BIO-INOVED : Jurnal Biologi-Inovasi Pendidikan
Volume 2, Issue 2, October 2020 page. 117-122
https://ppjp.ulm.ac.id/journal/index.php/bino

OPEN ACCESS JOURNAL
P-ISSN : 2684-9062 | E-ISSN : 2714-9803
DOI: 10.20527/bino.v2i2.8756

The Practicality of Teaching Material Biology of Islamic-Science based on Augmented Reality

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Article Information

Keyword:
Teaching material
Islamic-science
Augmented Reality
Practicality

Kata Kunci:
Bahan ajar
Islam-sains
Augmented Reality
Kepraktisan

History:
Received : 11/07/2020
Accepted : 11/10/2020
Published : 11/10/2020

Abstract

The results of the observation of biology learning in MAN 1 Banjarmasin are not familiar with using the teaching materials based on interactive technology. The development of teaching materials based on Augmented Reality Media can be a solution to solve these problems. This study aims to determine the practicality of biology teaching materials based on Islamic-science using Augmented Reality media. The design of this study uses the Borg and Gall models that have been approved to perfection of limited trial evaluation. The results showed that the teaching material developed was very practical to be used in supporting biology lessons in the Arthropods sub material.

Abstrak

Hasil observasi pembelajaran biologi di MAN 1 Banjarmasin belum familiar menggunakan bahan ajar berbasis teknologi interaktif. Pengembangan bahan ajar berbasis media *Augmented Reality* dapat menjadi salah satu solusi untuk menyelesaikan permasalahan tersebut. Penelitian ini bertujuan untuk mengetahui kepraktisan bahan ajar biologi berbasis islam-sains menggunakan media *Augmented Reality*. Desain penelitian ini menggunakan model Borg and Gall yang telah dimodifikasi yaitu sampai pada tahap penyempurnaan evaluasi dari uji coba terbatas. Hasil penelitian menunjukkan bahwa bahan ajar yang dikembangkan sangat praktis digunakan dalam menunjang mata pelajaran biologi pada sub materi Arthropoda.

How to cite: Destiara, M. (2020). The Practicality of Teaching Material Biology of Islamic-Science based on Augmented Reality. *BIO-INOVED : Jurnal Biologi-Inovasi Pendidikan, 2*(2), 117-122.

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A. Introduction

Learning biology in schools basically requires supporting facilities and infrastructure in the implementation of learning. One of the supporting facilities and infrastructure is printed textbooks in the form of teaching materials. According to Nasution (2011), teaching materials are textbooks that can be centered on students to be able to learn independently or alone to achieve learning goals. Furthermore, Mulyasa (2006) states that teaching materials are independent learning materials in the form of a series of learning experiences planned and designed sequentially to help students achieve learning objectives.

Based on the results of observations in MAN 1 Banjarmasin, that is obtained that the teacher in the Biology learning process had not personally used teaching materials, but in the learning process, the teacher only used textbooks and student worksheets. The textbook and worksheets do not yet contain the relationship between the material and the verses of the Koran. Also, based on the results of the analysis of several books sold in markets, several criteria were not following the module writing format, including there were no instructions for using teaching materials for both teachers and students, there was no clear picture, yet There are perceptions related to learning, and there are no conclusions or summaries and glossaries in the teaching materials.

So it requires a high level of understanding for MA or SMA level students to understand the module. Besides, the existing teaching materials do not relate Biology learning materials to the teachings and values of Islam. Shihab (2007) states that one of the sources of learning that can be compiled into a teaching material are the verses of Allah in the form of the Qur'an and the Word of the Prophet Muhammad SAW in the form of hadith, both are sources of learning in which are messages, events, facts, and events. A phenomenon that occurs in the field, in the subject of Biology to make the module does not relate to the verses of the Qur'an as a source of teaching materials delivered to students

Besides, package books and worksheets have not shown the existence of Islamic studies that link with the study of Science/Biology. In the books held by students of biology subjects, especially in the sub-material Arthropod, so far no book relates the material to the verses of the Qur'an. If we study further, there are many verses of the Qur'an that explain the living beings, especially the species in the sub-material Arthropod. As in Surah An-Naml tells about ants, surah An-Nahl tells about bees and surah Al-Ankabut tells about spiders.

