

Flipbook Platform E-Module Development: Geographic Information Systems Subject

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ABSTRACT

This research aims to determine the feasibility and effectiveness of e-modules with the Flipbook platform in the Geographic Information Systems (GIS) Class XI Geospatial Engineering subject at SMK Negeri 1 Percut Sei Tuan. This research applies the Research and Development (R&D) method with the ADDIE model (Analysis, Design, Develop, Implement, and Evaluate). The research subjects were 30 students of Class XI Geospatial Engineering at SMK Negeri 1 Percut Sei Tuan. This research involved validation tests by material experts, media experts, and learning design experts, as well as trial stages, namely individual trials on 3 students, small group trials on 6 students, and limited field trials on 30 students. The research results show that the E-Module with the Flipbook platform is suitable for use based on media expert validation of 89.17% (very feasible), material expert validation of 92.13% (very feasible), and learning design expert validation of 88.71% (very feasible). In the individual trial, the score was 91.47% (very decent), the small group trial got a score of 92.33% (very decent), and the field trial got a score of 96.14% (very decent). The use of E-Modules with the Flipbook platform in GIS subjects is more effective than conventional whiteboard media, as can be seen from the results of $t_{count} = 1.91$ and $t_{Table} = 1.672$, where $1.91 > 1.672$ at the significance level $\alpha = 0.05$. This shows that H_0 is rejected, and the alternative hypothesis (H_a) is accepted. This means that there is a noticeable difference in student learning results between the experimental and control classes with a significance level of 5%. The effectiveness value of the E-Module with the Flipbook platform is higher, namely 84.7%, compared to student learning outcomes using whiteboard media of 80.8%.

KEYWORDS

E-Module; flipbook; Geographic Information Systems

INTRODUCTION

Technological developments also caused the industrial revolution, and finally, we are now in the Era of Industrial Revolution 4.0. According to Herman, as quoted in Sawitri (2019: 2), The Industrial Revolution 4.0 is a time when technology is used in factories and industries. Everything is connected and works together using digital tools of it collaborate and communicate with each other in real time, anywhere, and at any time, using Information and Technology (IT). This era also changed the development of the existing education system in the world and in Indonesia.

Since the implementation of the Independent Curriculum, learning media have also experienced an upgrade as an effect of digitalization in the Industrial Revolution 4.0 era. Various ways of using technology in creating learning media are currently starting to shift

from manual to digital-based (E learning), such as the use of e-modules, educational videos, Listening to audio lessons, using fun and interactive videos, and the rise of virtual reality (VR) and augmented reality (AR). Allen (2013: 27) says that e-learning is a way of learning that uses computers or electronic systems to help with the learning process. So, using e-learning in schools is necessary. From what we saw and the conversations we had with the class XI Geographic Information Systems (GIS) subject teacher at SMK Negeri 1 Percut Sei Tuan, GIS is one of the elements in geospatial engineering. GIS is basically a subject that aims to make it easier for someone to find information related to a particular location by entering, keeping, checking, combining, changing, studying, and showing information about places on the Earth's surface.

Learning Outcomes and Description of GIS Subject Elements in Phase F, Elements of Geographic Information Systems, Learning Outcomes At the end of Phase F, students are able to carry out GIS, which includes carrying out data input, editing, and presenting digital maps to build Geographic Information Systems. Includes data input work, editing, and presenting digital maps to build GIS. (Source: Educational Standards, Curriculum and Assessment Agency, Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia, Geospatial Engineering for Vocational Schools, 2022). The GIS subject is taught in Phase F, namely in Classes XI and XII for two semesters each (Odd and Even). In Class XI with TP-3.1, the main material taught in the first semester is: (1) Understanding GIS concepts; and (2) Understanding Types of Maps in GIS. Meanwhile, in the second semester, the main material taught is (1) Understanding Spatial and Non-Spatial Data Sources; and (2) Understanding the On-Screen Digitization Method. In Class XII with TP-3.2 and TP-3.3, in the first semester, the main material taught is: (1) analyzing how to convert spatial data; (2) analyzing non-spatial data conversion methods; and (3) evaluating analog and digital geospatial data. Meanwhile, in the second semester, the material taught is: (1) Understanding the data input process in building a GIS database; (2) Analyzing computer hardware specifications; and (3) Understanding the operation of Geographic Information System software.

