Development of Android-Based E-books Using Sigil 0.9.13 in Animal Ecology Courses for Biology Students

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Abstract: The purpose of this research is to produce an android based ebook in Animal Ecology courses that is valid, practical and effective. This research is research and development using the Plomp model. The results of the validation assessment by the validator of the android-based e-book in the Animal Ecology course showed an average value of 82.33% (very valid). The results of the practicality assessment by lecturers of the Animal Ecology course showed an average value of 81.5% (very practical) and student assessment results obtained an average value of 91.64% (very practical). The results of the effectiveness test of Android-based e-books show that Android-based e-books are very effective. Thus, it can be concluded that the developed Android-based e-book is very valid, very practical, and very effective.

Keywords: Android-based E-book; Animal Ecology; Teaching Materials

Introduction

The way that can be taken by a country in order to survive in global competition is by improving the quality of human resources such as education. The use of online technology is one of the innovations in the learning process. In accordance with the opinion of Oktaviana & Prihatin, (2018) with the rapid development of science and technology, we get the positive impacts is the use of gadgets in learning as a tool in the learning process. Zheng et al. (2015) stated that the current rapid development of science and technology. One of the science and technology products used by students and students is gadgets.

The selection of strategies and teaching materials must adapt to the conditions of the times such as the digital age which is full of current technological developments. Cahyana (2018) states that the use of technology is an effort to create a meaningful learning process and improve the quality of student learning outcomes. Utilization of these devices can be used as

teaching materials in the form of electronic books, abbreviated as E-books. Ohene-Djan & Fernandes (2003) defines an interactive android-based e-book containing a network of digital information units consisting of text, graphics, video, animation and questions, all of which are packaged in Sigil animated visualizations combined in one program and equipped with different colors. interesting.

Android-based e-book teaching materials are expected to be able to increase student interest and motivation in a better learning process (Wijaya & Sinatra, 2017). This is reinforced by the opinion of Sakat et al. (2012) that android-based e-books in the learning process are very effective and can be implemented in the world of education. One of the alternative electronic teaching materials used in Animal Ecology courses is one of them by using teaching materials in the form of android-based e-books. Seeing that Android-based teaching materials are still very limited and still very minimal, this is a problem that results in low student interest so that learning outcomes do not reach

predetermined demands. Putrawansyah & Sardianto (2016) explained that the use of Android-based E-books has effectiveness in improving learning outcomes.

The purpose of this research is to produce an android-based ebook in Animal Ecology courses that is valid, practical and effective. Based on these problems, the researcher wants to provide the role or contribution of existing problemsolving solutions by conducting research on the development of android-based e-books Using Sigil in Animal Ecology Courses for Biology Students, Padang State University.

Method

This type of research is development research which aims to produce an android-based e-book using Sigil in the Animal Ecology Course for Biology Students, Padang State University which is valid, practical and effective. This study uses the Plomp development model. The development stage of this model begins with the initial investigation stage, at this stage an analysis of problems and needs, syllabus analysis, and concept analysis is carried out. Next is the development or prototyping stage, at this stage an Android-based e-book is designed using Sigil and validation is carried out by experts, namely 2 lecturers. Then the final stage is the assessment, at this stage trials are carried out in large groups against one class to see the practicality and effectiveness of the prototype. The practicality test was carried out by filling out a practicality response questionnaire by lecturers and students on the use of an Android-based e-book using Sigil in the Animal Ecology Course.

The subjects in this study were Science class A and Science class B. The design of this study was a posttest only group design (Moazami et al., 2014), the researcher used a group of research subjects from a certain population, then randomly grouped them into two groups or classes, namely the experimental class and the control class. The experimental class was given treatment (treatment) and the control class was without treatment, then both classes were subjected to the same test (posttest).

The instruments in this development research were at the initial investigation stage in the form of interview sheets with teachers, problem and need questionnaire sheets for teachers and students. At the development or prototyping stage, there are self-evaluation sheets, Interactive Multimedia validity test sheets, and one-onone evaluation questionnaire sheets. At the assessment stage, there are practicality test sheets, cognitive, affective and psychomotor aspects assessment sheets.

The data analysis technique in this study is to analyze the feasibility of android-based e-books on the validity test and practicality test in the form of a modified Likert scale. The effectiveness test was carried out using the normality test, homogeneity test and hypothesis testing with the t test for evaluating cognitive aspects and hypothesis testing with the U test for evaluating affective and psychomotor aspects.

This research method uses quantitative and qualitative methods). Collecting data by conducting initial investigation instruments in the form of interviews and giving questionnaires to lecturers and giving questionnaires to students. Prototyping instruments in the form of self-evaluation and validation by experts. The assessment instrument is the practicality of androidbased e-books for lecturers and students, as well as an android-based e-book effectiveness instrument.

