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Android-Based E-Booklet Development: To Improve Learning Outcomes in Geography Subjects

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Abstract

This research aims to determine (1) the feasibility of e-booklets and (2) their effectiveness. Types of R&D research include the include the Borg and Gall development models. The research subjects were material experts, media experts, learning design experts, and two class X students of SMA Negeri 1 Silimakuta. The research object is an Android-based e-booklet. The research results show: (1) learning material expert test in very good classification (87.85%), (2) learning media expert test in good classification (81.67%), and (3) learning design expert test in very good classification (86.11%). The results of proposing a hypothesis prove that: (1) Android-based e-booklets are suitable for use; (2) there is a significant difference between the learning outcomes of students who use e-booklets and conventional methods. The posttest results obtained tcount = 2.214 at a significant level ($\alpha = 0.05$) with ttable = 1.99, so tcount > ttable. The average effectiveness of learning outcomes when using Android-based e-booklets is 80.28%. Meanwhile, the group of students who used conventional methods was 74.91%. Using an Android-based e-booklet is more effective in increasing student competency in remote sensing material than without using an Android-based e-booklet.

Keywords: android, e-booklet, geography, media, remote sensing

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INTRODUCTION

Learning is an interaction between education and students in order to achieve good learning goals, not just providing material but stimulating and building meaning from what students learn. The learning process is a communication process that takes place in a system; therefore, learning media occupies a quite important position as a component of the learning system (Weiss, 2017). Without these learning media, communication will not occur, and the teaching and learning process and communication process will not be able to take place effectively and optimally.

The use of information technology and the internet is currently very developed in society. This is due to the use of technology, which cannot be separated from the lives of people who are facing the Industrial Revolution 4.0 era (Nordin & Norman, 2018). It can be said that one of the most important factors in the Industrial Revolution 4.0 is the emphasis on the digital revolution. This refers to the digital revolution due to the development of computer systems and file automation in all fields (Afrian, 2018).

Facing the era of Industrial Revolution 4.0, which emphasizes the concept of independent learning, every educational institution is expected to have competitiveness and innovation and be able to collaborate so as not to be left behind. In the era of industrial revolution 4.0, the education system is expected to be able to produce students who have critical thinking skills, are able to solve problems, are creative and innovative, and have the skills to communicate and collaborate (Yamin and Syahrir, 2020).

To achieve learning goals effectively and efficiently, the development of learning technology must be in accordance with the right domain or area. The area or realm of learning technology is development, which means the process of translating design specifications into physical form. This development area includes: (1) print/visual technology; (2) audiovisual technology; (3) computer-based technology; and (4) multimedia (Abdulhak & Darmawan, 2013). Many educational practitioners realize that the use of learning media really helps learning process activities both inside and outside the classroom, especially helping to improve students' learning achievements (Krakowka, 2012).

Based on the results of interviews and data obtained from teachers who teach geography subjects, it can be concluded that the results of daily tests on remote sensing subjects found unsatisfactory grades in the learning process. The average daily test score for remote sensing material in the geography subject is still below the Minimum Completeness Criteria, namely 75. In the 2022–2023 academic year, the average student score was 66.30, with 57.19% of students not completing and only 42.81% completing the daily remote sensing material test. Based on this, it can be said that there are some students who have difficulty following the learning process of remote sensing material.

Based on the results of the needs analysis, 100%, or 32 students, stated that they needed learning media that was used flexibly and easily understood and agreed to develop learning media such as Android-based e-booklets on remote sensing material as an alternative teaching material to support geography learning. And 93.75%, or 30 people, stated that they still had difficulty understanding geography lessons, especially remote sensing material.

Remote sensing material has many complex concepts and events that cannot be observed directly; for example, the remote sensing process. Due to the large amount of material and the addition of many events that cannot be observed directly, some students have difficulty understanding the material well. Students in Class X who are still relatively new to remote sensing material need time to adjust to the material.

Geography-learning media is one thing that has the potential to be developed. One learning media that can be developed in the classroom that can be applied is using Android for the geography subject, Remote Sensing Material in Class X of SMA Negeri 1 Silimakuta. It is hoped that the learning process using this media can foster student enthusiasm to learn more about the material being presented so that the subject matter being taught can be well received by students. The classroom atmosphere needs to be designed and built in such a way that it uses the right learning model so that students can get the opportunity to interact with each other so that, in the end, they can get a maximum learning atmosphere that is not boring.