The subjects in the Geospatial Engineering major contain theoretical and practical vocational material about collecting data on the surface of the earth and in the air using digital measuring instruments and computer-based data processing tools and then presenting the measurement results in a map (Standards, Curriculum and Assessment Agency Education Ministry of Education, Culture, Research, and Technology of the Republic of Indonesia Geospatial Engineering for Vocational Schools, 2022: 4). Subjects in this department refer to the Indonesian National Work Competency Standards (SKKNI). One of the key subjects that students need to learn well majoring in geospatial engineering is GIS.

According to Erkamin et al. (2023: 15), GIS are computer systems that help to collect, organize, and study information about places and the environment. GIS is a tool that helps people put in, save, look at, combine, change, study, and show information about places on the earth. GIS consists of three important components, namely hardware, software, and humans as users. GIS hardware includes a CPU, monitor, printer, digitizer, scanner, plotter, CD-ROM, VDU, and flash disk. GIS software is in the form of GIS work support programs such as data input, data processing, and data output. Examples of GIS software are work programs such as Q-GIS, ArchView, and ArcGis. Humans, as GIS users, are responsible for collecting, processing, analyzing, and publishing geographic data.

According to Purwadhi (1994), GIS is a system that brings together hardware, software, and data. It allows for storing, processing, and analyzing information at the same time, helping to understand and use related information better. According to Amrulloh et al.

(2013: 50), GIS is a computer system that can work with data related to specific locations. It allows users to enter, store, retrieve, and analyze this data, and then produce final results or reports. Of course Please provide the text you'd like me to simplify. The final results can help in making choices about geography problems. GIS software is a type of computer program that helps people create maps, manage, and study information about different places. The main feature of GIS software is that it can show and study location-based information and details about it (Erkamin et al., 2023: 38).

According to Udayana et al. (2017: 130), an e-module is an online learning tool designed to help students learn on their own and tackle problems they face. E-modules can display text, images, videos, and animations via computer devices (Imansari & Sunaryantiningsih, 2017). The researchers considered choosing the e-module because it is part of e-learning and can support independent learning in line with the Independent Curriculum. Learning independence is a skill where a person takes charge of their own learning. They encourage, manage, and check their own progress (Jumaisyaroh et al., 2015). This means students learn to control their own study by using their thinking, feelings, and actions himself to achieve the desired learning goals.

According to Antonius and Purbo (2002), there are Three things to focus on when making e-learning are: it should be easy, personalized for the learner, and quick. A simple system will help students use the available technology and menus more easily. It will make the E-Learning system easier to use, allowing students to focus more on learning instead of figuring out how to use the system. This way, their study time can be spent on learning rather than on dealing with the E-Learning tools. Furthermore, the system must have a more personal approach and interaction.

Modules are study tools created by teachers. They include content, teaching methods, and rules, and are organized by difficulty to help learners develop skills that students can learn independently. With this learning equipment, educators are more enthusiastic and creative in delivering lesson material (Puspitasari, 2021). According to Puspitasari et al. (2020), an e-module is A way of showing learning materials that are organized in a specific order to meet learning goals and available in electronic form. Through this electronic module, the learning process will involve visual video displays, sound, etc. According to Hanafi (2016: 2), E-Module is a computer-based learning medium. Usually electronic modules contain animations to make use and programs more interactive. According to Suharsana & Mahayukti (2013: 266), E-Module is an ICT-based module. Compared to printing modules, its advantage lies in its interactive features, such as being easy to help users find their way, showing and shrinking pictures, sounds, videos, and animations and having formative tests with immediate and automatic feedback.

The E-Module developed by researchers is an E-Module with the help of the Flipbook platform, where Flipbook is an application that allows the creation of digital books that can be 'flipped' or 'flipped' like physical (printed) books. The help of this Flipbook application can provide added value to the e-module because it can increase student interaction because there are interactive features such as page flips or animations. Apart from that, the e-module being developed will also be linked to video, websites, and audio. The Flipbook application makes E-Modules more flexible and can be used on different devices like students' computers, tablets, or phones. E-modules with Flipbook also allow teachers to update or correct teaching material in the module more easily. This is different from conventional modules, which need to be reprinted again if there are errors or updates to the material.

Susilana and Riyana (2009) explain that interactive multimedia modules (E-Modules) as teaching materials) Make messages easier to understand and less wordy; find ways to work

around time, space, and how students learn with their senses; and use different methods effectively. The goal is to highlight the benefits of e-modules compared to other options to printed modules can increase students' motivation to learn independently. Students can also develop abilities in interacting with the environment and learning resources, especially those based on ICT.

