
Development of e-book on video integration on seaweed processing materials in vocational education

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Abstract

Seaweed in Indonesia in 2023 reached a significant figure of up to 9 million tons. The utilization of seaweed products encompasses various industrial sectors, both food and non-food. In the process of seaweed processing, the role of education becomes one of the important roles to enhance students' understanding of its potential and processing. This study aims to describe the stages of developing e-book-based learning media integrated with video and to measure the improvement in students' understanding of the media. This research uses the 3D development model (Define, Design, Develop) with an approach that includes the stages of planning, creation, and validation testing. Validation data were collected using a Likert scale for content experts and media experts, while for users, a pretest-posttest was used. Based on the validation results by the three expert team members, the research findings indicate that the content expert validation is 93% (Very Feasible), and the media expert validation is 85.3% (Very Feasible). Additionally, the N gain from the pretest posttest results, which measures the users' understanding level, is 0.4 (Moderately High). In addition, it was found that the average response of students to the media trial was 63.47% (Interesting). Based on the results of this study, it shows that the E-book media integrated with video can significantly enhance students' understanding, while also providing an interesting and interactive learning alternative. Therefore, it can be stated that the learning media using video-integrated e-books for seaweed processing materials is capable of attracting students' attention and interest in learning.

Keywords: e-book; seaweed; vocational education; learning media

INTRODUCTION

Seaweed is one of the most common natural resources found on Indonesia's coasts and oceans (Akmal *et al.*, 2017). The latest data from the Ministry of Maritime Affairs and Fisheries of the Republic of Indonesia shows that Indonesia's seaweed production will reach 9 million tons in 2023, this shows Indonesia as one of the largest seaweed producers in the world (Sarmin *et al.*, 2021). Indonesia has many advantages as an archipelagic country with a beautiful tropical climate (Fatmawati & Wahyudi, 2015). Seaweed has a similar structure and seaweed has a difference called talus. These plants can grow by tying themselves to other objects in tidal areas or on the seafloor. Today, seaweed has become a high-value commodity and offers great opportunities, especially in the development of product products such as cosmetics. Many seaweed farmers are now actively cultivating this plant (Dolorosal *et al.*, 2017). The potential of Indonesian seaweed is very promising, as this commodity makes a great contribution to the country's economic progress. According to data, Indonesia is the second largest producer of seaweed after the Philippines, with a percentage of 69% of all fishery products in Indonesia, seaweed is the most in demand (Sulistiyo *et al.*, 2018).

Seaweed is widely used as a food mixture or food additive because of its characteristics. The characteristics of seaweed in food include its use as a thickener, stabilizer, and gel-maker

in various processed foods (Wibowo & Madusari, 2018). Therefore, there is material in education about processed seaweed as a food. Education in the industrial revolution 4.0 has progressed so that technology is used in the field of education (Effendi & Wahidy, 2019). Rodhiah & Roza (2020) stated that technological developments can influence students to participate in the learning process. Students are currently in a generation that lives all digitally. One of them is paper books that are now widely developed into digital books.

Digital books or known as e-books (electronic books) are information or learning resources that can be accessed through electronic devices in the form of mobile phones, computers and others. The information presented by the e-book contains text, images, videos, and sounds. So that e-books have the ability to attract students' attention in learning (Syafuruddin, 2019). E-books have a variety of formats, namely plain text, PDF, JPEG, EPUB, Docx, HTML and others (Ruddamayanti, 2019). However, what is used for this research is an e-book in the form of an android-based application.

Based on the results of the needs analysis at SMKN 3 Pandeglang, the learning resources commonly used by teachers are in the form of powerpoints, package books, and the internet. So the learning process requires innovation that integrates with technology. Therefore, researchers have developed an e-book on video integration on processed seaweed materials with the aim of finding out the feasibility test of material experts and the feasibility test of media experts, as well as to find out the improvement of the quality of learning and creativity of students.

Digital books or known as e-books (electronic books) are information or learning resources that can be accessed through electronic devices in the form of mobile phones, computers and others. The information presented by the e-book contains text, images, videos, and sounds. So that e-books have the ability to attract students' attention in learning (Syafuruddin, 2019). E-books have a variety of formats, namely plain text, PDF, JPEG, EPUB, Docx, HTML and others (Ruddamayanti, 2019). However, what is used for this research is an e-book in the form of an android-based application.

