial microbiology. Students' understanding of basic microbiology courses will be the basis for student understanding in developing microbiology concepts in other courses and making student final assignments when conducting research related to microbiology. Therefore, students must have a good and correct understanding of the concept in this subject. Although the microbiology material in the examples of the application of the knowledge can be directly observed and can be easily found in everyday life, the "biology" process that occurs to produce a product will be difficult for students to understand if it is taught using only pictures or schemes. Therefore, appropriate learning sources and media are needed to be able to concretize the object of study in this microbiology course so that it is easier for students to understand.

The use of the latest and valid learning resources allows lecturers to present the latest information and knowledge according to the development of science in their field. Law Number 12 of 2012 concerning Higher Education Article 41 paragraph 1, mandates that learning resources in the higher education environment must be provided, facilitated, or owned by universities in accordance with the study program being developed. Based on this law, it is clear that higher education institutions are required to develop learning resources according to the needs of students. Even though universities implement an adult learning system (andragogy) where students are required to proactively explore information and knowledge from anywhere related to learning materials, the more complete and actual learning resources developed by lecturers in their field of study make it easier for students to learn and encourage the achievement of learning goals. .

Learning resources are something that can support relatively permanent changes in a person's knowledge, behavior and or attitudes. This can be in the form of data, people, and objects that are used separately or combined in learning and learning to facilitate learning and learning activities whose procurement is developed by design or by utilization (Rahmadi et al, 2018). Ellington and Harris (1986: 95) say, teaching resources are any resources that include people, teaching materials, instructional tools, and others that can be used by learners to realize and facilitate learning. Meanwhile, according to the Association for Educational Communication and Technology (AECT), learning resources are all sources including data, people, and objects that can be used for learning, separately or in combination, in order to achieve learning objectives (AECT, 1986: 9). This is in line with Majid's (2008: 170) statement that learning resources are information that is presented and stored in various forms of media that can help students learn as a form of curriculum. The form is not limited whether in the form of print, video, software, or a combination of these forms that can be used by students and educators.

Based on the opinions of the experts above, it can be concluded that learning resources are anything that can be used to facilitate learning and improve learner performance in learning and learning which consists of messages, people, materials, tools, techniques, and backgrounds that can be used simultaneously. separate or combined, where the utilization can be specifically designed or simply utilized from everything that is available.

The teaching module is one of the teaching resources which is the most important learning reference besides the curriculum in learning. A teacher can use the media more effectively if he understands the underlying concepts of the teaching and learning process (Naz, 2008). In order for the learning experience to be more concrete, teachers must use and prepare special teaching materials. Teaching materials help teach abstract concepts in meaningful ways. A lot teaching aids certainly will strengthen the presentation of faculty into a more profound understanding. The use of media teaching has managed to turn most classrooms of pen gajaran traditional, in which teachers do most of the talking and the learners are passive listeners, into participatory learning centers that facilitate productive learning. (Thomas, 2008: 106)

One of the teaching resources for the Microbiology course used by biology students at the State University of Padang (UNP) is the teaching module prepared by the lecturer who teaches the Microbiology course of UNP, Mrs. Dr. Dwi Hilda Putri, et al (Putri, 2019). Based on the results of the analysis of the microbiology e-module textbook (Putri, 2019), it is known that in an effort to improve concept understanding, this e-module is equipped with video sites, journals and articles. The journal or article presented is a journal / scientific article whose discussion can make it easier for students to understand the material presented. The youtube video link presented in the e-module is a youtube video link containing material related to learning topics. The learning media in the form of a youtube video link presented by the microbiology e-module is known to be mostly in English, while after being traced, the Indonesian language microbiology learning videos are still few and difficult to find on YouTube.

In addition to teaching resources, students also need actual learning media that can make it easier for students to be able to reflect clearly on abstract concepts in the Microbiology teaching module. Gagne and Briggs in Arsyad (2007) implicitly say that

learning media includes tools that are physically used to convey the contents of learning material, including books, tape recorders, cassettes, video cameras, video recorders, films, slides (picture frames), photos, pictures, graphics, television, and computers. Most educational experts distinguish between media and teaching aids, but the two terms are also used interchangeably. The difference in the use of these terms lies in the function, not in the substance. Learning sources are said to be teaching aids if they function only as a tool. It is said the media if it is part of learning resources integrating throughout of the entire learning activities (Asnawir, 2002).

According to Gunawan (2019) multimedia is a media that can support communication between educators and students during the learning process through text, audio, images, animation, video and graphics. Multimedia has the ability to explain complex and dynamic concepts more clearly, makes it easier to remember content easily and improves understanding of topic content through the perspective of students and ultimately makes students more interested in learning (Chachil et al, 2014; Khan & Masood, 2015; Hwang et al, 2012 in Gunawan, 2019).