E-booklets are smaller in size than e-books, although their use in interactive media will remain the same (Setiawan & Wardhani, 2018: 83). Suitable material to

include in e-booklet media is material that has lots of pictures to explain the material concisely. The role of e-booklets in learning outcomes is that they are designed to be equipped with concise and systematic explanations, as well as pictures as illustrations, which make it easier for students to use them in the learning process (Hanifah, Afrikani, Yani., 2020:10).

Geography is a science that studies or examines the earth and everything on it, such as population, fauna, flora, climate, air, and all their interactions, without ignoring any phenomena that are part of that whole (Jennings & Huber, 2003). Geography learning, according to Sumaatmadja (2001), is providing facilities and assistance to humans to be able to adapt to new environments, wherever they are. Geography learning is learning about the spatial aspects of the earth's surface, which constitute the totality of natural phenomena and human life with their regional variations. The adjustment process is directed at creating a new balance and harmonious interaction between humans and their environment. so that humans and the environment can have maximum social power.

Wardiyatmoko (2004) states that geography is a valuable subject in the school curriculum. Because geography can contribute to our understanding of the world (or parts of the world). For example, in understanding an area, geography contributes an approach with questions like: who lives in that area, where do they come from, and what do they do for their lives? This question raises the view that an area is connected to other areas on this earth.

Waite & Hume (2016) explain that geography learning objectives include the following three aspects: (1) Knowledge: (a) develop basic geography concepts related to spatial patterns and processes. (b) develop knowledge of natural resources and their limited opportunities for utilization; (c) develop basic concepts of geography related to the surrounding environment and regions of the country or world; (2) Skills: (a) develop skills in observing the physical environment, social environment, and built environment; (b) develop skills in collecting and recording data and information relating to spatial aspects; (c) develop skills in analysis, synthesis, tendencies, and results of the interaction of various geographical phenomena. (3) Attitude: (a) foster awareness of changes in geographic phenomena that occur around us; (b) develop an attitude of protection and responsibility towards the quality of the environment; (c) develop sensitivity to problems in resource utilization; (d) develop an attitude of tolerance towards social and cultural differences; and (e) embody a sense of love for the homeland and unity.

Remote sensing is the science and art of obtaining information about an object, area, or phenomenon through the analysis of data obtained with a tool without direct contact with the object, area, or phenomenon being studied (Lillesand and Kiefer, 1994; Purwadhi, 2001). The basic concept of remote sensing consists of several elements or components, which include energy sources, the atmosphere, the interaction of energy with objects on the earth's surface, sensors, data processing systems, and various uses of data. Remote sensing data can be in the form of images and/or non-images. A remote sensing image is an image that is similar to its original form, or at least a planimetric image, so that the image is the output of a data recording system that can be optical, analog, or digital. Non-image data can be in the form of graphs, diagrams, or numeric data (Purwadhi, 2001).

E-booklet media is a visual booklet media in digital electronic form that contains information and can be accessed and read via electronic devices, such as

gadgets and computers (Azinar & Fibriana, 2019). This e-booklet is like a digital book, the difference is that the number of pages in this e-booklet is fewer, the information presented is more concise, and the content of the material is easier to understand. Apart from e-booklets, there are also modules and printed books, which are often used in learning. Modules are teaching materials that are arranged systematically in language that is easy for students to understand, according to their age and level of knowledge, so that they can learn independently with minimal guidance from educators (Prastowo, 2012).

E-booklet learning media is a group of online technology media. E-booklets contain important information; the contents of the e-booklet must be clear and easy to understand; and it will be much more interesting if the e-booklet is accompanied by pictures. E-booklets are informative, and their attractive design can arouse curiosity so that students can easily understand what is conveyed in the learning process (Pralisaputri, Soegiyanto, and Muryani, 2016).

The research problems can be formulated as follows: (1) Is the Android-based e-booklet learning media for geography subjects suitable for use in remote sensing material? (2) Is the Android-based e-booklet learning media for geography subjects effective for remote sensing material?