Dewi & Rohayati (2017) stated that e-book applications have advantages over printed books, namely being practical so that they are easily accessible anytime and anywhere, making and distributing them is very easy and does not cost much, has a variety of formats, does not require special maintenance, and does not require a large place like books, only preparing memory on electronic devices. Ruddamayanti (2019) stated that the media is said to be environmentally friendly because it does not use paper. E-books can last a long time, are not easily damaged in contrast to printed books which will be yellower and the paper will be more damaged over time. The convenience of this learning media is also supported by various technological innovations that are developing so that it continues to have a positive impact on the digital-based learning process (Yulda & Widiaty, 2021).

E-books have various advantages, such as ease of access, namely, can be accessed anywhere, easy to carry, allow readers to read anytime and anywhere. In addition, e-books also have disadvantages, such as requiring an android device, needing an internet network to download applications, dependence on the device, and potential interference from the device used to read it.

Functional food is a type of food in the form of food and beverage products that not only provide nutritional benefits but also additional health effects. This food is consumed to get health benefits more than just the nutritional value contained in it. The use of seaweed in Indonesia is still lagging behind compared to seaweed in other countries (Ministry of Marine Affairs and Fisheries, 2014). Functional food can be defined as food or beverages that contain ingredients that are believed to improve health status and prevent certain diseases.

The use of seaweed in the fields of food, nutraceutical, supplements and cosmetics is due to the composition of nutritional value and bioactive components contained in seaweed. In order to be categorized as a functional food product, processed seaweed food products must contain high nutrients, fiber, and bioactive components that are almost the same as the content in the raw materials. The content of raw materials can be seen from the nutrients it contains, such as protein, carbohydrates, fat, and fiber, which vary depending on the specific type of seaweed.

Seaweed processing innovation is one of the efforts to increase the added value and competitiveness of seaweed commodities. In addition, this processing innovation can meet consumer demand and needs for a variety and alternative processed seaweed. The following products have the potential to be food innovations from the use of seaweed: (1) seaweed dodol; (2) seaweed bubbles/boba; (3) seaweed cookies; and (4) seaweed flour.

Learning media is used as a tool to facilitate teachers during the teaching process so that learning goals can be achieved. The needs of teachers in designing learning can be adjusted because learning media has several types. The function of the learning media used certainly has the following capabilities: (1) to bring out the actual object; (2) duplicate the actual object; (3) turning abstract concepts into concrete; (4) to form a common perception; (5) be a time-limited solution; (6) presenting information repeatedly and consistently; and (7) to create a fun, relaxed, and stress-free learning atmosphere so that they can achieve learning goals.

METHODS

This research aims to develop a project-based learning video integration e-book to improve students' understanding and skills. This research will be conducted at SMK 03 Pandeglang in 2024. This research uses the Research and Development (R&D) method. The product developed from this study is a video integration e-book using a 4D development model developed by S. Thagarajan. At the e-book production stage, video integration only carries out up to the 3D stage, namely: (1) define, (2) design, and (3) develop.

The techniques used in data collection are in the form of observation of the needs of teachers and students used during pre-research with the aim of finding out a problem in the research, finding out information related to learning resources used by teachers in learning activities and finding out the needs of students in learning activities. The questionnaires used during post-research are feasibility assessment questionnaires given to material experts and media experts, as well as individual student response test questionnaires to find out students' responses to video integration e-books.

Product validation is determined by expert testing. The validators of this research came from Lecturers of Marine and Fisheries Education, Lecturers of Marine Information Systems at the University of Education Indonesia, and Education Teachers in the Department of

Agribusiness and Fishery Product Processing (APHPI), namely media experts and material experts, namely Mad Rudi, S.Pd., M.Si., Luthfi Anzani, S.Pd., M.Si., and Eem Mahdiah, S.Pi. The purpose of the expert validation test is to determine the feasibility of video integration e-books. The expert test involves media experts and material experts, for this reason the data collection technique in this study uses questionnaires. User test on grade XI students of SMKN 03 Pandeglang who also use questionnaires. Data analysis techniques are carried out to obtain learning media that are suitable for use and meet the validity criteria.

The data that has been obtained will be analyzed using descriptive analysis techniques through Likert scale measurements. Here are the steps in data processing. The data obtained from the expert feasibility test assessment is in the form of data in accordance with the score criteria in table 1.