Result and Discussion

Preliminary investigative stage
Problem Analysis

The results of the problem analysis are that the teaching materials used during the learning process are in the form of PPT, journals, books, and browsing from the internet, but some of these teaching materials have not been able to visualize and make students less understanding of the learning material, as well as students' low interest in Animal Ecology lectures. The reason is because of the difficulty of students in understanding the basic concepts of the material.

In addition, gadget communication tools have not been utilized optimally because students spend more time just playing gadgets which results in reduced reading power and their time to study. Electronic teaching materials for students are not widely available and minimally available, while students are less interested in using journals and other teaching materials in learning animal ecology.

Needs Analysis

Analysis of students' needs for Android-based ebooks obtained data that 95% of students agreed that there was learning using Android-based e-books and students also stated that the Android-based e-books consisted of material, images, and videos. Yusra. et al. (2021), on the application of inquiry-based learning modules, it can be concluded that the application of inquiry-based learning modules can improve science process skills in aquatic ecology courses.

Syllabus Analysis

The results of the analysis of the syllabus that has been carried out obtained the subject matter to be studied so that it is in accordance with the final ability goals planned for students.

Concept Analysis

Concept analysis found that the concepts presented in the Android-based e-book have been systematically arranged to be used as a reference in the development of Android-based e-books so that students can easily understand concepts when reading Android-based ebooks.

Development or Prototype Making Stage
Development of Prototype I

The design for the development of Prototype I starts with designing an Android-based e-book storyboard. After that, it is continued by designing a systematic presentation of the material and the learning objectives to be achieved which are divided into several sub-topics. Android-based e-book products are created using the Sigil application program.

Development of Prototype II

Prototype II was obtained after prototype I had been revised, then the expert validation stage (expert review) was carried out by two validators.

Didactic aspect

The android-based e-book was declared very valid by the validator in the Animal Ecology Course with an average value of 97.5% in a very valid category. Afriadi and Razak (2019) state that validity shows suitability, meaningfulness and usability as well as conclusions made.

Construct Aspect

The construct aspect of the Android-based e-book is declared valid by the validator with an average value of 95%. The description of the material presented is considered to be communicative, effective, and efficient.

This means that the developed android-based e-book is in accordance with good and correct Indonesian Spelling. In line with the opinion of Batubara et al. (2022)stating that android-based e-books adapted to the correct Indonesian language rules will be easily understood by students.

Technical Aspect

The technical aspects of the Android-based e-book were declared very valid by the validator with an average value of 94.64%. The presentation of images in an Android-based e-book has dimensions and explanations that can be read clearly and according to the concepts discussed. With easy-to-read writing and an attractive design, Android-based e-books can be delivered quickly and easily remembered by students, as well as fostering student interest and learning outcomes.

Table 1. Results of Testing the Validity of Android Based E-Books

Assessment Aspects	Average (%)	Criteria
Easy of Use	97.5	Very Valid
Learning Time	95	Very Valid
Efficiency	94.64	Very Valid
Benefit	287.14	Very Valid
Total Average	95.71	

Development of Protype III

The next step is to carry out a practicality test by a small group. At this stage a test was conducted on 6 (six) students with different levels of ability (high, medium, and low). Practicality can be seen from the implementation time which should be short, fast and precise.

Table 2. Average Results of Interactive Multimedia Practicality Test Analysis in Small Groups (Small Group)

Assessment Aspects	Average (%)	Criteria
Easy of Use	97.5	Very Practical
Learning Time	95.00	Very Practical
Efficiency	94.64	Very Practical
Benefit	287.14	Very Practical
Average	95.71	Very Practical

Development of Protype IV

The product on prototype IV is the same as prototype III, because there were no revisions at the practicality test stage (small group) and the practicality test results showed that the android-based e-book was very practical so that it could be directly used for the large group practicality test stage (field test).

Assessment Stage

Interactive Multimedia Practicality Test Results by Large Group Students (Field Test)

The results of the large group practicality assessment (Field Test) conducted by 32 students obtained an overall average score of (very practical). Aspects of practicality include ease of use, efficiency of learning time and benefits. Android-based e-books really help students understand the material well.

Table 3. Average Results of Android-Based E-book Practicality Test Analysis in Large Groups (Field test)

Assessment Aspects	Average (%)	Criteria
Easy of Use	90.49	Very Practical
Learning Time Efficiency	95.31	Very Practical
Benefit	89.68	Very Practical
Average	91.97	Very Practical

Android-Based E-Book Practicality Test on Lecturers

The results of the practicality assessment of the android-based e-book by the lecturer found that the overall average score was (very practical). The aspects assessed include ease of use, efficiency of learning time and benefits. Of all these aspects, it has met the practicality criteria in accordance with the objectives of achieving the practicality of Android-based e-books for lecturers. Android-based e-books are practical and can be used by lecturers in carrying out learning process activities. According to Nieveen & Folmer (2013) stated that what is stated in the practical category is that products developed can be used, used, easy to use and in accordance with research objectives.

