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Needs Analysis of Development Interactive Multimedia Learning Based Android on Molecular Genetic Material in University

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***Abstract* –This study aims to determine the learning problems in molecular genetics. This type of research is descriptive quantitative research. Methods of data collection were conducted by interviewing professor of genetics and distributing questionnaires to students who have taken the course genetics. Results of the study are students experiencing difficulty in studying the molecular genetic material because the material is abstract and limitations of using instructional media used, for it takes the learning multimedia interactive *android-based* that can assist students in learning.**

Keywords* – Multimedia; Learning; Molecular Genetics; Interactive Multimedia; *Android.

I. INTRODUCTION

Genetics is a compulsory subject studied in college. One of the majors studying genetics courses in college was biology. Genetic material learned in college includes classical genetics (Mendel genetics) and molecular genetics (chromosomes, DNA, genes, and the processes associated with it such as replication, transcription and translation).

The learning process and the learning outcomes of genetics is still a problem in many Workforce Education Institutions (LPTK). Hera (2017:53) states that the genetic material that is difficult to comprehend. Mahmudati (2015: 504) states that the course genetics has a high difficulty level for students of biology education. This is due to the lack of ability of the students in understanding the molecular genetics concepts that are abstract or cannot be observed directly. Low student learning outcomes in subjects genetically reinforced the perception that the hard science of genetics.

Niwangtika (2017) stated that the lack of results of student learning in subjects genetically reinforced the perception that the hard science of genetics. One of the factors that cause low results of student learning is the process of learning and teaching material the use of which has not been in accordance with the needs of the students in understanding the subject matter. This is in accordance with the opinion Cimer (2012) that the appropriate learning should be appropriate to the needs of students and courses taken.

Based on preliminary observations in mind that the molecular genetic material is the material difficult to understand by the students. The learning process is done by means of presentations and group discussions. The use of teaching materials such as books, *handouts*, and interactive multimedia still make most students find difficulty in studying the molecular genetic material. The purpose of this study was to determine the problems faced by lecturers or students during study molecular genetics so you can find an alternative solution to solve it.

II. REVIEW OF LITERATURE

Teaching materials is a set of learning materials designed and prepared based curriculum. For teachers teaching materials serve to direct all the activities in the learning process, while for students teaching materials to guide the

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learning process. Teaching material also serves as an evaluation tool belajaran achievement (Lester, 2013:2-7).

One type is a multimedia teaching materials. Multimedia is all media components such as text, images, animation, sound, and film or video is presented in a tool (Asandhimitra, et al., 2004: 75). Ivers and Ann (2010: 2) states multimedia is the use of media for presenting information. These combinations can contain text, graphics, animation, images, video and sound.

Definition multimedia in science includes some aspects of synergy, between text, graphics, static images, animations, movies and sound. In multimedia Progress can be categorized into two groups, namely linear multimedia and interactive multimedia. Linear Multimedia is a multimedia that is not equipped with a control device thereof. Sequential or sequential nature and duration of the broadcast can be measured. Film and television are included in this group. While a multimedia interactive multimedia is equipped with a controller that can be operated by the user, so the user can choose what is desired for further processing (Sanjaya, 2012: 219). According to Rizky (2016: 41), multimedia is the use of various types of media that are presented sequentially or simultaneously to convey the topic or information.

III. METHODOLOGY

This study is a quantitative descriptive. This research subject is a lecturer in genetics and biology education students at the Universitas Negeri Padang, STKIP PGRI Sumatera Barat, and Universitas Bung Hatta. This study is a research method that is trying to get an overview and interpretation in accordance with the actual situation. This study focused on the analysis of the problems, needs, and learning syllabus of lectures in molecular genetics. This analysis refers to the stage of the Preliminary research from the stage of development models Plomp.

Data was collected through interviews with the lecturer in genetics to determine problems in the learning process. It also conducted interviews and questionnaires to students to know the difficulties of learning and teaching materials used by students.

IV. RESULTS

1. Problem Analysis

Based on interviews with three people lecturer in genetics at the college note that in general the students have difficulty in learning the material DNA, chromosomes, genes and DNA replication. This is because the material is abstract and a lot of talk about the process, so we need a media that is able to describe or visualize the material to be more easily understood.