Table 1. Criteria for Expert Eligibility Test Score

Value Scale	Score
Highly Worth It	4
Proper	3
Not Eligible	2
Very Unworthy	1

(Modified from Sugiyono, 2020)

Furthermore, the results of the data obtained will be calculated using the following formula:

$$R = \frac{S}{N} \times 100\%$$

(Aini *et al.*, 2023)

Information:

R : Average percentage of score
 S : Total score obtained
 N : Maximum number of scores

From the results of the percentage values obtained and then interpreted into qualitative sentences in accordance with the eligibility score criteria, the following table can be seen.

Table 2. Eligibility Score Criteria Table

Validity Criteria	Validity Level
80,01%-100%	Highly Worth It
60,01%-80,00%	Proper
40,01%-60,00%	Quite Decent
01,00%-40,00%	Less Worthy

Source: Modification of Rozak *et al.*, (2018)

Furthermore, the results of the data obtained will be calculated using the following formula:

$$N \text{ Gain} = \frac{\text{Skor Posttest} - \text{Skor Pretest}}{\text{Skor Ideal} - \text{Skor Pretest}}$$

- High N-gain: If $N\text{-gain} > 0.7$
- Moderate N-gain: If $0.3 < N\text{-gain} < 0.7$.
- Low N-gain: If $N\text{-gain} < 0.3$.

Then a trial was carried out and saw the results of students' responses in the use of the obtained media and then interpreted into qualitative sentences in accordance with the attractiveness score criteria in table 3.

Table 3. Table of Attractiveness Score Criteria

Validity Criteria	Validity Level
80,01%-100%	Very Interesting
60,01%-80,00%	Pull
40,01%-60,00%	Quite Interesting
01,00%-40,00%	Less Attractive

RESULT AND DISCUSSION

The results of the development research are in the form of video integration e-books as learning media that can be used by students and teachers on processed seaweed materials. Sugiyono (2017) stated that R&D is a research method used to produce educational products and tested to assess the feasibility of a product. In this e-book research, an R&D method was used with a 4D development model modified to 3D. The results of each stage of development are as follows: (1) the definition stage, aiming to find out the needs in the learning process activities. At this stage, the steps taken, namely observation and need assessment at SMKN 3 Pandeglang and the design of video integration e-book products; (2) the design stage, including making media design starting with making a storyboard that contains depictions or designs to develop e-books, looking for various references to materials, images, videos, and scientific activities used as content for the content of the e-book application, and compiling an e-book assessment criteria instrument, then validated so that the instrument made is valid and feasible to be used for the feasibility test using the Likert scale; and (3) the development stage consists of 3 activities, namely the development of video integration e-books, the feasibility assessment of video integration e-books, and product revisions. In the development stage of video integration e-books, researchers searched for various sources and compiled seaweed processed materials using the Microsoft Office Word 2010 application, then used the Sigil application to develop video integration e-books in the form of applications.

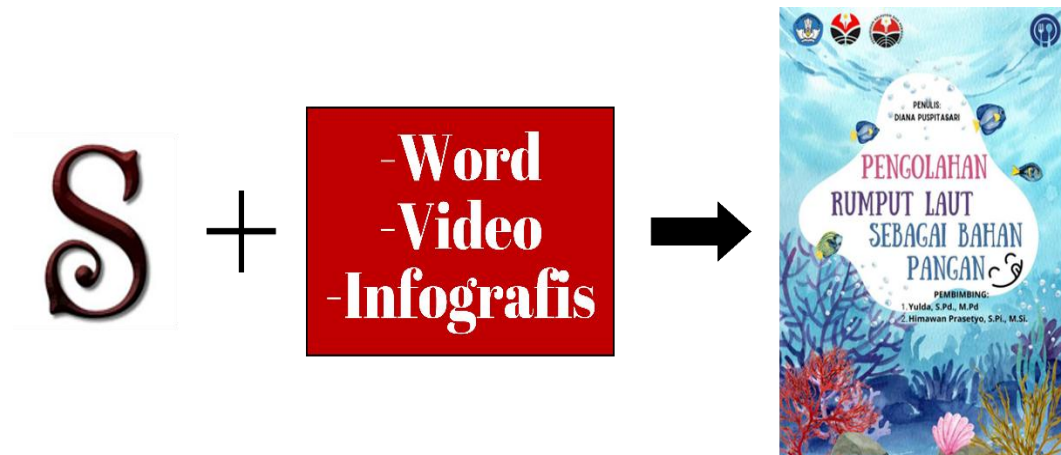


Figure 1. Sources in compiling seaweed processed materials

Here is the Storyboard used in conducting the research.