RESEARCH METHOD

This research is research and development (R & D). R&D is a research method that produces a product in a certain field of expertise, which is followed by certain by-products and has the effectiveness of that product (Saputro, 2017). The research design for the development of e-booklet teaching materials on remote sensing that the researchers carried out followed the steps of the Research and Development method, an adaptation of the Borg and Gall development model.

This research was conducted in the odd semester of the 2023–2024 academic year. The location of this research is SMA Negeri 1 Silimakuta, which is located on Jalan Pendidikan Ujung No. 156 Saribudolok, Silimakuta District, Simalungun Regency, North Sumatra Province.

The subjects in this research were all 280 class X students of SMA Negeri 1 Silimakuta. Sampling was carried out using a cluster random sampling technique, namely class X-4, totaling 32 people using the Android-based Geography e-booklet learning media, while the research object is the geography subject on remote sensing material with the Android-based Geography e-booklet.

The procedures and design used in this research combine the steps of the research and development model (Borg & Gall, 1983). Steps include:

1. Preliminary Stage. (1) needs analysis, carried out to determine the objectives of the program or product to be developed; (2) learning analysis is a process used to determine relevant skills and knowledge; (3) Analysis of student characteristics including actual abilities possessed by students, learning styles, and attitudes towards learning activities; (4) Determine basic competencies and indicators in Android-based geography e-booklet learning media; (5) Develop assessment tools or instruments that are capable of measuring student learning outcomes; (6) Learning strategies that can be used in implementing learning activities; (7) Reviewing literature related to the development of Android-based geography e-booklet media; (8) Carrying out a formative evaluation, namely where this evaluation is carried out to see the deficiencies in the

Android-based geography e-booklet learning media; (9) Revise the Android-based geography e-booklet learning media; and (10) Carrying out a summative evaluation, namely to determine the success of geography learning outcomes using Android-based geography e-booklet learning media.

2. Planning and Development Stage. The planning stage consists of two stages, namely the Android-based e-booklet planning stage and the stage of preparing the instruments needed in this research. The Android-based geography e-booklet learning media is designed according to the basic competencies in the curriculum. To validate the Android-based geography e-booklet learning media being developed, it is necessary to prepare a validation instrument consisting of: (1) a design validation sheet for the Android-based geography e-booklet learning media on remote sensing material; (2) a remote sensing material validation sheet; and (3) a learning media validation sheet. At the development stage, validation tests and effectiveness tests for literacy-based geography e-booklet learning media were carried out. Analysis of suggestions and validation from experts and practitioners is used as a basis for refinement or revision of the initial draft of learning media using Android-based geography e-booklet learning media for remote sensing material. This aims to obtain valid Android-based geography e-booklet learning media.
3. Validation Stage. The validation in developing this Android-based geography e-booklet learning media is carried out by validating the learning material, namely, where the validation of the material is done by geography lecturers at Unimed geography education and teachers in the field of geography studies. Media validation is carried out by media expert lecturers, and learning design validation is carried out by learning design expert lecturers.
4. Product Feasibility Stage. The suitability of the Android-based geography e-booklet learning media will be assessed based on the suitability of the content and material, the suitability of the presentation and design, and the suitability of the media. From the student perspective, the suitability of Android-based geography e-booklet learning media is assessed by the readability of the e-booklet and how much the e-booklet can provide information in geography learning.
5. Test Subjects. The subjects for testing the development of Android-based geography e-booklet learning media on remote sensing material were class X students at SMA Negeri 1 Silimakuta.
6. Product Trial Stage. Determine whether the product is truly suitable for use and attractive. The sequence of activities carried out is as follows:
    1) Trial design. At this stage, the researcher has designed an Android-based geography e-booklet learning media with the steps of the Borg & Gall development model, which has been adapted to remote sensing material. Next, it was tested on students. The trial design stages are as follows: (1) individual trial; (2) small group trials; (3) limited field group trials; and (4) product revision.
    2) Test subjects. After the resulting Android-based geography e-booklet learning media product was validated by media experts, material experts, and design experts, the product was then tested on students.
    3) Implementation of trials This trial was carried out at SMA Negeri 1 Silimakuta

Data Collection Instruments and Techniques

The data collection instrument in this research is a product assessment instrument that has been developed by researchers. Questionnaire sheet (Questionnaire): The instruments used in this research are (1) a questionnaire sheet for material experts, (2) a questionnaire sheet for media experts, (3) a questionnaire sheet for learning design experts, and (4) a wide questionnaire for students.