E-Modules with the help of the Flipbook platform, including research by Asmi and Adhitya (2018), states that E-Modules with Flipbook Maker on Character Education Material are help build student character and improve learning results. Furthermore, research by Puspitasari et al. (2020) stated that HOTS-based e-modules assisted by Flipbook Maker became finished products that were suitable for use.

According to Bambang (2012), Flipbook is one of the digital book display designs that is now in great demand by the public. This three-dimensional E-Book technology allows book pages to be opened like reading a physical book on a monitor screen. According to Asrial (2019: 203), a flipbook is a virtual book that looks like an album and has learning materials with sentences and colorful sections. This Flipbook is made to look great with colorful columns to make students more interested and excited about learning activities. According to Fonda & Sumargiyani (2018: 49), Flipbook is professional software that helps Change PDF, image, text, and video files into a book format. Flipbook is a program that lets you edit pages. You can add links, pictures, videos, and sounds to make it more interesting. The pages can be flipped like a real book.

An attractive layout has been created from Canva, so the module will be created in Flipbook form with the Heyzine application. Heyzine is an online platform that allows users to create interactive digital magazines from various content, such as articles, images, videos, and audio. According to Anggreni & Sari (2022: 264), using Heyzine is similar to using an e-book, but Heyzine's advantage lies in its ability to open each page of the book gradually with additional multimedia elements such as video, audio, text, and images. These elements help keep the appearance of the book interesting and support the context, preventing readers from getting bored.

The way the problem is explained in this research includes: (1) What is the feasibility of E-Modules with the Flipbook Platform in the Geographic Information Systems Subject Class XI Geospatial Engineering? And (2) What is the effectiveness of the E-Module with the Flipbook Platform in the Geographic Information Systems Subject in Class XI Geospatial Engineering?

RESEARCH METHODS

This research uses a method called research and development, or R&D for short. This means the study focuses on creating and testing educational materials. This research method is used to make specific products and check if they work well and are practical. The product developed in this research is an e-module with a Flipbook platform in the GIS subject, the material Understanding On-Screen Digitization Methods in Class XI Geospatial Engineering (TGS).

This research will be carried out at SMK Negeri 1 Percut Sei Tuan, which is located at Jalan Kolam No. 3 Medan Estate, Percut Sei Tuan District, Deli Serdang Regency, in the 2023–2024 Even Semester academic year in Class XI Geospatial Engineering in the GIS subject. The development procedure is a set of stages regarding the steps that researchers take in conducting their research. In this research, the ADDIE development model was used.

Framework structure for the development of the Geographic Information System E Module. It is planned that this e-module will sequentially consist of: a cover (containing

the media title and logo); E-Module Usage Guide, along with information on tools that can be used in the E-Module as well as the E-Module WhatsApp Group Link as a means of communication; Table of Contents, List of Tables, and List of Figures in the E-Module Glossary; Learning Outcomes; Learning Objectives and Flow of Learning Objectives; Concept maps; The Google Drive link contains Pretest Test; Motivational Words Main Material Title; Igniter Questions; Lesson material is enriched with audio elements, sound recordings, and instrumental music. Visuals in the form of text material and images or illustrations that support audio-visuals in the form of video tutorials. m. Learning evaluation in the form of a quiz integrated with Kahoot Link; Material Summary; Student assignments are in the form of job sheets. Assignment submission link via Google Drive; reflection via Google Drive link; Reference: Creating E-Module Assessment Instruments.

The results of this validation are used as a basis for making objective improvements to the product. The following is a grid of validation Sheets created by media experts, shown in Table 1.

Table 1. Validation Sheet Grid for Media Experts

No	Aspect	Indicator
1.	Appearance and Layout Design	<ul style="list-style-type: none"> - Text clarity (selection of text type and font size) - Appropriateness in choosing colors with the learning theme - Arrangement of graphic elements that makes it easier to understand concepts and flow of material. (images and illustrations of objects, instrumental music, sound recordings, links) - Navigation button layout - Material design layout - Distance settings (spacing) - The animation displayed is very interesting
2.	Navigation	<ul style="list-style-type: none"> - The Flipbook E-Module tools function well - Clarity of instructions for using the E Module
3.	Use of Language	<ul style="list-style-type: none"> - Accuracy of language use (in accordance with EYD rules, no double meaning, easy to understand)
4.	Implementability	<ul style="list-style-type: none"> - Ease of accessing the application - Helping students learn independently of the installation process

Experts in materials need to check if the way the material is presented is appropriate for how students learn and think. This tool is a questionnaire that uses a rating scale. Here is a table (Table 2) that shows validation sheets created by media experts.