Table 4. Storyboard

Display	Understanding
	There is a three-dot located in the upper right corner, which aims to set the desired options for reading e-books. The option can be seen in the image on the side, by clicking on the icon.



Functions to display the icon to be used in reading the e-book.



Functions to display the chapters contained in the e-book.



Functions to get automatic scrolling.



Functions to display day or night mode.



Works for screen orientation.

MATERIAL



DAFTAR ISI

- [KATA PENGANTAR](#)
- [DAFTAR ISI](#)
- [BAB I PENDAHULUAN](#)
- [BAB II RUMPUT LAUT](#)
 - [2.1. Tinjauan Umum Rumput Laut](#)
 - [2.2. Jenis Rumput Laut yang Dapat Dikonsumsi](#)
 - [2.3. Kandungan Pada Rumput Laut](#)
 - [2.4. Manfaat Mengonsumsi Rumput Laut](#)
- [BAB III ANEKA OLAHAN RUMPUT LAUT](#)
 - [3.1 Dodol Rumput Laut](#)
 - [3.2 Bubble Rumput Laut](#)
 - [3.3 Cookies Rumput Laut](#)
 - [3.4 Tepung Rumput Laut](#)
- [DAFTAR PUSTAKA](#)

In the table of contents section, users can select one of the chapters and subchapters they want to read first by pressing that section. This feature makes it easy to navigate in the e-book which allows users to go straight to the desired topic without the need to scroll through the pages one by one.



There are videos that can be played by pressing the play button available.

A storyboard is a sketch design that describes the sequence of research products. It is usually used to convey ideas through images, so that others can easily understand them. With a

storyboard, readers can clearly see an overview of the research product from start to finish. In this study, a storyboard with a digital format was used.

After the product development stage, the e-book integrated with the video is then validated by experts to assess the feasibility of the product. Here are the results of the validation from the experts.

Media Expert Validation

Validation from media experts includes five aspects, namely screen appearance, ease of use, consistency, graphics, and usefulness. The following is a validation table of media experts.

Table 5. Media Expert Validation Results

Aspects	Number of Items	Total value	Percentage
Media Display Design	4	39	81,2%
Ease of Use	3	31	86,1%
Consistency	3	29	80,5%
Graphical Display	3	33	91,6%
Benefits	4	42	87,5%
Average			85,3%

Based on Table 5, the results of the validation of the video integration e-book that has been carried out by media experts with 17 questions, obtained product feasibility with an average of 85.3% and categorized as Very Feasible. However, there are some additional suggestions, namely improvements to the video section that must include the source of the video and also the need to add subtitles to the video so that users can understand the content.

Material Expert Validation Results

Validation carried out by material experts consists of material coverage, ease of use, up-to-date and contextual, presentation techniques, material presentation support, and learning presentation. The following is a table of material expert validation.

Table 6. Material Expert Validation Results

Aspects	Number of Items	Total value	Percentage
Material Coverage	2	22	91,6%
Ease of Use	2	21	87,5%
Up-to-date & Contextual	2	22	91,6%
Serving Techniques	2	22	91,6%
Material Presentation Support	2	24	100%
Learning Presentation	2	23	95,8%
Sum			93%

Based on Table 6, the results of the validation of the video integration e-book that have been carried out by subject matter experts with 12 questions, obtained product feasibility with an average of 93% and are categorized as Very Feasible. However, there are some additional suggestions, namely improvements to the video section that must include the video source or citation.

Implementation Results

The implementation stage of this learning media was carried out for grade XI students of SMK Negeri 3 Pandeglang, on Monday, August 12, 2024, with seaweed processing materials. Before implementation, the researcher gave a pretest to students and after the implementation of learning media, students filled out the posttest. The following are the results of students' pretest and posttest scores.

