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Biologiku: Android-Based Biology Learning Media Integration of Science, Islam and Technology

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Abstract: Learning is currently experiencing a shift from conventional learning in the classroom to internet-based virtual learning via mobile devices. This study aims to produce an android application for biology learning media based on android integration of science, Islam and technology that is appropriate to be implemented in high school or equivalent level. This type of research is research and development using the Borg & Gall development model with locations on the island of Karimunjawa. The research subjects included pre-service Biology teachers, Biology teachers and students, while the samples were taken from all students of class XII. The data in this study included assessment data from validators, data from preliminary trials and data from field trials which were collected using a product feasibility assessment questionnaire with the help of the Google form. Data analysis was performed using the Rasch Model assisted by the Ministep application. This research resulted in an android-based biology learning media application called "biologiku" which is appropriate, as seen from the data analysis from field trials which showed a raw variance explained by measures value of 35.4% so that it can be said that the developed application met the eligibility criteria. This research is expected to provide real benefits in the world of education as well as being a motivation for the development of media, especially those that integrate science, Islam and technology.

Keywords: biologiku, learning media, integration, science, Islam, technology.

Introduction

Based on research, more than 25% of children worldwide have gadgets before they are even 8 years old (Murdaningsih & Faqih, 2014), especially children over that age. Almost every junior and senior high school student already has his own gadget. The 4.0 era was marked by the rapid development of information technology as a basic need in human life. Causing changes in various human activities, including in the fields of education, arts and social. This era places more emphasis on the Internet of Things or internet-based. This requires adjustments in various fields, including the world of education.

The development of learning activities has shifted from conventional learning in the classroom to virtual internet-based learning via mobile devices, via Android, which everyone already has. Gadgets, smartphones or Android have become an important need, including school-age children, especially at the high school level, who are used to interacting with gadgets or Android. This is coupled with the outbreak of the Covid-19 pandemic which demands non-face-to-face or online learning.

The Pew Research Center's survey of Android usage in Indonesia ranks 24th in countries with the largest number of smartphone users in the world (Taylor, K. & Argento, L. 2019). However, the use of Android, which should support learning activities and support the achievement of educational goals, has not been maximized, even more sad for school-aged children, it is generally more just for playing media or social media.

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Science learning including biology is one of the urgent knowledge to be included in education in Indonesia. Because science is one of the benchmarks for the achievement of a country's education world. Referring to the 2018 PISA results, the average score of Indonesian students is only 389, even though the OECD average score for the sciences is 489. Indonesia is ranked 9th from the bottom or 71st out of 80 countries (The OECD Program for International Student Assessment , 2019). This result needs to be a serious concern for stakeholders in the world of education in Indonesia. There needs to be a development of information technology or an increase in the quality of education, especially in this 4.0 era that we must adapt quickly so we are not getting left behind.

Smartphones or Androids are very likely to become very effective learning media for use in this 4.0 era. The use of Android applications to support learning is a major requirement at this time. With the development of an Android application, it is hoped that it can maximize the use of Android for the community in general, especially for high school-age students. This study aims to produce an android application for biology learning media based on android integrati on of science, Islam and technology that is appropriate to be implemented in high school or equivalent level.

Materials and Methods

Study area

This type of research is research and development (research and development), namely research to produce a product. The resulting product is the android application 'BIOLOGIKU', which is an application for learning biology at the high school level or equivalent that links Islamic, multicultural and science (biology) concepts. This research and development step uses the Borg & Gall development model (Borg, W.R. & Gall, 2003). The reason for choosing this model is based on the systematic and sequential steps and is quite clear in explaining each step.

The location of this research is MA Safinatul Huda 2 Karimunjawa, Jepara, Central Java. Subjects as well as data sources in this study were media validators (experts), material and the Koran, prospective biology teachers, MA Biology teachers and as a sample all students of class XII MA Safinatul Huda 2 Karimunjawa were selected. The data in this study included assessment data from validators, data from preliminary trials and data from field trials.

Figure 1. *The data collection in MA Safinatul Huda 2 Karimunjawa*

Procedures

Ten procedural steps of R & D from the Borg & Gall model (Borg, W.R. & Gall, 2003), adapted and modified into eight steps as follows: 1) Conduct a preliminary study and gather information, 2) Doing research planning and design, 3) Prepare the initial product draft (android application), 4) Conduct preliminary field tests, 5) Perform product revisions, 6) Conducting main field tests, 7) Revise the results of the main field trials, 8) Conduct product dissemination and implementation. The eight steps are the results of modifications that fall into the limitations of the research.