Table 2. Validation Sheet Grid for Material Experts

No	Aspect	Indicator
1.	Curriculum	Suitability of material to the curriculum and learning objectives
2.	Comprehensive View	<ul style="list-style-type: none"> - The cover design depicts GIS learning - E-Modules are tailored to the characteristics of students - Adequate references/reading sources
3.	Presentation of Material	<ul style="list-style-type: none"> - Well structured material (from easy to difficult, adjusted to students' cognitive development) - Make it simpler for students to grasp the content.
4.	Use of Language	<ul style="list-style-type: none"> - Accuracy of language use (in accordance with EYD rules, no double meaning, easy to understand)
5.	Evaluation	<ul style="list-style-type: none"> - Suitability of questions to cognitive development - Suitability of questions to the concept of the lesson given.. - Suitability of questions to competencies or learning objectives

Validation Sheet Grid for Learning Design Experts:

Table 3. Validation Sheet Grid for Learning Design Experts

No	Aspect	Indicator
1.	Learning Design	<ul style="list-style-type: none"> - Accuracy of Topic Selection - Suitability of material to learning objectives - Providing training - Consistency of tests with learning objectives
2.	Information Design	<ul style="list-style-type: none"> - Providing motivation - Use of Study Guides - Clarity of material description - Clarity of the examples given - Feedback on student learning test results - Explanation of terms - Ease of use
3.	Presentation Design	<ul style="list-style-type: none"> - Color composition - Use of graphics - Selection of font type and size - Use of navigation buttons - Image and animation quality - Use of music

Here is a chart of student feedback forms, shown in Table 4.

Table 4. Student Response Questionnaire Grid to E-Module Media

No	Aspect	Indicator
1.	Appearance Design	<ul style="list-style-type: none"> - Text clarity - Media design
2.	Accessibility	<ul style="list-style-type: none"> - Ease of navigation - Material Arrangement
3.	Understanding the material	<ul style="list-style-type: none"> - The role of supporting media (images, animated moving images, and videos) in increasing interest in learning - Understanding of material through E-Module media - Use of audio
4.	Practice and Evaluation	<ul style="list-style-type: none"> - Suitability of practice questions, mini quizzes, and evaluation questions with the concepts presented - It is easy to answer questions in the application
5.	Implementability	<ul style="list-style-type: none"> - Ease of accessing the application - The role of E-Modules in increasing learning motivation - Ability to use applications - Encourage students to learn independently

Here is a table (Table 5) showing what students are expected to learn.

Table 5. Grid of Student Learning Results for E-Module Media on Geographic Information System (GIS) Elements Phase F Class XI

Learning Outcomes (CP)	Subject Matter	Question Indicator
Includes data input work, editing and presenting digital maps to build Geographic Information Systems	Understand the On Screen digitization method. (Phase F Class XI Even Semester - T.P 2023/2024)	<ul style="list-style-type: none"> - Explain the meaning of map digitization - Distinguish between On Screen digitization and digitization using a digitizer - Identify GIS software that supports On-Screen digitization methods - Examining the Working Principles and Application of On-Screen Digitization Methods - Applying Tools/Menus Used in the On-Screen Digitization Process in Arcgis - Loading Data Into Arcmap and Creating Shapefiles in the On-Screen Digitization Process - Performing On Screen Digitization

Data Analysis Technique

Product feasibility testing is carried out in order to find out if the learning device product being created is a good fit or not through the results of questionnaire assessments distributed to learning experts (materials, media, and learning design), individual trial evaluations, small group evaluations, and limited trials. The answer to each statement item is then measured using a Likert scale. The Likert scale is a tool that helps us understand what someone thinks or feels about something regarding a phenomenon (Sugiyono, 2011: 93). The development product criteria will be converted into values using a Likert scale with the following The formula and rules are shown in Table 6:

Table 6. Qualification Criteria for Expert Validation Questionnaire Assessment and Student Responses to E-Modules with the Flipbook Platform

Mark	Criteria	Percentage (%)
A	Very Decent	81-100
B	Worth	61-80
C	Fairly Decent	41-60
D	Inadequate	21-40
E	Very Poor	0-20

(Source: Sugiyono, 2011: 134-136)

To measure the feasibility of a development product, the predetermined criteria will be converted into values using a Likert scale. This value will then be calculated using the formula:

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

The results of this calculation will produce a number in the form of percent (%). After that, the score will be classified based on percentage, following the classification listed in Table 3.11. Next, the hypotheses tested for the feasibility test are:

$$H_0 : \mu < 61$$

$$H_1 : \mu > 61$$

This hypothesis specifies that we want to test whether the average feasibility (μ) of the development product is less than 61 or greater than 61. The goal of this test is to find out if the development product meets or exceeds the established feasibility standards.

