

Multimedia Validity of Android-Based Interactive Learning in Mutation, DNA Repair and Recombination Materials for Higher Education

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Abstract – Genetics is a field of study that studies genetic material. Overall genetic material is abstract, the process that occurs can not be directly seen by the eye and difficult to imagine. The students' need for media in helping the learning process has become very important, especially for abstract material that can be visualized. Including genetic material, especially mutations, DNA repair and recombination. The use of technology is very rapid at this time, one of which is android-based smartphone is expected to be used as a learning aid so that learning can be effective and fun for students. One of the stages that must be carried out in research development is to validate multimedia interactive learning based on Android. Research with the development carried out using the Plomp model. The validation stage is carried out to find out whether this multimedia is suitable for use by students. This stage was carried out by 4 experts who will validate android-based interactive learning multimedia on the aspects of construct, graphics, material and language with the research instruments used in the form of multimedia validation sheets which then produce validation score data. Based on the results of data analysis, it can be concluded that the multimedia-based interactive learning multimedia on mutation DNA repair and recombination material for higher education is valid for use with an average percentage of validation obtained at 83.59% with very valid criteria.

Keywords – Interactive Learning Multimedia, Android, Genetics.

I. INTRODUCTION

Genetics is branch discipline of Biology studying about genetic materials. Genetics supports the development of Biology. Almost no Biology materials are developed without the concept of Genetics. In other words, Genetics covers all biological materials^[1]. The material itself is very complex. It consists of gene, DNA, RNA, chromosome, protein and interconnected process. Genetics is not studied in only one level of education, middle school or high school

but also studied in university level by students who are choosing Biology science or Biology Education Department.

The learning process and the result obtained from Genetics courses has become problems in university. According to analysis result of student score in Genetics course of semester July-December 2016 in Universitas Negeri Padang (UNP), it was found that the percentage of students who got B- were 78%, indicating student's low

learning outcome. In addition, the results of research by Fauzi and Mitalistiani^[2] revealed that genetics is a topic that is considered the most difficult for the majority of undergraduate students majoring in biology. One of the reasons was the abstract nature of Genetics materials. As found in a research by Fauzi and Fariantika^[3], identifying that the factors that cause genetics to be considered as the most difficult branch of biology for students to learn are traits and concepts that are abstract, difficult to understand, and contain many foreign terms that are difficult to understand by students. Although students read books or accessible references, they still found it difficult to illustrate the occurring process. Based on the problem, a media which could help students visualizing the materials is needed.

Learning media is one of supporting educational facility used for materials, helping students to understand given materials and improving education quality^[4,5,6]. The combination of several types of learning media will form a unity, known as the term learning multimedia. The combination of these media consists of text, animation, sound, video, graphics and others in accordance with the demands of the material^[7]. Learning multimedia that can be operated by the user (students), can choose what is needed for the independent learning process and given the freedom to operate it is called the interactive learning multimedia^[8].

Technology today grows so fast especially information and communication technology. A need for a learning concept and a learning mechanism based on information technology cannot be ignored. The more society including students use mobile device, the more chances for it to be used in educational world, included in developing interactive learning multimedia^[9].

The massive use of mobile phone or smart phone among both students and college students means a new opportunity in learning process. About 96,2% college students had and actively used *smartphone* with android operation system. However, the device is commonly used for communication and entertainment as calling, messaging, or social media. The recent data shows that the use of android as a supporting operation system in Indonesia increased up to 92.27 % in 2018 and android dominated smart phone market^[10]. This means that android is the most used operation system on smart phone in Indonesia. Thus, smart phone should be used optimally for example in facilitation learning process.

Android is one of operation system used in smart phone and tablet. It as a free open source operated in mobile and

internet based devices (MID). It gives chances to everyone to develop various apps and features according to the user's needs^[11], for example developing learning application. By doing so, it hopefully can create representative learning media and add audio visual materials like animation to text materials so students can easily understand the materials^[12].

Android based smart phones used by most students nowadays are hoped to be one of solution for learning problems. It contains animation and various media. Mutation, DNA *repair*, and recombination materials which are claimed to be difficult by students due its abstract nature can be visualized through media to help them to understand the materials. As found in a research by Fadri^[13], he stated that the implementation of android based learning multimedia for learning significantly affected student learning outcome. Plass^[14] mentioned that abstract materials needs media to create active learning and to visualize and explain concepts. It can also increase the effectiveness and efficiency of learning because it is applicable anywhere and anytime, making it a self-study media i. This is in line with the research result by Amirullah^[15] which revealed that android based learning could widen student's knowledge and could be used anywhere. It eases students to better understand concepts by relearning materials outside classroom.

