

Designing Cellular Biology Dictionary Based On Android System As Learning Media For Senior High School Students

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Abstract. This study aimed to arrange and find-out the appropriateness of cell biology dictionary based on android system as the learning media for senior high school students year XI-Science in the first semester. It was research and development (R&D) study with ADD (*Analysis, Design, Development*) model. The instrument used in this study was the evaluation sheet from the materials expert, media expert, peer reviewer, biology teacher, and students. The analysis in this study was a descriptive analysis. The research result pointed out that the quality of this learning media based on android system in biology cell was appropriate used in independent learning for XI-science students of Senior High School. It was based on validation scoring from media expert, materials expert, peer review with good category, based evaluation scoring teacher and students expressed good dictionary application.

1. Introduction

Biology learning is essentially a process to deliver students to their learning goals, and biology itself acts as a tool to achieve these goals [4]. The process of learning biology is the creation of conducive situations and conditions so that interaction occurs between the subject of the student with the object of learning in the form of living things and all aspects of life. Through interactions between students' subjects with learning objects can lead to the development of optimal mental and sensory motor processes in students.

There are several ways that can be taken to help students in the learning process, one of which is by learning media. Learning media is a tool used by teachers to support successful learning. The development of instructional media is very closely related to technological development. Products from instructional media continue to develop as technological advances are more practical to use. Based on the explanation above, it is known that learning does not depend on the existence of the teacher as the manager of the learning process, because in essence learning is the interaction between students and the object being studied.

Facts show that the use of assistive devices in the form of instructional media has not been used optimally when learning, for example learning biology in SMA N 1 Depok. In cell biology material, the learning media used have not yet visualized the material clearly and is easily understood by students as a whole. Based on preliminary observations made at SMA N 1 Depok, researchers found several problems that occurred during the learning process, including 1) Learners have difficulty in understanding the scientific terms of cell material biology, even though the material is important to base further biological material (2) Android-based biology dictionaries that are available are still general, there is no specific biology dictionary in the cell (3) Lack of variation in learning media that

causes students to get bored quickly, so it is necessary to optimize the use of instructional media (4) *Smartphones have a high use in education, but they are still lacking in accessing learning media.*

Based on these problems, variations in learning media that are easier for visualization of cell material in overcoming the limitations of the senses, space and time are needed, given the microscopic object of cell biology and there are terms that use foreign languages in it.

The dictionary is chosen by considering its advantages in presenting vocabulary and its explanations. Dictionaries in book form have advantages in the large number of vocabulary, but also have weaknesses in terms of vocabulary search and meaning of words that require a long time. Electronic dictionary media can help in finding words that are fast and practical, can be used anytime and anywhere. In electronic dictionaries and mobile applications the dictionary has weaknesses in terms of the limited amount of word data [2]. The method of preparing a dictionary application using R&D (research and development) was chosen based on the research objectives to produce a product prototype.

For that reason, by looking at the above problems and the development of an android smartphone that has not been utilized optimally in the world of education, an idea arises to create a learning media that contains cell material for high school class XI students which is then implemented in a study entitled "Designing Cellular Biology Dictionary Based on Android System as Learning Media for Senior High School Students".

2. Method

2.1 Type of Research

This research is included in the type of Research and Development (R&D) research with the ADDIE research and development model (Analysis, Design, Develop, Implementation, Evaluating). This research only reached the development stage.

2.2 Time and Place

Preparation of the cell material dictionary was carried out in May to August 2019. The implementation of the feasibility test and limited trials in August 2019 at SMA N 1 Depok.

2.3 Subject

The subjects in this study were students of class XI of SMA N 1 Depok, totaling 20 children from class X IPA 1.

2.4 Object

Learning media in the form of Android-based cell material dictionary.

2.5 Procedure

This research procedure adapts the ADDIE development model. However, in this study only reached the ADD (Analysis, Design, Develop) stage, due to the limited time of researchers. The study begins by analyzing the competence and instructional and analysis of student needs. The next stage is designing the media by determining the material, design, framework, and instruments. The results of the preparation in the form of a media dictionary that will be tested for validity and testing is limited to students and produce a prototype.

2.6 Instruments, Data Collection Techniques

The instrument used in this study was a questionnaire validation of cell biology dictionary applications by media and material experts, teacher and student assessment questionnaire.

2.7 Data Analysis Technique

This research uses descriptive analysis, with the following steps:

1. Changing the data quality assessment module of teachers and students into a quantitative form to calculate the frequency of occurrence of each assessment
2. Calculate the percentage of occurrences of each assessment using a formula:
Percentage of eligibility for each aspect (%)=

$$\frac{\Sigma \text{average score obtained}}{\Sigma \text{average ideal score}} \times 100\%$$

The above formula is used to calculate each category. The results of the assessment are ordinal data so data processing is very limited. Assessment with the most frequency of occurrence is the mode and has the largest percentage which will be a conclusion of quality.