Data analysis technique

Data analysis in this research uses quantitative descriptive analysis. All collected data is analyzed quantitatively, separated by categories, to sharpen judgment in drawing conclusions. Qualitative data in the form of very poor, poor, moderate, good, and very good statements was converted into a quantitative scale with a rating scale of 1 to 5 (Likert scale). The results are averaged and used to assess the quality of the e-booklet. The e-booklet criteria will be converted into a value on a scale of five using a Likert scale, which is analyzed descriptively as a percentage with the following formula:

$$x = \frac{Number\ of\ scores\ obtained}{Sum\ of\ ideal\ scores\ for\ all\ items}\ x\ 100\%$$

From calculations using the formula above, a number is produced in the form of a percent (%). The score classification is then converted into a classification in the form of a presentation, which is then interpreted using the qualitative sentences listed in Table 1 below:

Table 1. Interpretation Criteria for Media Appropriateness.

No	Interval Skor	Interpretation
1	1,00 – 2,49	Not Eligible
2	2,50 – 3,32	Not Appropriate
3	3,33 – 4,16	Decent
4	4,17 – 5.00	Very Decent

(Source: Sriadhi, 2018)

Product Effectiveness Test Data Analysis Techniques

In this development research, analysis was also carried out to determine the effectiveness of the learning media developed using two types of data, the first qualitative, which was obtained from preliminary studies or feasibility studies in the literature or in the field. Second is quantitative data obtained from student learning gains, namely comparing student pretest and posttest scores. The percentage of data obtained from the validator assessment results is analyzed using the formula below:

$$x = \frac{Number\ of\ scores\ obtained}{Sum\ of\ ideal\ scores\ for\ all\ items}\ x\ 100\%$$

The presentation of student learning outcomes from classes that use geography e-booklet learning media and classes that use textbook media with assessment criteria is in Table 2 below:

Table 2. Assessment Criteria

No	Percentage (%)	Criteria
1	81 – 100%	Excellent
2	61 – 80%	Good
3	41 – 60%	Fair
4	21 – 40%	Poor
5	0 – 20%	Very Poor

Before carrying out an effectiveness test using the t-test, there are several stages of statistical tests carried out by researchers, including normality tests and homogeneity tests. The normality test functions to determine whether the distribution of respondent data is normally distributed or not. The homogeneity test is a test of whether the variances of two or more distributions are the same.

The homogeneity test is carried out to determine whether the data in the two groups of data samples is homogeneous or not. Data analysis in this study used quantitative analysis techniques for the data obtained, namely the learning results of students from classes that had taken remote sensing material without using e-booklets and classes that were taking remote sensing material using e-booklets.

To see whether there is a significant difference between the learning outcomes of students who are taught using e-booklets and those who are not taught using e-booklets, a hypothesis test is carried out using the t-test.

Hypothesis testing

According to Sudjana (2013) the research hypotheses tested are:

Ho: $\mu 1 \leq \mu 2$

Ha: $\mu 1 > \mu 2$

Information:

$\mu 1$ = average student learning outcomes using Android-based geography e-booklet learning media.

$\mu 2$ = average student learning outcomes without using Android-based geography e-booklet learning media, namely by using textbooks.

Ho = There is no difference in the learning outcomes of students who use e-booklet learning media and those who use textbook learning media

Ha = The average learning outcomes of students who use e-booklet learning media are higher than those who use textbook learning media

Learning is said to be effective if there is a significant difference in the average learning outcomes of the experimental class and the control class. This hypothesis testing was carried out using the average difference test, or t-test (independent sample t-test). The t-test calculation uses a test of the difference between two population averages (Sudjana, 2016).

$$t \frac{\overline{x1} - \overline{x2}}{Sp\sqrt{\frac{1}{n1} + \frac{1}{n2}}}$$

Information:
$\overline{X1}$ = Sample mean 1
$\overline{X2}$ = Sample mean 2
n1 = Sample size 1
n2 = Sample size 2
s1 = Sample standard deviation 1
s2 = Sample standard deviation 2
S_p = Combined standard deviation

Hypothesis testing is carried out using the mean difference test or t-test (independent sample t test) because the data is homogeneous and normally distributed. The t-test is a mean difference test to determine whether there is a significant difference in the means of the experimental class and the control class with a significance level of 0.05 with SPSS 23 software. The hypothesis formulated is:

1. Ho: μ1 = μ2 (there is no difference in the average between the control class group and the experimental class group).
2. Ha: μ1 ≠ μ2 (there is a difference in the average between the control class group and the experimental class group).