II. RESEARCH METHOD

The type of research used is design and development research. This research was conducted at the Faculty of Mathematics and Natural Sciences, Padang State University. The data sources in this study are one biology education lecturer, one geneticist lecturer, one instructional media instructor, and one Indonesian language lecturer. The method of collecting data in this study is a validation method using an interactive learning multimedia validation sheet instrument which is then calculated as a percentage of its validity. Validated aspects include constructs, content aspects, graphic aspects, and language aspects. Android-based interactive learning media are said to be valid if the percentage of all aspects assessed reaches $\geq 61\%$.

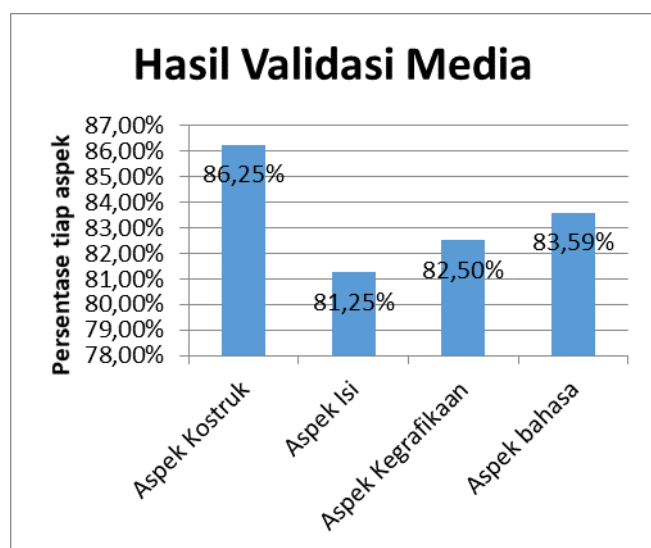
III. RESULT AND DISCUSSION

The first aspect in evaluating product quality is validity. The word valid is often interpreted correctly, correctly, valid, and valid. Valid means that the instrument can be used to measure what should be measured^[16]. Validation is the process of requesting approval or endorsement of product conformity with needs so that the product is declared suitable and suitable for use in learning^[17]. Validity

test is carried out by experts. Validity test of the developed product prototype was carried out through validation assessment by experts^[18]. The components that must be assessed when validating are^[19]:

1. Components for the appropriateness of contents, including the conformity of the Decree with BC, the needs, the truth of the substance, the benefits, moral values and social values.
2. Components of the presentation (construct), including clarity of objectives to be achieved, the order of presentation, giving motivation, attractiveness, interaction (giving stimulus and response) and completeness of information, use of fonts (type and size of letters), layout (layout), illustration of images, photos and display designs.
3. Language component, including readability, clarity of information, conformity with Indonesian Spelling (EBI) rules, use of language effectively and efficiently.

Following are the results of the validity of each aspect shown by diagram 1.



Based on diagram 1, it can be seen that the aspects of construction, content, graphics and language have fulfilled the very valid category. This criterion is obtained by looking at the indicators that can be fulfilled by interactive multimedia learning based on Android. Multimedia is able to present learning in plain view so that learning seems real, visualization with pictures, words, videos, audio and animation will be more easily captured and remembered by students^[20].

Android-based interactive learning multimedia is stated to be very valid by the constructor's validator. Android-based interactive learning multimedia designed to be used on Android smartphones in the form of applications that run without using a data package so that users in this case students can access the application anytime and anywhere students need.

Multimedia is designed to be able to provide feedback quickly as if the media provides interaction to users, so users can choose what they want for the next step^[21]. That is because interactive media is equipped with a controller^[22], so that it can help students learn in accordance with their speed in understanding the lesson. Learning experiences obtained by students will affect the good learning outcomes^[23]. And can motivate students to actively participate in the learning process^[24].

In the aspect of android based interactive learning multimedia contents declared very valid by the validator. The content aspect contains material about gene mutation, DNA repair and recombination. This material was selected in accordance with the learning achievements available in tertiary institutions that contain important concepts, as well as the processes that occur in the material. The material presented comes from printed books and the web such as NCBI which contains material according to college standards.

The assessment of the graphic aspect which was assessed by the expert was declared to be very valid. This means that components on Android-based interactive learning multimedia in the form of animations, images, displays, navigation buttons and backgrounds have been fulfilled well. The valid value is given by the validator based on several indicators. First, the image shown is in accordance with the material and a clear size so that it is easily seen. Second, the animation presented is in accordance with the material, has movements that are not too fast and clear so that students easily understand the material.

The next validation results are the language aspects and the values obtained in the criteria are very valid. This means that android-based interactive learning multimedia developed has been good and right in accordance with Indonesian Spelling (EBI). The description of the material delivered both writing and narration has been considered communicative, effective and efficient, and the use of language that is logical and does not contain multiple

meanings so that interactive android-based learning multimedia can be well received by students.

IV. CONCLUSION

Based on the results of the analysis and discussion of the research data obtained It can be concluded that the validity of andriod-based interactive learning multimedia that has been developed is in very valid criteria with an average percentage of 83.59% that has fulfilled the aspects of construct, graphics, content and language.

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