Product Effectiveness Test Data Analysis Techniques

Quantitative data obtained from this research, we looked at how well students learned by using a method called a quasi-experiment, which involved comparing two groups that were not exactly the same. The quasi-experiment method was chosen because it suits the conditions of the research sample, where there is a comparison group (the control group) and an experimental group. In the non-equivalent comparison group design, the two groups are not chosen randomly (Sitompul & Ardyansyah, 2022: 29).

The product being developed will be tested first by giving a Give a test to both groups (the group being tested and the group used for comparison) to determine students' initial knowledge regarding the material to be taught. Furthermore, the experimental group will receive special treatment in the form of using E-Modules with the Flipbook Platform in the GIS subject that has been developed, while the control group will receive conventional learning with the teacher explaining the material as usual and giving assignments to students. Both groups will be tested on the On-Screen Digitization Method material. After the treatment is complete, both groups will be tested again with a post-test to measure learning outcomes after the treatment. Changes in learning outcome scores before (pre-test) and after (post-test) treatment will be analyzed to be prepared in a research report. Here is the experiment plan for this research, shown in Table 7 below:

Table 7. Experimental Design Model Nonequivalent Comparison Group Design E-Module with Flipbook Platform

Class	Pretest	Treatment	Final Test (Post test)
XI TGS 1	O1	X1	O2
XI TGS 2	O3	X2	O4

(Source: Sugiyono, 2010:323)

Information:

- O1 : Experimental class Pre Test Score (XI TGS 1)
- O2 : Experimental class Post Test Score (XI TGS 1)
- O3 : Control class Pre Test Score (XI TGS 2)
- O4 : Control class Post Test Score (XI TGS 2)
- X1 : Learning with E-Modules with the Flipbook Platform
- X2 : Conventional learning (material and assignments)

When conducting research, it is necessary to control the treatment for the influence of internal and external validity to ensure that the results obtained from both treatments accurately reflect their effectiveness, and are not caused by other factors. Control of internal and external validity is very important in ensuring research quality (Maksum, 2012: 66). Controls for internal validity ensure that research results appropriately reflect the effects of the treatment administered. Meanwhile, control of external validity allows generalization of research results to a wider population and ensures that the study follows the rules for testing a hypothesis.

Feasibility Test Data Analysis Techniques

Input obtained from the results of multimedia assessments by experts is then analyzed using the following formula (Sriadhi, 2018): (1) Create a table showing the scores for each instrument item in every category. (2) Calculate the average score for each part using this formula:

$$\bar{x} = \frac{\sum X}{n}$$

Information:

- \bar{x} : Average score
- $\sum X$: Total score of the items in the statement.
- n : Number of data items

To check if the media is good overall, we look at all the scores from the three areas of assessment and find the average by using a specific formula:

$$\bar{x}_t = \frac{\sum X_i}{N}$$

Information:

- \bar{x}_t : Average score
- $\sum X_i$: Total score from the three evaluation areas
- N : Total information for the three evaluation parts

To check if it's possible, we look at the results from this calculation shown in Table 8 below:

Table 8. Interpretation of Product Quality Assessment

No	Interval Mean Score	Interpretation
1.	1,00 - 2,49	not feasible
2.	2,50 - 3,32	not worthy
3.	3,33 - 4,16	worthy
4.	4,17 - 5,00	very worthy

Source: (Adapted from Sriadhi, 2018)

Effectiveness Test Data Analysis Techniques

The collected information using tests after lessons in both the control group and the experimental group to see how effective the teaching methods were of Smart Apps Creator-based teaching and multimedia modules with the results of the Recount Text material test on students. Next, The information from the test will be checked to see how well it works.

Before doing a t-test to check how effective something is, you need to meet some requirements. First, you must test if the data is normal. Second, you should check if the groups are similar (homogeneous). The normality test is used to check if a person's data follows a normal distribution. The homogeneity test checks if two or more groups have the same variation or not. Once both requirements are met, the independent sample t-test can be done on the research data.