Data analysis

Data collection was carried out using a product feasibility assessment questionnaire sheet with the help of Google form. After trying to use the application developed by the researcher, the respondents were asked to fill out a questionnaire for assessing the feasibility of the product that had been developed. In addition, researchers also collected data from respondents regarding inputs for the application. Data analysis was performed

using the Rasch Model assisted by the Ministep application. The analysis was carried out by looking at the Unidimensionalitas table, which is by looking at the value of the raw variance explained by measures.

Results and Discussion

This development research procedure refers to the ten procedural steps of R & D from the Borg & Gall model (Borg, W.R. & Gall, 2003). The ten steps were then adapted and modified into eight steps as follows: 1) Conduct a preliminary study and gather information, 2) Doing research planning and design, 3) Prepare the initial product draft (android application), 4) Conduct preliminary field tests, 5) Perform product revisions, 6) Conducting main field tests, 7) Revise the results of the main field trials, 8) Conduct product dissemination and implementation. The eight steps are the results of modifications that fall into the limitations of the research, namely related to operational field trial stages, product revisions from operational field trials and dissemination (carried out by exposing research results and distributing android application products to MA teachers and students or equivalent through the play store application). Several stages in this research, namely as follows:

Preliminary Study

The implementation of this preliminary study was carried out by researchers assisted by a team of field assistants with a literature review related to the importance of biology being taught, how the curriculum should be, how biology learning should be in the 4.0 era, and the arguments of the Koran related to biology material. At this stage the researcher carried out an analysis of KI-KD and SMA/MA Biology Material referring to or in accordance with the PERMENDIKBUD attachment No. 37 of 2018 Concerning KI/KD Subjects in the 2013 curriculum (jdih kemdikbud; 2022).

Research Planning and Design

At this stage the researcher was assisted by a team of field assistants to determine KI-KD and SMA/MA Biology Material referring to or in accordance with the attachment to PERMENDIKBUD No. 37 of 2018 Concerning KI/KD Lessons in the 2013 curriculum. At this stage the researcher also determined the verses of the Qor'an that related to the biological material that has been determined. Besides that, the researcher also designed the content of the android application to be developed.

Preparation of the initial product draft

At this stage the researcher is assisted by a team of field assistants to make a draft design and layout for the display of the menu and content in the application to be developed, namely the BIOLOGIKU' application starting from its appearance and content. At this stage the researcher uses the services of an application development consultant, so what is important is how to transfer the researcher's concept of the application to be developed to the application developer consultant. During the production process, researchers also coordinate, check and monitor the progress of making applications.

The appearance of the 'BIOLOGIKU' application is as follows:

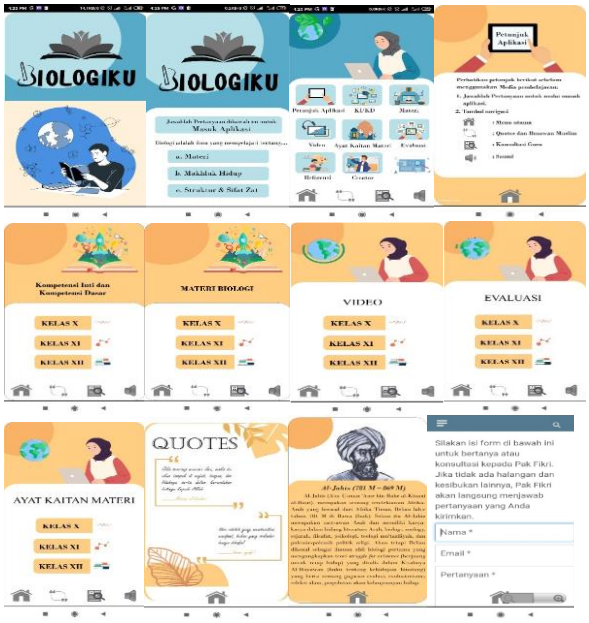

Fig. 1. The appearance of the 'BIOLOGIKU' application.

At this stage after the product has been successfully developed, the next step is for the researcher to carry out a product validation test.

The validation test was carried out with 3 expert validators, namely application validation to media experts, application content validation to material experts and validation related to the suitability or relevance of Al-Quran verses with biological material to Al-Qur'an experts.