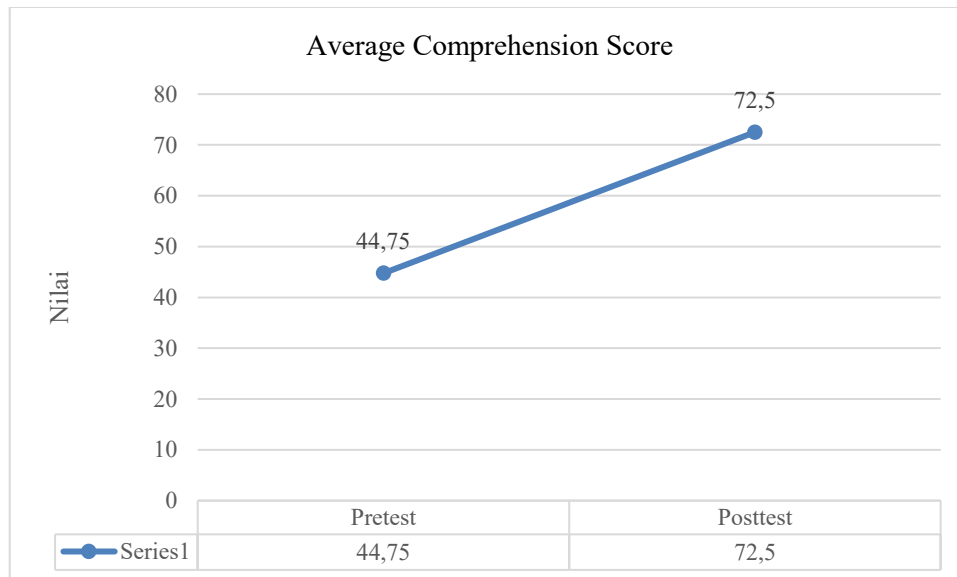


Figure 2. Average results of students' pretest-posttest assessments.

The diagram above shows that the results of the pretest and posttest of the 20 questions that have been developed have significant differences. The data is seen from the average pretest assessment of 44.75 then there is an increase in the average posttest assessment to 72.5. This means that the use of e-books can improve student learning outcomes and is strengthened by an N-gain measurement of 0.4, meaning that there is a change in the medium category.

Table 7. Student Respondents' Results on Media Use

Aspects	Number of Items	Total value	Percentage
Quality of Use of E-Books	3	123	51.25%
Students' Interest in Video Integration E-Books	4	242	67.22%
Presentation of Materials in E-Books	4	234	65.00%
Languages used in the E-Book	3	169	70.42%
Sum			63.47%

Based on Table 7, the results of respondents who are students related to media use show significant results. In the respondent test, a total of 14 questions were asked to students to measure the extent to which they responded in the use of e-books. After analyzing the students' answers, an overall average score of 63.47% was obtained. This figure shows that the level of response or assessment of the use of the media is classified as feasible. This means that the media used can be accepted and considered effective by most students, although there are still suggestions for improvement to be more optimal in improving the quality of learning.

The use of learning media using e-books that integrate video has been proven to provide various benefits. This video-integrated e-book is believed to help education in improving efficiency, reducing operational costs, and accelerating responses to existing needs (Raup *et al.*, 2022). The integration of e-book algorithms with learning media also offers a fun, engaging, and supportive learning experience for children as a whole (Pratikno *et al.*, 2023). This is the basis for the development of e-book-based learning media for seaweed processing materials. The learning process of processing materials at SMK Negeri 3 Pandeglang requires innovation that integrates with technology. Therefore, innovative, economical, and can be used at any time with the facilities available at the school are needed. The results in the development of video integration e-books aim to improve the quality of learning and creativity of students. The e-book eligibility of video integration is due to several factors. The design of this learning media product begins with the collection of materials sourced from books, journals, and Google. The collected data is then processed to create the basis of e-book materials. The output of making this e-book is in the form of files that are equipped with various features. The main page of the e-book contains a brief introduction to seaweed, as well as an in-depth explanation of the seaweed processing process.

The next stage is development, which includes two important things, namely the implementation of learning media through the Moon Reader application so that this e-book can be accessed by students and the general public. After the learning media is completed, a validation process is carried out to assess its feasibility according to media experts and material experts. The learning media about seaweed processing was evaluated formatively by two lecturers and one educator at SMK. Media validation was carried out by one lecturer from the Department of Marine and Fisheries Education, one lecturer from the Marine Information System of the University of Education Indonesia Serang Campus and one educator from SMK Negeri 3 Pandeglang. The purpose of media validation is to assess the quality of programming and display, so that the resulting application can be interesting and interactive for students. The material validation was carried out by one lecturer from the Marine and Fisheries Education Study Program, one lecturer from the Marine Information System of the University of Education Indonesia Serang Campus, and one educator from SMK Negeri 3 Pandeglang. The purpose of material validation is to ensure the suitability of the material presented in the learning media.