Average value

The following formula is used to obtain the average value for Sugiyono (2011):

$$\bar{x} = \frac{\sum X_i}{n}$$

- \bar{x} : Mean (Average)
- $\sum X_i$: the number of x values from I to n
- n : Number of individuals

Standard deviation (Standard Deviation)

$$s = \sqrt{\frac{\sum (X_i - \bar{X})^2}{(n - 1)}}$$

Information:

- s : sample standard deviation
- X_i : value of x 1 to n
- \bar{x} : average
- $(n - 1)$: degrees of freedom
- n : Number of samples

The normality test is done to check if the research data follows a normal distribution. This means that the way data is spread in the population is either normal or not. To check if this data is normal, we use the Chi Square formula like this:

$$x^2 = \sum \left(\frac{(F_0 - F_h)^2}{F_h} \right)$$

Information:

- x^2 = Chi Square
- F_0 = Frequency obtained from the sample
- F_h = Expected frequency of the sample

According to Arikunto (2014), the Chi Square value used is based on a significance level of 5%, and the degrees of freedom are calculated as the number of frequency groups minus one ($dk=K-1$). If the count of x squared is less than or equal to the x squared table value, then we can say that the data follows a normal distribution. The homogeneity test is done to check if the data in the population is evenly spread out. According to Sudjana (2005:249), you can check if the variances are the same using the Barlett test.

$$F = \frac{s_1^2}{s_2^2}$$

Hypothesis test

The research idea needs to be checked for its accuracy. In this study, the method used to check the idea is called the t-test (independent test). For t-test data analysis, you need to have post-test results in the group you are studying. The idea we will test for its effectiveness is:

- Ho: $\mu_1 \leq \mu_2$
- Ha: $\mu_1 > \mu_2$

Information:

- μ_1 : The average results of students who learn using E-Modules
- μ_2 : The typical results of students who learn in a regular classroom setting
- Ha: There is a big difference in how well students learn in classes that use E-Modules compared to regular classes
- Ho: There is no major difference in what students learn from classes using E-Modules compared to regular classes.

To check the idea, the research uses a two-party test formula.

$$t_{count} = \frac{\bar{x}_1 - \bar{x}_2}{S \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

where S is the result of the combined variance calculated using the formula:

$$S^2 = \frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1 + n_2 - 2} \quad \text{where } S = \sqrt{S^2}$$

Information:

- \bar{x}_1 : average score of the class in the experiment

- \bar{x}_2 : average score of the control class
- n_1 : number of experimental class samples
- n_2 : number of control class samples
- S_1^2 : variation in the experimental group
- S_2^2 : variation in the control group
- S : combined variance
- t : calculation price

with $db = n_1 + n_2 - 2$

The correlation criteria obtained are said to be significant (the hypothesis is accepted) if the $t_{count} > t_{table}$ for a significance level of 5%.

Miarso (2004) said that learning effectiveness is often measured by the achievement of objectives. Learning effectiveness refers to the level of consistency of experience, in this case the learning process with learning objectives (Fitria et al., 2017: 17). The effectiveness value of media using the learning model using E-Modules is obtained based on the percentage of classical completeness which is then categorized based on a minimum learning completeness standard of 75 in the Geographic Information Systems subject where the effectiveness criteria are met if students achieve completeness greater than or equal to 75% .

RESULTS AND DISCUSSION

As a result of creating E-Module learning materials products using the Fipbook Platform, materials were collected and created in the form of images, learning material modules, which were needed, which were then compiled into complete learning multimedia. Next, a description of the appearance of the E-Module with the Fipbook Platform that has been developed in this research is described as follows:



Figure 1. E-Module learning media with the Fipbook Platform

The validation results from the two respondents (1: 86 & 2: 82) are as assessment scores on aspects of the E-Module with the flipbook platform in terms of media which are shown in Table 9:

Table 9. Media Expert Validation Results

Aspects/Indicators	Percentage	Criteria
Appearance and Layout Design	86.67%	Very Eligible
Navigation	90%	Very Eligible
Use of Language	90%	Very Eligible
Implementability	90%	Very Eligible
Average	89.17%	Very Eligible

The validation results from the two respondents (1: 69 & 2: 70) are in assessment scores on aspects of the E-Module with the flipbook platform in terms of material which is shown in Table 10:

Table 10. Material Expert Validation Results

Aspects/Indicators	Percentage	Criteria
Curriculum	90%	Very Eligible
Full View	96.67%	Very Eligible
Material Presentation	92%	Very Eligible
Language Use	95%	Very Eligible
Evaluation	90%	Very Eligible
Average	93%	Very Eligible

The validation results from the two respondents (1: 76 & 2: 75) are in the form of assessment scores on aspects of the E-Module with the flipbook platform in terms of learning design which are shown in Table 11.