Multimedia can interpret a concept that can help participants explore, analyze, try, and explore the concepts and principles contained in the material, so that they are able to more quickly build the structure of students' understanding. Multimedia can also optimize the role of the senses in receiving information into the memory system because it integrates elements such as sound, text, animation, images or graphics that are presented interactively (Afriani, 2014). This statement is also in line with Mayer (2002) that learners can achieve a deeper understanding when explanations are presented in an audiovisual form rather than just words. And learning with multimedia allows learners to build mental representations of the display of words and images or audio visuals that have been presented. According to Liana (2020) the advantages of multimedia is that students can access materials from home without having to meet directly with the lecturer as a source of multimedia teaching can be downloaded using a smartphone or computer, so students can read the material whenever they have free time both online and offline. The use of multimedia can also be applied effectively in higher education because almost all students already have smartphones or computers. Animated video is an example of multimedia that can provide visualization of abstract material based on computers or androids.

Based on this explanation, the purpose of this study was to identify the problems experienced by biology students in learning Microbiology courses and the learning media needed to improve students' understanding of learning materials.

II. MATERIALS AND METHOD

This research is a qualitative descriptive study that focuses on identifying problems and learning media needed by students in Microbiology courses in 2020. The subjects in this study were lecturers in the Microbiology course and students of the Biology Department at the Faculty of Mathematics and Natural Sciences, Padang State University (UNP) semester 3 of the 2019/2020 academic year who took the Microbiology course (N = 25). Data collection was carried out by observation, open questionnaires, and interviews.

The techniques used in collecting this data consist of:

1. Interview

An interview list will be prepared to ask a number of questions to a lecturer who teaches the Microbiology subject at Padang State University

2. Questionnaire

The types of questionnaires distributed were closed and open questionnaires distributed to biology students at Padang State University for semester 3 of 2020.

Data analysis using qualitative descriptive analysis. Analysis of the results of the student questionnaire is also presented using a table that shows the percentage of the student's assessment. The results of this analysis will also describe the problems faced by students in the application of Microbiology in Human Life in the Microbiology course.

III. RESULTS AND DISCUSSION

Based on the results of observations and interviews from questionnaires that the author has distributed to lecturers and students. From the results of interviews with lecturers, the following observations were obtained;

- a) In microbiology lectures, lecturers endeavor to provide cooperative and dynamic learning with discussion and presentation methods.
- b) In lectures, students have begun to adapt quickly to understand microbiology learning material.
- c) With the cooperative learning method, students are required to seek information related to the material and be active in discussions.
- d) There are many learning resources used by students in microbiology lectures and are quite easy to understand. One of the teaching resources used is textbooks in the form of e-modules compiled by lecturers. This textbook / e-module is designed to overcome the deficiencies found in textbooks. The material on e-module is generally sourced from text books which are presented with a sentence that is easily understood and adapted to the needs of students studying in the syllabus of lectures . In this e-module, there is also a link for learning videos from YouTube related to the material being studied. The teaching module is one of the teaching resources which is the most important learning reference besides the curriculum in learning.
- e) According to the lecturer, in the implementation of Microbiology lectures, especially the application material of microbiology in human life, students are still constrained in understanding the concept so that several related materials must be repeated frequently .
- f) The learning media used, namely power point slides (PPT), were still inadequate in supporting students' understanding of the material. Even though the material in microbiology in the examples of scientific applications can be observed directly and easily found in everyday life, the "biology" process that occurs to produce a product will be difficult for students to understand if taught only using pictures or schemes. According to the lecturer, better supporting media such as videos are needed to be able to describe microbiology learning material. In this case, the use of multimedia video animation is considered very well used to describe and explain the process of "biology" that occurs realistically using video, sound, text, animation and graphics.
- g) Based on this, the lecturer who teaches the subject agrees to create supporting teaching media that is in accordance with the Microbiology course syllabus and student needs.