3. Result and Discussion

3.1 Analysis of Learning Media Development (ADDIE Model)

Competency and instructional analysis refers to the 2013 curriculum, which are Core Competencies (KI), Basic Competencies (KD), objectives and indicators that include cell material to explore curriculum competencies. The selected basic competency, KD 3.1, understands the chemical components of cells, the life characteristics of cells, which are shown by the structure, function, and processes that take place in the cell as the smallest unit of life. Phase analysis of student needs of students is done by observation and interviews with high school teachers. The analysis of students shows that students have difficulty in understanding the terms contained in cell material. Whereas teachers in high schools still use conventional learning with printed books.

The next stage is design, at this stage it is the design and preparation phase of learning media which includes making media designs (story boards), collecting media materials, collecting backgrounds, fonts, and buttons, and preparing instruments.

The third stage in the preparation of the media is development. In the development that is done first is to choose the software that will be used to compile the application. The software chosen by researchers is Android Studio. [1] argues that Android is a Linux-based operating system specifically for mobile devices such as smartphones or tablets. The Android operating system is open source, so there are many programmers who flock to create applications and modify this system.

Next, the researchers conducted media validation with material expert lecturers, media experts, and peers. The results of the validation are used for media improvement. After the media revision phase, the researchers assessed the learning media to the biology teacher, then tested it limited to 20 XI IPA 1 high school students in Depok. According to [3] the feasibility of media items in terms of material / substance aspects, construction aspects, and language aspects.

3.2 Product Feasibility Analysis

Product feasibility analysis is carried out in 2 stages, namely validation by material experts, media experts and peers, and assessment by biology teachers and students. The assessment of learning media by material experts in terms of two aspects shows a percentage of 84.65% which means it is very feasible. Suggestions and input can be used to improve media, including a) Text size enlarged b) Media depends on internet access.

Learning media assessment by media experts viewed from six aspects shows a percentage of 81.75% which means it is very feasible. Suggestions and input can be used to improve media, including giving warnings to students if the application uses internet data packages if used.

The assessment of learning media by peers in terms of five aspects shows a percentage of 83.83% which means it is very feasible. Suggestions and input can be used to improve the media, including a) More attractive appearance if added color or background b) More variations in font types.

The assessment of learning media by biology teachers in terms of six aspects shows a percentage of 91.88% which means it is very feasible.

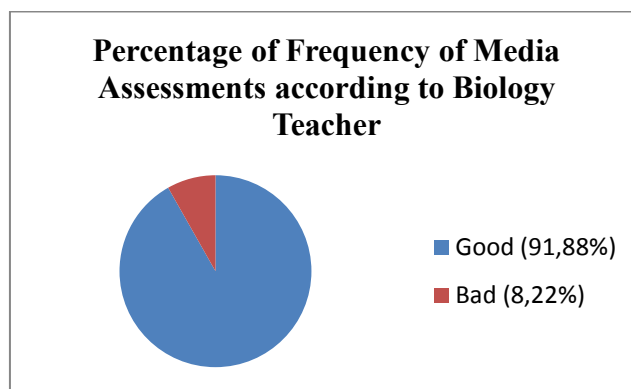


Figure 1. Percentage Diagram of Frequency of Assessment of Biology Teachers

Suggestions and input can be used to improve media, namely printing dictionaries, so students are easier to learn, because they do not depend on internet quota packages.

The limited trial to students showing a percentage of 83.35% which means it is very feasible.

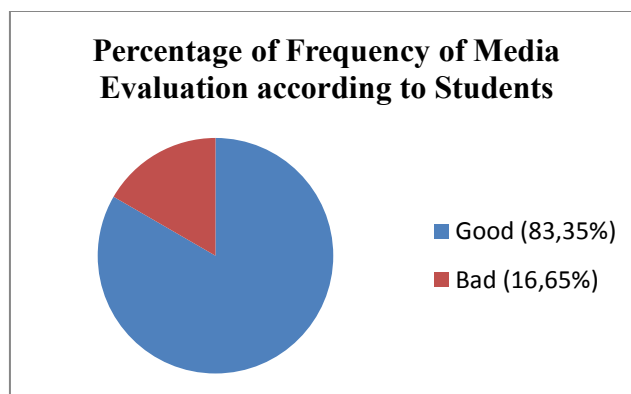


Figure 2. Diagram of Percentage of Student Evaluation Frequency

Suggestions and input can be used to improve media, including a) Background colors and fonts are more varied b) Language in the video uses Indonesian c) Explanation of terms is clarified more d) Adding zoom and download features for video e) Adding animation f) Using applications if you can offline.

4. Conclusion

The compilation of an android-based cell biology dictionary, starts with the stages of analysis (curriculum, needs and characteristics of students), design design, then development. At the development stage media validation is carried out by material experts, media experts, and peers. Based on the assessment of educators and students, android-based cell biology dictionaries are suitable for use in the learning activities of students in class XI SMA / MA.

5. Suggestion

Based on research, researchers provide suggestions for further research including a) Utilization of media is expected to be used optimally in the learning activities of students b) Utilization of media is not used in negative terms such as cheating during exams c) Utilization of media is expected to be socialized to schools other to increase students' knowledge of understanding scientific terms in cell material d) Further media development can be done by adding other material to make it more varied. Development can be carried out until the final stage so that quality media.

6. References

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