In decision making, Ho is accepted if the significance value is more than 0.05.

The Ha test criterion is accepted if $t_{count} < t_{table}$, and Ho is rejected if tcount > ttable obtained from the t distribution list with dk = n1 + n2 - 1 with a significance level of 5%. To see the effectiveness value of the e-booklet being experimented with, the following effectiveness calculation formula is used:

$$x = \frac{Number\ of\ scores\ obtained}{Sum\ of\ ideal\ scores\ for\ all\ items}\ x\ 100\%$$

RESULTS AND DISCUSSION

Results

Based on product validation through a series of trials and revisions that have been carried out, the Android-based geography e-booklet learning media has valid status. The trial was carried out in 4 stages, namely: (1) evaluation of material experts, learning design experts, and learning media experts; (2) individual trials; (3) small group trials; and (4) field trials.

The results of validation and trials in the form of assessment scores for the components of this Android-based geography learning media on the quality of learning materials can be seen in Table 3.

Table 3. Expert Validation Assessment Scores and Student Trials

No.	Assessment Aspects	Average	Percentage	Criteria
1.	Learning Material Expert	4,38	87,85%	Very Eligible
2.	Learning Media Expert	4,06	81,67%	Very Eligible

3.	Learning Design Expert	4,31	86,11%	Very Eligible
4.	Individual Trial	3,89	77,76%	Eligible
5.	Small Group Trial	3,96	79,30%	Eligible
6.	Field Trial	4,11	82,28%	Very Eligible
	Total Score	4,38	87,85%	Very Eligible

Description of Product Effectiveness Test Results Data

Based on the learning outcomes of students who were taught using the Android-based Geography e-booklet learning media, the lowest score was 60 and the highest score was 96; the average score was 80.28; the median was 80.50; the mode was 78.75; and the standard deviation was 9.58. The frequency distribution of student learning outcomes taught using the Android-based Geography e-booklet learning media can be seen in Table 4 below:

Table 4. Frequency Distribution of Student Learning Outcomes Taught Using Android-based E-booklet Learning Media

No. Class	Interval Class	Absolute Frequency	Relative Frequency
1	60-71	4	12,50%
2	67-73	3	9,38%
3	74-80	9	28,13%
4	81-87	7	21,88%
5	88-94	8	25,00%
6	95-100	1	3,13%
	Total	32	100%

Based on Table 4 above, it can be seen that the value of student learning outcomes taught using the Android-based Geography e-booklet learning media is 7 students with a percentage of 21.88% below the average, as many as 9 students with a percentage of 28.13% is right on average, and there are 16 students with a percentage of 50% above average.

Based on the learning outcomes of students taught using textbooks, the lowest score was 52 and the highest score was 92; the average score was 74.91; the median was 75.61; the mode was 76; and the standard deviation was 9.92. The frequency distribution of student learning outcomes taught using textbooks can be seen in Table 5 below:

Table 5. Frequency Distribution of Student Learning Outcomes Using Package Books

No. Class	Interval Class	Absolute Frequency	Relative Frequency
1	52-58	3	9,38%
2	59-65	2	6,25%
3	66-72	7	21,88%
4	73-79	9	28,13%
5	80-86	7	21,88%
6	87-93	4	12,50%
	Total	32	100%

Based on Table 5 above, it can be seen that the value of student learning outcomes taught using textbooks is 12 students with a percentage of 37.5% below the average, and as many as 9 students with a percentage of 28.13% are right on average. average, and as many as 11 students with a percentage of 34.38% above the average.