Table 11. Validation Results of Learning Design Experts

Aspects/Indicators	Percentage	Criteria
Learning Design	88.75%	Very Eligible
Information Design	90.91%	Very Eligible
Design Percentage	86.67%	Very Eligible
Average	88.78%	Very Eligible

The assessment of this individual trial can be seen in Table 12 below:

Table 12. Assessment Results from the Individual Trial Questionnaire

Aspects/Indicators	Percentage	Criteria
Appearance Design	86.67%	Very Eligible
Accessibility	86.67%	Very Eligible
Material Understanding	90.67%	Very Eligible
Training and Evaluation	94.67%	Very Eligible
Implementation	100%	Very Eligible
Average	92%	Very Eligible

The assessment results from this small group trial can be seen in Table 13 below:

Table 13. Assessment Results from the Small Group Trial Questionnaire

Validation Expert	Percentage	Criteria
Appearance Design	100%	Very Eligible
Accessibility	91.67%	Very Eligible
Material Understanding	91.67%	Very Eligible
Training and Evaluation	91.67%	Very Eligible
Implementation	100%	Very Eligible
Average	95%	Very Eligible

The assessment results from limited field trials you can see it in Table 14 below:

Table 14. Assessment Results from the Limited Field Trial Questionnaire

Validation Expert	Percentage	Criteria
Appearance Design	98%	Very Eligible
Accessibility	96%	Very Eligible
Material Understanding	96.33%	Very Eligible
Training and Evaluation	95.6%	Very Eligible
Implementation	94%	Very Eligible
Average	96%	Very Eligible

Table 15. Summary of Product Feasibility Results Based on Expert Assessment and Student Testing

Validation Expert	Percentage	Criteria
Media Expert	89.17%	Very Eligible
Material Expert	92.13%	Very Eligible
Learning Design Expert	88.71%	Very Eligible
Individual Trial	91.47%	Very Eligible
Small Group Trial	92.33%	Very Eligible
Field Trial	96.14%	Very Eligible
Average	91.66%	Very Eligible

The results of the test for normality in the experimental class and control class is shown in Table 16.

Table 16. Summary of Data Normality Test using the Liliefors Test

Data	N	Lcount	Ltable	Conclusion
Pre test Experimental Class	30	0.100	1.161	Normal
Pre test Control Class	30	0.081	1.161	Normal
Post test Experimental Class	30	0.082	1.161	Normal
Post test Control Class	30	0.059	1.161	Normal

In the experimental class, we did a pre-test for students, and found that the calculated value (Lcount) is 0.100. We compared this to the table value (LTable) for 30 students, which is 0.161, with a significance level of 0.05. Since Lcount (0.100) is less than Ltable (0.161), we can say that the learning results using E-Module media with the flipbook platform at SMK Negeri 1 Percut Sei Tuan are normally distributed. In the control class, students took a pre-test. The results showed a value of Lcount = 0.081, and for a group of 30 students, the Ltable value was also 0.161, using a significance level of $\alpha = 0.05$. Since the value of Lcount (0.081) is less than Ltable (0.161), we can say that the information about learning results indicates whiteboard (conventional) media carried out at SMA Negeri 1 Percut Sei Tuan is normally distributed.

The results of the students' post-test calculations carried out in the experimental class for a significant level of $\alpha = 0.05$ obtained Lcount = 0.082 and LTable with N = 30 was 0.161. Because the value of Lcount < LTable is 0.082 < 0.161, it can be concluded that the data on learning outcomes using E-Module media with the flipbook platform carried out at SMK Negeri 1 Percut Sei Tuan is normally distributed. Meanwhile, the results of the students' post-test calculations carried out in the control class for a significant level of $\alpha = 0.05$ obtained Lcount = 0.059 and LTable with N = 30 was 0.161. Because the value of Lcount < LTable is 0.059 < 0.161, it can be concluded that the data on learning outcomes using whiteboard (conventional) media carried out at SMA Negeri 1 Percut Sei Tuan is normally distributed.

It can see the results of the data test for both the experimental class and the control class in Table 17.

