



DEVELOPMENT OF BIOLOGY E-BOOK TEACHING MATERIALS BASED ON LOCAL POTENTIAL IN ASAHAN DISTRICT ON ECOSYSTEM MATERIALS FOR CLASS X SMA/MA STUDENTS AT SMA NEGERI 1 PULAU RAKYAT

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Abstract

The learning process will run smoothly and effectively if it is supported by infrastructure. One of the infrastructure that can support the learning process is the availability of teaching materials. One of the teaching materials that can be applied is electronic teaching materials (e-books). The purpose of this study was to determine the development of e-book teaching materials based on local potential in Asahan Regency on ecosystem material for class X students at the senior high school level which is valid, practical, and effective. This research is a research and development model of ADDIE. The research trials were carried out on a large scale. The validity of the E-Book is measured using a validation sheet. The validity of the E-Book material that has been developed is 74% categorized as valid, the validity of the media is 88% categorized as very valid, and language validity of 84% which is categorized as very valid. The practicality of the E-Book was measured using field practitioner validation sheets and student response questionnaires. Based on the validation of field practitioners, the practicality percentage of the E-Book is 96%, which is categorized as very practical, and the student response questionnaire is 94%, which is categorized as very practical. The effectiveness of the E-Book is measured by the normalized gain test. The N-Gain score is 0.7 which is categorized as effective because The effectiveness of the E-Book is measured by the normalized gain test. The N-Gain score is 0.7 which is categorized as effective because The effectiveness of the E-Book is measured by the normalized gain test. The N-Gain score is 0.7 which is categorized as effective because $N\text{-gain} > 0.7$.

Keywords: *Research and Development, Biology E-Book, Ecosystem, Local Potential.*

Introduction

Teaching materials are a set of materials that are arranged systematically, both written and unwritten so as to create an environment or atmosphere that allows students to learn. Educators are asked to be able to creatively plan a teaching material that allows students to easily understand the material and can be used appropriately as an available learning resource to make it meaningful. The learning process is inseparable from the use of learning media. The teaching and learning process will run effectively if it is supported by the availability of supporting media. The provision of media and educational methodologies that are dynamic, conducive, is indispensable for optimally developing the potential of students. This is because the potential of students will be more stimulated if assisted by a number of media or facilities and infrastructure that support the interaction process that is being carried out. (Gd Tuning Somara Putra, et al. 2013).

One of the learning media that implements the development of technology and communication with user interaction that is currently being developed is a digital book, also known as an e-book. A digital book, also known as an e-book, is a publication that consists of



text, images or sound and is published in digital form that can be read on a computer or other electronic device such as an Android or tablet. E-books or electronic books (or also digital books) are an evolution of the printed books that we usually read everyday. (Dwi Mentari, et al. 2018). Law No. 20 of 2013 concerning the "National Education System" which states that, curriculum development is carried out by referring to national education standards and curricula at all levels and types of education that are developed with the principle of correcting in accordance with an education, regional potential and students so that the development of the learning process in schools needs to refer to local potential in the area. The local potential in question is events, events, problems or phenomena found in the environment where students come from. The use of local potential in learning can be packaged into teaching materials such as e-books. (Dytta Lyawati Prabowo, et al. 2016)

Learning ecosystem biology material that is linked to the local potential of Asahan Regency, is useful for making local wisdom known in the world of education that utilizes the environment or local areas as a source of learning. The 2013 curriculum provides opportunities to add to the repertoire of learning resources from local natural phenomena with the help of effective learning media technology. In this case it is in accordance with the 2013 curriculum which requires effective, student-centered learning (student center). (Tien Aminatum, Et. Al. 2016)

Research methods

This research uses research and development (Research and Development). Research and development is a research method used to produce certain products, and test the effectiveness of these products. This study uses the ADDIE model. This development model has five stages, namely: Analysis, Design, Development, Implementation, and Evaluation (ADDIE). The product developed in this research is an E-Book based on local potential of Asahan Regency on ecosystem material. Data collection techniques were carried out by interviews, validation sheets and questionnaires.