Based on the results of questionnaire analysis of the issue that was distributed and completed by 40 students of biology education showed that 55% of the students stated matter of DNA, chromosomes and genes is a material that is difficult to understand, 68% of the students stated material on DNA replication is a material that is difficult to understand , 55% of students said it was not able to understand the material of DNA and chromosomes merely by reading the explanation through textbooks, 61.5% of students said it was not able to understand the material on the process of DNA replication only by reading the explanation through text books, and 90% of the students stated require a learning medium study material on DNA, chromosomes, genes and DNA replication.

Based on the results of research interviews with three people lecturer in genetics, it is known that the teaching materials used by professors in the learning process in the form of *handouts* textbooks, and *Macromedia Flash.* Disadvantages of handouts and books are not able to visualize the concepts of a process, while the lack of *Macromedia Flash* is only usable with the help of *a laptop.* In addition, not all students have the book at the time of learning, students also have difficulty accessing a given faculty instructional media such as *Macromedia Flash* because not all students have a *laptop,* so that access to the use of the media is limited. Students who do not have a *laptop* it difficult to learn the subject matter back home. Based on the observations of the use of *laptops* in the learning process revealed that only 25% of students have *laptops.* The use of *laptops* as an aid in teaching media access has the disadvantage, among others, has a large weight and size, it is not practical because it can be used anytime and anywhere, as well as prices *laptop* relatively expensive cause not all students have it. Lecturer requires a media that is interactive, communicative, practical, attractive appearance, using the Indonesian language and content or content according to student ability S1 as supporting media in explaining the matter of DNA, chromosomes, genes and DNA replication.

Based on the results of questionnaire analysis of the issue note that 97.5% of students own *mobile phones* based on *Android.* This is a consideration for researchers to create multimedia interactive learning *Android-based* can be used by all students and accessible anywhere.

2. Multimedia Learning Needs Analysis

Based on the results of learning multimedia needs analysis questionnaire, found that 87.5% of students stated the use of *android* can be used as a means of support in the learning process in the classroom, 92.5% of the students stated in need of interactive learning multimedia applications that can be accessed via *mobile* phone-based *android* to understand the material of DNA, chromosomes, genes and DNA replication, 80% of the students agreed if multimedia interactive learning based on *android* created with themes such as *games*, 85% of the students agreed if multimedia interactive learning based on *android* created by appearance of attractive colors, 87 , 5% of the students agreed if the multimedia-based interactive learning *android* has an animation that can assist in visualizing the subject matter, 82.5% of the students agreed if the multimedia-based interactive learning *android* has pictures can helping in visualizing the subject matter, 80% of the students agreed when multimedia-based interactive learning *android* has not boring music to see, 80% of the students agreed when multimedia-based interactive learning *android* material in the form of text description to facilitate understanding of the subject matter, 67.5% students agree if multimedia interactive learning based on *android* have a material explanation in the form of audio for easy understanding of the subject matter, 80% of the students agreed if multimedia interactive learning based on *android* has the instructions for use to be easy to use, and 90% of students agreed if multimedia interactive learning based on *android* have exercises to test the understanding of the subject matter.

Based on the analysis of multimedia learning needs also known colors are preferred by students. The result of this analysis was 85% stated that like the color blue, 85% of the students stated like gray, 82.5% of the students stated like dark blue, 75% of the students stated like the color black, 75% of the students stated liked the color white, 65 % of the students stated liked the red color, with 77.5% of the students stated liked the color green, 52.5% of the students stated liked the color pink, 75% of the students stated liked the color yellow, and 85% of the students stated loves color *Tosca* and 30% of the students stated liked *OCR A Extended* type of writing this is the kind of writing that obtained the highest score and the most preferred by students, then this article is used as a kind of consideration the type of writing on multimedia. The results of the analysis of the needs of learning multimedia is used as a consideration in designing themes, graphics, animation, text, navigation buttons, and *back sound* on multimedia.

3. Syllabus Analysis

Based on the analysis of syllabi at several universities outlined the achievements of the learning material DNA, chromosomes, genes and DNA replication as follows: 1) be able to describe about DNA, chromosomes and genes; 2) be able to describe the definition and the process of DNA replication. Results syllabus for material analysis of DNA, chromosomes, genes and DNA replication. Syllabus analysis serves to determine the learning outcomes and learning indicators as a reference in determining the concepts presented in multimedia-based interactive learning *android.*

V. DISCUSSION

Students have difficulty in understanding the material DNA, chromosomes, genes, DNA replication. This is because the material is abstract or difficult to observe directly, so we need a media that is able to describe or to visualize the material to be more easily understood. Munandi in Asyhar (2012: 35) explains that, instructional media enable learners to gain a clear picture of objects or things that are difficult to be observed directly.