Based on the assessment of the media validator on the aspect of display design, a score of 81.2% was obtained and included in the Quite Feasible criterion. The aspect of ease of use was obtained with a score of 86.1% and was referred to in the Very Feasible criteria. The consistency aspect was obtained with a score of 80.5% and was included in the Quite Feasible criteria. The graphic aspect obtained a score of 91.6% and was referred to in the Very Feasible category. The usefulness aspect was obtained with a score of 87.5% and was included in the Very Feasible criteria. Of the five aspects of media experts, the average score of 85.3% of this presentation is included in the Very Feasible category. In the material validator in the aspect of material coverage, a score of 91.6% was obtained and included in the Very Feasible criteria. The aspect of ease of use was obtained a score of 87.5% and was included in the Very Feasible criteria. The up-to-date & contextual aspect obtained a score of 91.6% and was included in the Very Feasible criteria. The aspect of presentation technique was obtained with a score of 91.6%

and was included in the Very Feasible criteria. The supporting aspect of the presentation was obtained with a score of 100% and was included in the Very Feasible criteria. The aspect of learning presentation was obtained with a score of 95.8% and was included in the Very Feasible criteria. Of the six aspects of material experts, they received an average score of 93%, this presentation is included in the Very Feasible category.

The next stage is the implementation of learning media, the implementation refers to the results of the pretest posttest and student respondents in the use of learning media. This implementation was carried out on grade XI students of SMK Negeri 3 Pandeglang, with seaweed processing materials. Before implementation, the researcher gave a pretest to the students, and after the implementation of the learning media, the students filled out the posttest. In this implementation, significant results can be obtained from the pretest results, obtaining an average result of 44.75 then experiencing an increase in the average posttest assessment to 72.5. This means that the use of e-books can improve student learning outcomes and is strengthened by an N-gain measurement of 0.4, meaning that there is a change in the medium category. This means that the use of e-books can improve student learning outcomes. The implementation of the results of respondents who are students related to the use of media shows significant results. After analyzing the students' answers, an overall average score of 63.47% was obtained. This figure shows that the level of response or assessment of the use of the media is classified as Feasible. It can be concluded that the media used is acceptable and considered effective by most students.

According to Sulviana (2019), the existence of interactive media and electronic media has an important role in increasing students' interest in reading. This can be seen in the development of the use of electronic media that is increasingly widespread and easily accessible to students. Innovative and interactive electronic media not only provide faster and more diverse access to information, but can also create a more engaging and enjoyable learning experience. Therefore, these media can be an effective means of stimulating students' interest in reading and can also improve the overall quality of education.

Based on the qualifications, test results of experts and overall user response, it can be concluded that the video integration e-book on improving the quality of learning and student creativity is suitable for use in learning activities in class XI of SMK Negeri 3 Pandeglang.

CONCLUSION

Based on the results of the development research that has been conducted, e-books that integrate videos have proven to be very suitable for use in the learning process for grade XI students of the Department of Agribusiness of Fishery Product Processing, especially in increasing students' motivation and learning independence. The results of the validation calculation from material and media experts conducted by the three validators show that the validity level of this e-book reaches 93% of material experts and 85.3% of media experts. In the results of the implementation of the pretest and posttest results, the pretest was 44.75, then there was an increase in the average posttest assessment to 72.5 with an N-gain measurement of 0.4 which has a Medium category. In the implementation, respondents who are students related to the use of media showed significant results. After analyzing the students' answers, an overall average score of 63.47% was obtained. This figure shows that the level of response or assessment of the use of the media is classified as Feasible.

Therefore, it can be concluded that this video integration e-book is very feasible to be used in learning activities on the processing of fishery products. This research product in the form of an e-book is considered feasible because: (1) it can encourage students to learn independently and (2) it is able to help students understand the material in more depth and detail.

The advice that can be given in this study is to develop an application that can be accessed on various gadgets, so that students who have mobile phones other than Android can access the e-book.

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