Furthermore, observations were made to identify problems experienced by students in lectures obtained by using a closed questionnaire. This questionnaire identifies problems from 7 aspects, namely:

- 1) Interest and understanding in microbiology courses
- 2) Learning media used in microbiology lectures
- 3) Implementation of microbiology lectures
- 4) Use of microbiology e-module textbooks
- 5) Constraints in understanding microbiology textbooks
- 6) Video lessons needed

Table 1. Student Opinion Questionnaire About Lectures

No.	Statement	Score Answer Percentage (%)			
		Yes	Not	Yes	Not
1.	Aspects of Interest and Understanding of Microbiology Subjects				
	a. Microbiology is an interesting subject	25	-	100	-
	b. Microbiology is a difficult subject to understand because it is too abstract	15	10	60	40
2.	Implementation of Microbiology Lectures				
	a. Lecturers use learning media based on information and communication technology in microbiology learning	23	2	92	8
	b. Is there a need for media in the microbiology learning process that is equipped with audio visuals?				0

		25	0	100	
3.	Implementation of Microbiology Lectures				
	a. Microbiology lectures use the discussion method and students make group presentations	25	0	100	0
	b. When presenting using learning videos related to the material	17	8	68	32
4.	The use of e-module microbiology textbooks				
	a. Using a microbiology e-module textbook prepared by a lecturer as a teaching resource for microbiology courses	16	9	64	36
	b. Opening the learning video link in the e-module as additional teaching materia	20	4	83	17
5.	Constraints in understanding microbiology e-module textbooks				
	a. Microbiology e-module textbooks improve understanding of the material	19	6	76	24
	b. Constrained by the learning video link provided by the e-module, generally in English	20	5	80	20
6.	Required Learning Videos				
	a. The learning videos needed are videos in Indonesian with simple and easy to understand sentences	25	0	100	0
	b. To better understand the concept of abstract microbiology material during a group presentation, I needed a teaching resource in the form of an animated video	20	5	80	20
	c. The instructional video needed is an animated video	12	12	50	50
	d. The learning videos needed are real videos	12	12	50	50

The data obtained from a closed questionnaire can be described as follows:

- Overall students view that Microbiology is an interesting subject, but as many as 60% think Microbiology is a subject that is difficult to understand because, even though the microbiology material in the examples of science applications can be directly observed and easily found in everyday life, the process of "biology "What happens to produce a product is classified as abstract because it cannot be observed with the naked eye.
- In the learning process, almost all students perceive that lecturers are already using media-based learning information and communication technology in learning microbiologist i but all the students said it was still in perluka n media audio-visual learning process microbiology in order to further enhance student understanding.
- Overall, the Microbiology lecture method takes place with the discussion method where students learn cooperatively and make group presentations in turn. During group presentations, 68% of students used learning videos from YouTube to explain the material being discussed.
- In this Microbiology learning process, as many as 64% of students use e-modules prepared by teaching lecturers and 83% open learning video links embedded in e-modules as additional teaching materials.
- In using the e-module of Microbiology prepared by lecturers and colleagues, 76% of students stated that the e-module of microbiology improved their understanding of the material, but 80% of students experienced problems with the learning video link provided by e-modules which generally speak English so it is difficult understood. In addition, the obstacles experienced

are that some video links cannot be opened and the referenced learning videos are not in accordance with the main material being studied by students.

- 6) Overall, based on the results of observations through questionnaires, students admit that they need Microbiology learning videos in Indonesian that are in accordance with the topic being studied using simple and easy to understand language to support student understanding in microbiology learning, especially on the topic of Microbiology Applications in Human Life.

IV. CONCLUSION

Based on the results of observation and discussion, it can be concluded that students have difficulty understanding the concept of microbiology which is fairly abstract because the object of study is microorganisms that cannot be observed with the naked eye. The team of lecturers for the microbiology course at Padang State University (UNP) has provided teaching materials in the form of e-modules designed to overcome deficiencies in textbooks. The material on e-module is generally sourced from text books which are presented with a sentence that is easily understood and adapted to the needs of students studying in the syllabus of lectures. In this e-module, there is also a link for learning videos from YouTube related to the material being studied. The learning video link that is linked to the e-module aims to improve student understanding of the material. Even so, students still have problems understanding the learning videos provided by this e-module because generally the learning videos from YouTube are in English so they are difficult to understand. In addition, the obstacles experienced are that some video links cannot be opened and the referenced learning videos are not in accordance with the syllabus and main material being studied by students. Overall, based on the results of observations through questionnaires, students admit that they need audio visual media such as Microbiology learning videos in Indonesian that are in accordance with the topic being studied using simple and easy to understand language to support student understanding in microbiology learning, especially on the topic of Microbiology Applications in Human Life. Through the acquisition of data from this preliminary research, it is hoped that it can provide an overview for the lecturers in improving the implementation of the learning carried out. Furthermore, researchers can continue this research with research that leads to the realization of learning media in the form of animated videos, especially related to the topic of Microbiology Applications in Human Life in Indonesian which is in accordance with the Microbiology learning syllabus of Padang State University (UNP) which is rich in content, interesting and easy to understand by students as its user.

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