Media expert validation was carried out by filling out an assessment questionnaire which was adapted from Edy Priyono's research (Edy Priyono; 2021) consisting of 3 aspects, namely: aspects usability, functionality aspects and visual communication aspects. These three aspects are described in 6 questions. Validation regarding the suitability or relevance of Al-Quran verses with biological material to Al-Qur'an experts. At this stage the Qur'an expert validates the verses of the Koran that are entered into the "BIOLOGIKU" application so that the relevance of the verse to biological material can be known. The results of the validation are in the form of a table of the relevance of the verses of the Qur'an to biological material. Material expert validation was carried out by filling out an assessment questionnaire which was adapted from Edy Priyono's research (Edy Priyono; 2021) consisting of 3 aspects namely; aspects of learning design, aspects of material content and aspects of language and communication. These three aspects are described in 10 statements.

At this stage, the validator provides an assessment and also suggestions regarding product development. Some notes and input for the application are as follows: a) When using sound, it is still lacking, it is recommended to add sound in each menu, b) There are several videos that cannot be played immediately, c) On the multicultural Islamic menu, it would be nice if the writing could be zoomed in so that it could be seen clearly, d) On the menu, ask the teacher and the sound cannot be used, e) There are several parts of the text that are too many and too dense, so it's a bit uncomfortable to read because the text size is small, f) There is little relation to the holy verses, only 1 grade 1 study of the verses of the Qur'an, g) The discussion about multicultural Islam is still lacking in depth.

After receiving notes and input from expert researchers and the team then coordinated to make revisions and improvements, in addition to coordinating with the application developer consultant to revise the applications that had been developed.

Conduct preliminary field tests

Preliminary field trials were carried out on prospective Biology teachers, namely related to the use and content of the application. At this stage the researcher was assisted by a team of field assistants distributing application files (APK) and GForm links for pre-trial questionnaire sheets to prospective Biology teachers (students). After conducting the analysis, it was found that the respondents who received the application/APK file when they were going to install it on their smartphone took a long time to download the application because the size of the application was quite large.

From the respondents of this preliminary field trial, it was found that the application developed was good and innovative. With notes namely: a) Adding a back menu to the menu display in the application and b) Adding sound to the application.

Perform product revisions

After receiving notes and input from the respondents, the researchers and the team then coordinated to make revisions and improvements, in addition to coordinating with the application developer consultant to revise the applications that had been developed. The revisions made were minor revisions, namely related to the notes from the respondents of the preliminary trial.

Conducting main field tests

At this stage the researcher was assisted by a team of field assistants distributing application files (APK) and GForm links for the main field trial questionnaire sheets to MA Biology teachers and all class XII students of MA Safinatul Huda 2 Karimunjawa, Jepara district. The following are the results of the main field trials that have been analyzed using the Rasch model.

Table 1. Unidimensionalitas

Table of STANDARDIZED RESIDUAL variance (in Eigenvalue units)

	-- Empirical --			Modeled
Total raw variance in observations =	7.7	100.0%		100.0%
Raw variance explained by measures =	2.7	35.4%		37.0%
Raw variance explained by persons =	1.5	19.0%		19.8%
Raw Variance explained by items =	1.3	16.5%		17.2%
Raw unexplained variance (total) =	5.0	64.6%	100.0%	63.0%
Unexplned variance in 1st contrast =	1.7	22.5%	34.9%	
Unexplned variance in 2nd contrast =	1.4	18.2%	28.2%	
Unexplned variance in 3rd contrast =	1.1	14.2%	22.1%	
Unexplned variance in 4th contrast =	.7	9.5%	14.7%	
Unexplned variance in 5th contrast =	.0	.0%	.0%	

From the table above it is known that the raw variance explained by measures is 35.4%.

Table 2. *Raw variance explained by measures criteria*

Score	Description
<20%	Not fulfilled
>20%	Can be fulfilled
>40%	Better
>60%	Special

Based on the table of raw variance explained by measures criteria above, it can be seen that the value of raw variance explained by measures of 35.4% indicates that the meaning can be fulfilled, meaning that the eligibility requirements of the developed media can be fulfilled. (Suminto, B., & Widhiarso, W: 2014).

Revise the results of the main field trials

After receiving notes and input from the respondents, the researchers and the team then coordinated to make revisions and improvements, in addition to coordinating with the application developer consultant to revise the applications that had been developed. The revisions made are minor revisions related to the appearance of the application so that it is more attractive and easy to operate.

Conducting Product Dissemination and Implementation

Temporary dissemination is carried out by exposing research results and distributing android application products and publication in the form of articles. For widespread implementation in the future, this application will be submitted to the Play Store so that it can be used and utilized by all SMA/MA teachers and students.

Conclusions

This research has produced an android application 'BIOLOGIKU' which is appropriate for high school students or the equivalent. Stage by stage has been running on the track, referring to the predetermined research stages, namely the ten procedural steps of R & D from the Borg & Gall model (Borg, W.R. & Gall, 2003).

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