Table 4. The Average Results of Android-Based E-Book Practicality Test Analysis for Lecturers

Assessment Aspects	Average (%)	Criteria
Easy of Use	85.71	Very Practical
Learning Time Efficiency	75	Practical
Benefit	95.8	Very Practical
Total	256.54	Very Practical
Average	85.51	

Test the Effectiveness of Android-Based E-Books Cognitive Aspect

Student learning outcomes in the aspect of knowledge (cognitive) are obtained through the implementation of semester exams.

Table 5. Average Learning Outcomes of Knowledge Aspects of Students in Control Class and Experimental Class

Material	Class	Amount	Average (%)
Excretory system	Experiment	2592	81
	Control	2643	80

Seeing the comparison of Android-based e-books on student cognitive learning outcomes, several tests were carried out including normality tests, homogeneity tests, and hypothesis testing. The results of the t-test hypothesis that was carried out on scores in the cognitive domain of the experimental class and the control class showed that there was a significant difference between the learning outcomes (cognitive domain) of the experimental class students and the control class students. This has a positive influence on student learning outcomes (cognitive domain). Ulfa et al. (2017) explained that the use of Android based e-books can help teachers convey material well to students. Prospective biology teachers need to be well prepared, not only in terms of biology content but also their teaching skills, including lesson study (Siburian et al., 2023).

Get the positive thing from Android ebook. Susanti et al. (2021), it can be concluded that several learning achievements must be achieved, namely attainment learning attainment, general skills learning achievement, special skills learning achievement and knowledge learning achievement, and some material and suitable in age of the students that range in 18-21 yearsthat will be included in the book electronic interactive based on Project inStrategy and Design of Learning Subject.

Learning is often identified with the thinking process which is a cognitive activity to acquire knowledge and produce new mental representations. Cognitive processes cannot develop naturally, therefore they must be enriched by various stimuli and various conditions (Widia et al., 2022). Arsita & Astawan (2022), that teachers use various types of teaching materials in the classroom learning process to facilitate students' understanding of the lesson material.

Affective aspect

The observer made observations and filled out attitude assessment questionnaires on student affective competence.

Table 6. Average Results of Student Attitude (Affective) Analysis

Class	Amount	Average (%)	Criteria
Experiment	2368.7	81.75	Very Affective
Control	2237.5	80.36	Affective

Assessment of student learning outcomes (affective domain) shows that the use of android-based e-books in the learning process has an effect on improving student learning outcomes (affective domain) (Syafruddin, 2019). Furthermore, the assessment of the affective domain is strengthened by statistical tests to find out differences in android-based e-books on learning outcomes in the affective domain using the Mann Whitney test (Surbakti et al., 2023). The data obtained where H_1 is accepted is that there is a significant effect of the use of Android-based e-books on learning outcomes (affective domain).

According to Mantoviana et al. (2023), use the interesting e-book for the learning process has an effect on improving student learning outcomes.

Psychomotor Aspect

Assessment of aspects of skills (psychomotor) is carried out by filling out an assessment questionnaire and observing student activities during the learning process.

Table 7. Results of the Average Analysis of Student Skills (Psychomotor) Aspects

Class	Amount	Average (%)	Criteria
Experiment	2391.6	81	Very Effective
Control	2260.0	68.48	Effective

Assessment of student learning outcomes (psychomotor domain) showed that the use of Android-based e-books was better than the control class that did not use Android-based ebooks (Kustijono & Hakim, 2018; Rohlfing & Müller-Brauers, 2020). This is because the learning process that uses an Android-based e-book directs students in carrying out group discussion tasks so that students can easily develop their potential skills (Hediansah & Surjono, 2019; Muqarrobin & Kuswanto, 2016; Ramos, 2007). According to Asyhari (2015) states that in order to develop a product in the form of an android-based e-book that can train students' skills, they must have an interest in presenting pictures, videos, and with attractive designs so that they can influence student learning outcomes (psychomotor domain).

Conclusion

Based on the results of the study, it can be concluded that the android-based e-book using Sigil in the Animal Ecology Course developed has validity in a very valid category based on an assessment by a validator lecturer, has practicality in a very practical category based on assessments by lecturers and students, and has the effectiveness of cognitive, affective, and psychomotor aspects with very effective categories. Thus, the developed Android-based e-book using Sigil in Animal Ecology Course is very valid, verypractical, and very effective.

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