In line with the Islamic-Science-based teaching materials, there is also a need for media assistance to bridge students' understanding of the material presented, so that students can easily understand the learning material independently. According to Sadjati's (2000) opinion that the function of teaching materials can be active learners so that teachers are more directed to act as student facilitators. Related to biology material which is considered difficult for students because all the names of animal species are difficult to distinguish because they are in Latin designations. One of them is in the Arthropod material which has various types of species as well as types of species that are so dangerous, for example, such as Heterometrus spinifex (Scorpions), Sentipeda (Centipede), Hymenoptera (Bees), and many other types of Arthropod species which are quite dangerous if you do direct observation. Whereas biology material is material that requires observation and observation, especially if the teaching used is independent teaching material. Therefore, this teaching material presents a media form based on Augmented Reality (AR), which is a media that can visualize 2D into 3D with the help of a smartphone. According to Azuma (1997), Augmented Reality is a technology that can combine two-dimensional or three-dimensional virtual objects into a three-dimensional real circle and then project these virtual objects in real-time.

Following previous literature studies, research on the development of Islamic-Science-based teaching materials has been conducted by Kamilah (2014), Vert & Vasiu (2015), and Arimadona (2016). The research was conducted to produce science-based biology learning materials, as well as to determine the quality of the teaching materials to be developed. However, the teaching materials developed were not supported by the media as the researchers wanted to develop. Based on the description above, the researchers are interested in conducting research entitled Development of Islamic-Based Biology Teaching Materials-Science Assisted by Augmented Reality Media.

B. Material and Method

The type of research used is research and development (R & D). The model used is Borg & Gall which consists of 10 steps, but modification is made into seven steps, namely (1) potential and problems, (2) data collection, (3) product design, (4) product validation, (5) product revision, according to the suggested validation results. (6) limited trials, carried out using instruments in the form of student response questionnaires in the form

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of perceptions of the teaching materials developed, carried out to 20 students (7) Evaluation stage of revision of product improvement results from limited trials.

Student readability test data were analyzed based on the following steps:

1) Calculate the score using the formula:

$$\text{Validation Score} \frac{\text{The total score obtained}}{\text{The total score Validation}} \text{X } 100\%$$

2) After the score is calculated, it is measured based on the following categories (Table 1).

Table 1 Student Readability Assessment Category

Score	Category
85-100%	Very good
70 - < 85%	Good
60 - < 70%	Quite Good
50 - < 60%	Less Good
< 50%	Not Good

Source: Sugiyono (2010)

3) After the readability test was carried out a feasibility test was carried out by giving a questionnaire to the students. The aim was to carry out a small-scale test, namely to determine the practicality of the teaching material. Limited trial results data is included in a perception questionnaire with a yes or no assessment. The aim is to determine the response of students' perceptions of the teaching materials developed.

Table 2 Scale Guttman's

Response	Score
Yes (Y)	1
No (N)	0

4) Calculation of the percentage of data obtained by the formula:

$$\text{Kepraktisan (\%)} \frac{\text{Jumlah skor tiap pernyataan}}{\text{Jumlah responden}} \text{ x } 100\%$$

5) Analysis of the student response questionnaire with the score interpretation criteria listed in Table 3.

Table 3 Criteria Score

Presentase (%)	Category
0-20	Not Practice
21-40	Less Practice
41-60	Average Practice
61-80	Practice
81-100	Very Practice

Furthermore, the student response questionnaire data analysis was processed in a descriptive quantitative way, namely the assessment by percentage. The calculation of student response data is calculated based on the calculation of the Guttman scale score. Furthermore, the analysis of the student response questionnaire data is processed descriptively quantitatively, namely the assessment by the percentage. The calculation of student response data is calculated based on the calculation of the Guttman scale score.

C. Results and Discussions

The results of product development are in the form of Islamic-science-based teaching materials with the help of Augmented Reality applications. Teaching materials are prepared based on several literary textbooks and biology books related to Arthropod material.