Normality tests were carried out on pre-test data for both treatments, namely the class group of students who used the Android-based Geography e-booklet learning media and the group of students who used textbooks. Normality test results can be seen in Table 6 below:

Table 6. Summary of Pretest Data Normality Test

No	Class	L_{count}	L_{table}	Conclusion
1.	Students taught with Android-based Geography e-booklet learning media	-0,088	0,156	Normal
2.	Students taught using textbooks	0,105	0,156	Normal

From table 6 above, you can see the results of pretest calculations for student learning outcomes before using learning media in classes of students who use Android-based geography e-booklet learning media. For a significant level of $\alpha = 0.05$, $L_{count} = 0.0881$. In the list of critical values L for the Liliefors test with $n = 32$, namely $L_{table} = 0.1566$. Because the value of $L_{count} < L_{tabel}$, namely $0.0881 < 0.1566$, it can be concluded that the data on student learning outcomes before using learning media in the class of students who use the Android-based Geography e-booklet learning media is normally distributed.

The normality test was carried out on posttest data for both treatments, namely the class group of students who used the Android-based Geography e-booklet learning media and the class of students who used textbooks. Normality test results can be seen in Table 7 below:

Table 7. Summary of Posttest Data Normality Test

No	Class	L_{count}	L_{table}	Conclusion
1.	Students taught with Android-based Geography e-booklet learning media	0,069	0,156	Normal
2.	Students taught using textbooks	0,074	0,156	Normal

From table 7 above, you can see the results of posttest calculations for student learning outcomes after using learning media in a class of students who use Android-based Geography e-booklet learning media. For a significant level of $\alpha = 0.05$, $L_{count} = 0.0697$. In the list of critical values L for the Liliefors test with $n = 32$, is $L_{table} = 0.1566$. Because the value of $L_{count} < L_{tabel}$, namely $0.0697 < 0.1566$, it can be concluded that the data on student learning outcomes after using learning media in the class of students who use the Android-based Geography e-booklet is normally distributed.

The homogeneity test is carried out to determine whether the data is homogeneous or not. Based on the comparison of F_{count} with Ftable at a significance level of 0.05, if $F_{count} < F_{table}$, then the data has the same or homogeneous variance.

Table 8. Summary of Posttest Data Homogeneity Test

Class	N	dk (n-1)	Variance (Si^2)	F_{count}	F_{table}	Conclusion
Students taught with Android-based Geography e-booklet learning media	32	31	89,15	1,15	1,82	Homogeneous
Students taught using textbooks	32	31	102,95			

A list of F_{table} distributions with dk = n – 1 at a significance level of 0.05 obtained $F_{0.05}$ = 1.82. The calculation results in Table 8 of the pretest data for the class of students who used the Android-based Geography e-booklet and the class of students who used the textbook obtained a score of 1.18 < 1.82. Based on these data, it can be concluded that Ho is accepted, which means the data comes from a homogeneous group.

Hypothesis testing

Hypothesis testing in this research was carried out using the t-test formula. The t-test was carried out to determine whether there was a significant difference between the learning outcomes of remote sensing material in classes taught using Android-based geography e-booklets and the learning outcomes of remote sensing material in classes taught using textbooks. The calculation results obtained were t_{count} = 2.214 and t_{table} = 1.999, so that t_{count} > ttable at a significance level of 0.05. Based on these results, Ho was rejected and Ha was accepted, or, in other words, there was a significant difference between student learning outcomes in classes taught with Android-based geography e-booklets and classes taught with textbooks at a significance level of 5%. Thus, the learning outcomes of students taught using Android-based geography e-booklets are different from the learning outcomes of students taught using textbooks.

The effectiveness value of the Android-based geography e-booklet learning media developed is calculated as follows:

$$x = \frac{Number\ of\ scores\ obtained}{Sum\ of\ ideal\ scores\ for\ all\ items}\ x\ 100\%$$

$$x = \frac{2.572}{3.200}\ x\ 100\%$$

$$x = 80{,}38\%$$

Meanwhile, the effectiveness of learning with printed books can be seen as follows:

$$x = \frac{Number\ of\ scores\ obtained}{Sum\ of\ ideal\ scores\ for\ all\ items}\ x\ 100\%$$

$$x = \frac{2.404}{3.200}\ x\ 100\%$$

$$x = 75{,}13\%$$

Thus, the learning outcomes of students who use the Android-based Geography e-booklet learning media are higher, with a value of 80.38%, than the learning outcomes of students using textbook media, with a value of 75.13%. Thus, it can be concluded that the Android-based Geography e-booklet is more effective for remote sensing material compared to using textbooks.