Results and Discussion

The aim of the researchers in developing this research and development product is to produce a biology e-book based on local potential on ecosystem material in a more interesting, easy, useful and effective way as a learning resource. Relevant research regarding the use of local potential has been carried out by other researchers before. Relevant research on local potential, among others carried out by Zakaria, et al, shows that modules based on local potential can be used as a solution so that students are able to know local potential. (Zakaria Sandy Pamungkas, et al). The model used is the ADDIE model research and development method which consists of 5 steps. The following five steps were developed in developing teaching materials, namely Analysis, Design, Development, Implementation, and Evaluation (ADDIE). This statement is similar to research conducted by Arif Budi Utomo, et al in 2018.

The material in this e-book will be presented in 3 sub-materials, namely the scope of ecosystem components, life organization and interaction patterns, and types of ecosystems. After knowing the character of the e-book to be developed, then the type of data to be obtained can be in the form of quantitative data as well as qualitative data. This statement is similar to the research conducted by Putri Utami Wulandari Agustin, et al in 2018. In agreement with the research conducted by Fitri Wijarini and Zulfadi in 2018 it is said that the data analysis technique used to process data is descriptive qualitative and descriptive quantitative analysis. This data analysis is used to process the validation data. Data analysis is used as a reference for product revision or improvement.

The resulting product is a biology e-book based on the local potential of Asahan Regency which can be used by educators as learning materials. The instruments used in this study were



material expert validation sheets, media expert validation sheets, linguist validation sheets, field practitioner validation sheets, student response questionnaires, and pretest and posttest questions in the form of multiple choice questions. Steps to research and develop learning materials in the form of e-book biology based on local potential on ecosystem material.

1. Analysis

This research originated from observations made in one of the schools in Asahan District, Pulau Rakyat District, namely SMA Negeri 1 Pulau Rakyat. From observations made by interviewing biology educators, it was found that learning at the school did not yet have many references to learning materials, had never used local potential-based biology e-books, which were often used during the learning process, namely in the form of textbooks.

2. Product Design

The design stage is carried out to facilitate the product development process. Preliminary design by determining e-book covers, e-book backgrounds, and ecosystem materials related to local potential in Aek Songsongan District. This e-book uses A4 paper size, 1.5 spacing, 12pt font, and Times Newroman typeface. *E-books* in its manufacture using the main program Microsoft Word 2007. After the product has been designed, the next step is to convert the Microsoft Word file into a pdf file so that it can be integrated into a flipbook using online Flipbook Maker. To be able to open e-books created using Flipbook Maker, you can run them directly from a PC or laptop or smartphone without having to have the Flipbook Maker application, because the final form of creating an e-book is in the form of an executable file (Exe file).

3. Development

The researcher validated the experts in charge of assessing local potential-based biology e-books on the ecosystem material that had been made. The criteria for determining expert subjects are:

- a) Specialist in the field
- b) Experienced in the field
- c) S2 education or currently pursuing Masters education

After determining the validator criteria, the researcher makes a decision about how many expert validators will be assessors in the product developed by the researcher.

a. Validation by Media Experts

Table 1.1 Media Expert Test Results

Aspect	Number of Each Aspect	Max Score	Percentage	Criteria
E-book Cover Design	21	25	84%	sl
E-book Content Design	41	50	91%	sl
Amount		62		
Max Score		75		
Percentage		82.66%		



Criteria	sl
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Based on Table 4.1, the results of calculations that have been put forward by media experts can be explained that out of a total of 62, the maximum score is 75, the percentage is 82.66% so that it can be stated with the SL criteria (Very Eligible). There are 2 aspects assessed by media experts, namely the first aspect regarding the cover design of the e-book with the SL (Very Eligible) criteria in the percentage of 84%, the second aspect, namely the e-book content design, the percentage can be seen at 91% which is stated with the SL (Very Eligible) criteria.).

b. Material Expert Validation

Table 1.2 Material Expert Test Results

Aspect	Number of Each Aspect	Max Score	Percentage	Criteria
Content Eligibility Aspects	41	55	74.54%	L
Amount		41		
Max Score		55		
Percentage		74.54%		
Criteria		L		

Based on the product material test data above, there is a result with a percentage of 74.54%, and is stated in the L criteria (Eligible). Thus, the total feasibility score of the content of the material is expressed in criteria L.

c. Linguist Validation

Table 1.3 Language Expert Test Results

Aspect	Number of Each Aspect	Max Score	Percentage	Criteria
straightforward	17	20	85%	sl
Communicative	8	10	80%	sl
Dialogic and Interactive	5	5	100%	sl
Appropriate Development of Learners	8	10	80%	sl
Compatibility with Language Rules	8	10	80%	sl
Amount		46		
Max Score		55		
Percentage		83.63%		
Criteria		sl		