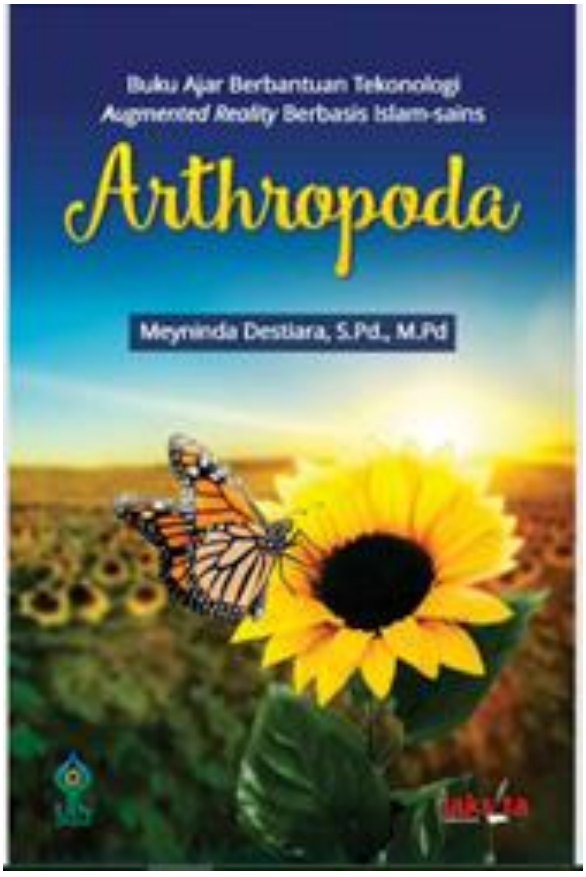

Figure 1 Cover the book

Then the arthropod material is integrated with verses, hadiths, and Islamic stories concerning the subject matter, namely arthropods. Furthermore, at the observation stage in the LKS (student worksheet) section, students are assisted to make observations with media that can be installed on smartphone applications, namely assisted by

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Augmented Reality technology or known as AR. So that this teaching material makes biology learning easier, where the material is related to nature.

PENDAHULUAN

Figure 2 Verses and Hadiths sccociated with the material

The teaching material is then validated and compiled based on an assessment of several references and syllabus, with the format adjusting to the guidebook for the development of teaching materials, namely the teaching material consisting of 3 chapters, including the first part of the introduction, the second presentation, and the third closing (Prastowo, 2014).

One of the objectives of this teaching material is to help students and teachers learn Arthropod material because, in arthropod material, students are required to carry out direct observation and make reports according to Competency Standards and Basic Competencies. Whereas in this material, the observed animals are animals that have a sting or poison, so that direct observation is feared to endanger students.

Therefore, researchers present teaching materials assisted by AR media, in which this media can display real objects according to the original. According to Azuma (1997), Augmented Reality is a technology that can combine two-dimensional or three-dimensional virtual objects into a three-dimensional real circle and then project these virtual objects in real-time. And according to Haryani & Triyono (2017) that delivering information with AR can visualize objects in the 3-dimensional form so that AR has the advantage of being interactive and real-time.

Figure 3 Augmented Reality technology-assisted worksheets

Figure 4
Display of Augmented Reality Applications during observation

The picture above is a supporting medium of teaching materials, namely the Augmented Reality application, its function is to help at the time of observation on the LKS section. The trick is to scan

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the barcode that is already available on the LKS, but previously the Augmented Reality application must be installed first.

According to Martono (2011), the implementation of Augmented Reality technology has developed rapidly, several applications that have implemented this augmented reality technology are in the fields of military, health, education, and the industrial world. Besides, Augmented Reality is also widely used as a learning medium in the education sector, as according to Destiara & Hermawan (2020) that Augmented Reality can help visualize objects when making biological observations.

Following this opinion, researchers are interested in developing Augmented Reality media as a learning medium on the concept of invertebrates, therefore with the help of AR media, it can help observations without bringing the original species because AR can display results that look like the real thing.