Discussion

From the results of the research data processing carried out, the average geography learning outcome after using the Android-based geography e-booklet learning media for Class Android is 66.63. This data proves that the Android-based geography e-booklet learning media is feasible and effective for improving student competency.

According to Asyad (2011:35), the benefits of using learning media in the teaching and learning process are as follows: (1) Learning media can clarify the presentation of messages and information so that it can facilitate and improve learning processes and outcomes. (2) Learning media can increase and direct children's attention so that it can lead to learning motivation, more direct interaction between students and their environment, and the possibility for students to learn independently according to their abilities and interests. (3) Learning media can overcome the limitations of the senses, space, and time, and (4) Learning media can provide students with a common experience regarding events in their environment.

From Arsyad's explanation about the benefits of media, it can be concluded that the Android-based Geography e-booklet learning media has benefits as a learning media as stated by Arsyad (2011), so that this learning media can improve students' learning outcomes in studying Geography. The use of Android-based Geography e-booklet learning media allows students to more easily understand the steps of Geography learning and better understand Geography material because the Android-based Geography e-booklet learning media allows students to be able to understand the material presented with the contents of the Geography e-booklet which is designed to be as attractive as possible so that students can better understand the material presented. This Android-based geography e-booklet is easy for students to carry anywhere for independent study.

The same research by Yulianti, Maharani, and Kumala (2019) on the use of e-booklets by experts shows that they are suitable for use with eligibility criteria of 94% in the very feasible category. The practicality of e-booklet media is known from the results of trials by teachers and students, showing 78% in the practical category. Effectiveness in terms of the results of student observation sheets, motivational aspects, activeness aspects, and learning effectiveness shows an average of 81% with the very effective category, and the increase in student character is known from the learning outcomes obtained after using the media, obtaining 86%, which has reached the school's KKM. This shows that high or very high feasibility aspects have an impact on the effectiveness of student learning outcomes.

Other research conducted by Sarip, Amintarti, and Utami (2022) shows that teaching media is included in the valid category with an average score of 85.34%. The students' readability test results for teaching media were 87.5%, which was classified as very good. The e-booklet teaching media development product was declared feasible and can be used as a teaching medium for students studying the

concept of biodiversity material, which is known to increase learning interest and students' cognitive knowledge. It is easy to carry anywhere because it uses a web link format. The same thing shows that excellent teaching media can improve students' learning outcomes and cognitive knowledge.

The same research conducted by Dayanti, Noorhidayati, Rezeki (2022) shows that: (1) The e-booklet resulting from the development was determined to be very suitable for the demands of the curriculum, learning and daily life with a suitability validation test result of 4.69 with very good criteria. in accordance; (2) The E-booklet resulting from the development was determined to be feasible with a feasibility test validation result of 4.71 with appropriate criteria, which means that the E-booklet can technically be used as teaching material; (3) The E-booklet resulting from the development was determined to be very good in the readability test of 4.60 with very good criteria, which means the E-booklet is easy for students to read and understand; (4) The e-booklet development results were determined to be very positive with participant response test results of 4.61. positive criteria, which means that e-books are in demand and liked by students. The same thing applies to e-booklet products that are developed if the feasibility and effectiveness factors really determine the quality of the product in several aspects of product assessment so that it is declared feasible and effective by expert validation and student trials and can also improve student learning outcomes.

CONCLUSION

Based on the results of research into the development of Android-based e-booklet learning media, several conclusions can be drawn, namely: (1) The product in the form of Android-based geography e-booklet learning media has been proven to be a suitable product for use by every class X student at SMA Negeri 1 Silimakuta. The assessment of material experts, media experts, and instructional design experts, shows quite high scores and is classified as "very appropriate" criteria. Individual trials, small group trials, and field trials also produced criteria scores of "decent" to "very feasible." (2) Based on the results of data processing, the average value of student learning outcomes who use the Android-based Geography e-booklet learning media shows that students who use the Android-based Geography e-booklet learning media are more effective than students who use textbook media. This is shown by the calculation results obtained: $t_{count} = 2.224$ and $t_{table} = 1.999$, where $2.214 > 1.999$ for the previous level of significance.

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