Judging from the calculation data of the linguists above, it can be seen that the total number is 46, with a maximum score of 55, and a percentage of 83.63% so that it can be stated



in the SL criteria (Very Eligible). There are 5 aspects in the assessment of linguists, the first aspect is straightforward with SL criteria in a percentage of 85%, the second aspect is communicative with a percentage of 80% SL criteria, the third aspect is dialogic and interactive, the percentage is 100% SL criteria, the fourth aspect is the percentage of suitability of student development can be seen, namely 80% of the SL criteria, and the last aspect, namely conformity with language rules, the percentage can be seen of 80% with SL criteria.

d. Field Practitioner Validation

Table 1.4 Field Practitioner Validation Results

Aspect	Number of Each Aspect	Max Score	Percentage	Criteria
Writing	5	5	100%	sl
Material Truth and Concepts	30	30	100%	sl
Depth and Breadth of Material	5	5	100%	sl
Language and Clarity	14	15	93.33%	sl
Attractiveness	18	20	90%	sl
Amount		72		
Max Score		75		
Percentage		96%		
Criteria		sl		

Based on data calculated by biology educators, it can be seen that the total number is 72, with a maximum score of 75, and a percentage of 96%, so that it can be stated in the SL criteria. There are 5 aspects in assessing the response of biology educators, the first aspect is writing with a percentage of 100% of the SL criteria, the second aspect is the correctness of the material and concepts, a percentage of 100% of the SL criteria is obtained, the third aspect is the depth and breadth of the material, the percentage of which is 100% is stated in the SL criteria, the aspect the fourth, namely language and clarity, is known to have a percentage of 93.33% of the SL criteria, and the last aspect, namely the aspect of attractiveness, has a percentage of 90% and is stated in the SL criteria.

4. Implementation Stage

Products that have been finalized and revised according to suggestions from the media expert validator, material expert validator, linguist validator, and made improvements to the e-book so that the final product is obtained. This e-book was also validated by a biology teacher at SMA Negeri 1 Pulau Rakyat, then the product could be tested on students. The trial was carried out using a large scale consisting of 36 students. In carrying out the trial, the e-book was displayed during product introduction in the zoom meeting room and the e-book data was given to students, then students could open it via their respective laptops or smartphones to operate directly at home.



5. Evaluation Stage

The evaluation stage is the final stage of development and is the stage for improving the resulting product. The evaluation of the media expert validator, material expert validator, and linguist validator is an indicator for improving e-books on local potential-based ecosystem material as learning media in class X SMA Negeri 1 Pulau Rakyat at the development stage. Teacher assessments and product trials in broad groups were carried out with the aim of seeing the practicality and benefits of the e-books developed through the responses of teachers and students.

Based on the validation process and followed by product trials that have been carried out, e-book learning media on ecosystem material based on local potential of Asahan Regency is declared suitable for use as learning media to help students understand ecosystem material. Furthermore, to test the effectiveness of the product, a normalized gain test was carried out, the average result of the normalized gain test was 0.7. Based on the normalized gain criteria, it can be concluded that the results of the normalized gain score are in the "Effective" category, namely $N\text{-gain} > 0.7$. In this case the biology e-book based on local potential on ecosystem material that the researchers developed received a positive response from students as users including: 1) e-book biology based on local potential is very interesting to use and can provide direct experience to students, 2) students think that biology e-books based on local potential can add insight into the potential of the area they have, as well as e-books based on local potential can increase independence in the learning process, 3) e-book biology based on local potential is effectively used as teaching material.

Conclusion

Based on data from the results of research and discussion in this study, it can be concluded that the validity of the e-book biology media based on local potential that has been developed is 88.57% which is categorized as "Very Eligible", the validity of the e-book material that has been developed is 74.54% which is categorized as "Decent", as well as the validity of the e-book language that has been developed by 84% which is categorized as "Very Eligible". categorized as "Very Practical", then the validity of e-book field practitioners that had been developed was 96% which was categorized as "Very Practical", and the effectiveness test of e-book biology based on local potential of Asahan Regency on ecosystem material was measured by the normalized gain test. The N-Gain score is 0.7 which is categorized as "Effective" because $N\text{-gain} > 0.7$.



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