The media used by professors in the learning process in the form of *handouts* textbooks, and *Macromedia Flash.* Media used lecturers have drawbacks or limitations. Hobbs (2006) states that such limitations may lead to less optimal use of the media and the lack of information about other media that can be used to learn the material.

Disadvantages of *handouts* and books are not able to visualize the concepts of a process, while the lack of *Macromedia Flash* is only usable with the help of *a laptop.* Another problem found is that not all students have *laptops* so that students have difficulty in learning the subject matter with the help of *Macromedia* Flash. Therefore, it takes a medium that can help students to visualize abstract concepts, has a communicative language, look attractive, practical and easy to use anytime and anywhere. Media is an important element in learning because through the media information can be channeled easily (Smaldino, et al., 2011). The use of instructional media needs to be adapted to the needs (Niwangtika, 2017).

Based on analysis of a questionnaire completed by 40 states require students to learn multimedia learning materials molecular genetics. Asandhimitra, et al., (2004), explains that multimedia is all media components such as text, images, animation, sound, and film or video is presented in a tool. Sanjaya (2012) explains that interactive multimedia is a multimedia equipped with a controller that can be operated

by the user, so the user can choose what is desired for further processing.

Another issue that was found from the observation is that not all students have the books at the time of learning; student learning difficulties accessing media provided lecturers such as *Macromedia Flash*, because it must be open and look for the media in advance on *a* laptop. The use of *laptops* as an aid in teaching media access has the disadvantage, among others, has a large weight and size, it is not practical because it can be used anytime and anywhere, as well as prices *laptop* relatively expensive cause not all students have it. Having observed turned out even though some students do not have a *laptop*, but most students use *mobile phones* based on *Android.* The percentage of ownership *mobile phone* is quite high among the community, because its use is simpler than any other device. The number of users *mobile phone* in Indonesia, there was 116 million and ranks sixth in the world (Triarso, 2010). It is also evident from the results of questionnaire analysis of problems and needs of learning media in mind that 97.5% of students own *mobile phones* based on *Android.*

Sakat, et al (2012) suggests that learning to use media technology provides a significant effect on learning. So far the users *mobile phone* android-*based* generally to communication, such as phone, instant messaging, *chat*, or social media. From the results of the questionnaire is also known that 95% of students take advantage of *mobile phone android-based* to access the communication, whether it be a phone, sms, or social media and 70% of students who have or take advantage of applications that is instructive on *mobile android-based* phone.

Mobile phone Android-*based* cannot only be used as a means of communication, but also can be used as a medium of learning. Through the system *android* a person can develop a learning medium to create an application that contains perlajaran material. Applications are made to visualize the abstract of lecture material, making it easier for students to understand the subject matter (Bustomi, 2010).

The results of questionnaire analysis also showed that 87.5% of the students stated in need and 95% agreed that developed interactive learning multimedia applications based on *android* that can be accessed via *mobile phones* based on *Android* for molecular genetic material.

Based on the problems found from the observation, takes multimedia interactive learning based *android* on molecular genetic material as an alternative solution in the learning process. Multimedia interactive learning based *android* will provide convenience to the students to visualize concepts of material that is abstract because it comes with animations, students can read and repeat material anytime and anywhere without having to open *the laptop* first, and reduce the burden of learning materials students because it can be accessed via *mobile* phone-based *android* owned by students. Sadiman (2010) states that students can learn indirectly that actively interact with using the media or other learning resources so that learning can take place anytime and anywhere.

VI. CONCLUSION

The problems in the learning process of molecular genetics include the difficulty students in understanding the molecular genetic material because the material is abstract, the use of the media to help the learning process has shortcomings and limited use such as the use of *Macromedia Flash* that can only be used by students have *laptops* only. Ownership *Android mobile phone* to the students is very high, so it can be a tool in the use of instructional media. Therefore, it takes a multimedia interactive learning based *android* on molecular genetic material to allow students to learn anytime and anywhere. This study is a preliminary investigation conducted by the researchers to develop multimedia products interactive learning *Android-based* on the materials as solutions to problems of molecular genetics in learning.

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