As an early-stage development, teaching materials are still in the form of drafts which must go through the expert test or validation stage to assess the feasibility of teaching materials. The teaching materials developed are then carried out by validation tests or expert tests, namely, validation carried out by experts (supervisors and experts), as well as being seen from the readability test of teaching materials by students. This activity was carried out aimed at reviewing the initial product in the form of draft teaching materials and providing input for improvement. According to Arifin & Anwar (2015), the product being developed must be consulted first with an expert validator to find out the appropriateness of the teaching material when used as teaching material. Based on Depdiknas (2008) product validation aims to obtain recognition or validation of product conformity with needs so that it is appropriate and suitable for use in learning.

After going through the validation stage by some of the experts above with various inputs and suggestions, then the teaching material was subjected to a legibility trial, by conducting trials in 2 schools with different backgrounds, namely SMA and MA. Each of these stages involved 3 students from both schools. Following are the results of the readability test validation assessment as follows Table 4.

Table 4 The Result of the Readability test by Students

Student Response	Score	Total score	Precentage
SS	91	180	87,64 %
S	89		
KS	0		
TS	0		

Note:
Very Agree (SS), Agree (S), Less Agree (KS), Not Agree (TS)

Based on the results of the student readability test in table 4 above, most of the students stated that the teaching materials were good enough to use both in terms of material, Islamic-science, presentation, independent learning, learning motivation, and supporting applications. Therefore it is necessary to have a small revision of teaching materials according to input from students.

Table 5 The Result of Student Responses Questionnaire

No.	Statement	Result	
		Yes	No
1.	Are you interested in the appearance that this teaching material has?	100%	0%
2.	Are you interested in the design (covers, writing, illustrations, pictures, prints, paper quality) of this teaching materia?	100%	0%
3.	Does the design of this teaching material motivate you to study the material further?	90%	10%
4.	Does this teaching material help you in understanding arthropod material?	100%	0%
5.	Apakah media pendukung (Augmented Reality) this teaching material helps you to make observations?	90%	10%
6.	Are you having trouble installing and using the supporting media in this teaching material?	15%	85%
7.	Is the language of the teaching material clear and does not cause multiple interpretations?	85%	15%
8.	Do picture illustrations on teaching materials help you understand the material?	100%	0%
9.	Can you easily understand the verses, hadiths, and Islamic stories in the teaching materials?	100%	0%
10.	Does this teaching material add to your insight into the concept of arthropods in Islam (the Koran and hadith)?	100%	0%
The average percentage of total answers Yes		8,8%	

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According to Rohmawati, *et al*. (2012) that the benefit of the readability test is to get an assessment from students so that the validated material needs to be refined according to input and suggestions by students so that it will be relevant and maximally according to the needs of students as prospective users.

After the legibility test, the next stage is a limited scale trial. Limited testing is carried out in SMA and MA with 10 students each. The selection of students is done randomly by the biology subject teacher.

The limited scale trial was carried out, the aim was to find out how practical the teaching materials were. The questionnaire presented is a statement that is answered yes or no using the Guttman scale criteria. Without suggestions and input, in this trial, the researcher found a shortage in the use of media and teaching materials for further revisions or correcting these deficiencies. According to the 2008 Ministry of National Education guidebook, revision or improvement is a process of refining modules after obtaining input from validation activities, namely aimed at finalizing or comprehensively refining products, so that products match the input obtained from validation activities.

Following are the results of student responses to teaching materials (Table 5). The teaching above shows that almost all students feel interested in the teaching material. They are more enthusiastic about doing practicum when they see real objects, this can be seen from the assessment of the presentation table above with a value of 100% in the motivating section. However, at the time of installing the application, some students were still constrained by signal, cellphone devices that were still not supported and were not yet available in the Playstore or App Store. So that it becomes a suggestion for further research by developing the application to the stage of downloading the application into the Playstore so that all users can enjoy it easily.

D. Conclusion

Based on the results of the study, it can be concluded that the development of Islamic-science-based biology teaching materials assisted by Augmented Reality media is feasible to be seen from the readability trial with an average value of 8.8% with very good readability criteria and the teaching material is considered practical seen from some student responses, although some students find it difficult to install the application because the application has not been published on the Android Playstore.

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