Table 17. Summary of Data Homogeneity Test with Fisher's Test

Data	dk (n-1)	Fcount	FTable	Conclusion
Pre test Experimental Class	29	0,45	1,84	Homogeneous
Pre test Control Class	29			
Post test Experimental Class	29	0,88	1,84	Homogeneous
Post test Control Class	29			

The F test results for the pretest and posttest data showed that in the experimental class, the F value for the pretest was 0.45 and for the posttest was 0.88. The comparison value, called F table, was 1.84. Based on the information above, the pre-test scores from the experimental group and the control group show that Fcount is less than Ftable (0.45 is less than 1.84). This means that the starting test scores for both groups are similar or equal. In the experimental class and control class, we found that the F value we calculated (0.88) is less than the F value we looked up in the table (1.84). This means that the test results for both classes are similar.

In this study, we used the t test method to check our ideas. A t test was conducted to find out if there was a significant difference in GIS learning results in the control class. The calculations showed that tcount is equal to 1.91 and table equals 1. This means that tcount is bigger than ttable at the 0 significance level. Based on these results, we reject the idea that there is no difference (H0) and accept that there is a difference (Ha). This means that students in the experimental class performed differently than those in the control class, and we are sure about this difference at a 5% significance level.

The results of learning for GIS students using the e-module on the flipbook platform are different from the results of students taught using traditional methods like blackboards.

Based on calculations of effectiveness tests on the two media, the results obtained were that the GIS learning outcomes of students taught using E-Module with the flipbook platform were higher than the GIS learning outcomes of students using blackboard media (84.7% > 80.8%). Thus, it can be concluded that digital student worksheets are more effectively used in learning Geographic Information Systems in Class XI vocational school compared to using whiteboard media.

Discussion

The validation results show that the E-Modul product using the Flipbook platform is ready for field trials. The e-module created using the Flipbook platform meets the required standards for designing learning media. After the experts stated that the E-Module product with the Flipbook platform was very suitable for field trials, field trials were carried out in accordance with procedures, namely individual trials, small group trials, and limited field trials.

The e-module with the flipbook platform in GIS Eyes was declared very suitable for use as a learning medium for Class XI vocational school students majoring in geospatial engineering. Assessments from various experts (media, materials, and learning design) show an average product feasibility of 90%, with all aspects rated as very feasible. Field trial results also strengthen this conclusion, with an average feasibility percentage of 93.35%.

This is in line with Kalimatus (2021) research, which stated that digital flipbook-based e-modules are very suitable for use in learning with an average score of 82% and are more effective than conventional media. Furthermore, research conducted by Hayati et al. (2015) also showed that Flipbook-based e-modules were "very feasible," with an average percentage of 95.87% with very good interpretation. A study by Apri and Gina (2022)

found that the E Module using the Flipbook Platform is considered "very good" with an average score of 92%.

The goal of testing the E-Module with the Flipbook platform is to find out if it works well enough to keep using it or if we should stop using it because it doesn't work. This test looked at the average learning results of students who used the E-Module with the Flipbook platform and those who used whiteboards or regular teaching methods. The data analysis shows that there are important differences in how well people learn GIS the two groups, where the E-Module with the Flipbook platform produces higher scores (84.7%) compared to whiteboard/conventional media (80.8%).

The effectiveness of e-modules with flipbooks in the learning process is due to their practical nature and ease of carrying because they can be accessed via cellphone, Android, with a small file size. This allows students to access materials anytime and anywhere, according to their needs for independent learning (Muzijah et al., 2020). Apart from that, the use of e-modules with the Flipbook platform as a learning medium makes the learning process more fun and interesting for students. The images and videos available in the e-module help students understand the material better, so that GIS learning does not feel monotonous. With this E-Module, students can explore the videos that have been provided, and the buttons in the E-Module function well, making it easier to use. This is in line with Amanullah's (2020) opinion that flipbook learning media can create an interesting, communicative learning atmosphere and support students' understanding of the material.

CONCLUSION

From the problems, goals, results, and discussions about creating e-modules with the Flipbook platform that we talked about earlier, we can make the following conclusions:

1. The E-Module product that uses a flipbook platform in GIS learning has met the necessary requirements and is considered a good learning tool. Overall, it is rated as "Very Appropriate."
2. The E-Module using the Flipbook platform for the GIS subject is seen as more effective than using a regular whiteboard. The results of the test show that there is a big difference in how well students learn when they use E-Modules with the Flipbook platform compared to when they are taught with traditional methods like a whiteboard. Students who learn with E-Modules using the Flipbook platform do better than those who learn with traditional methods like whiteboards.

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