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The Feasibility of Guided Inquiry-Based Digital Flipbook Learning Media: Physics Module in Sensing Systems

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Abstract

Various technology-based learning media have now been widely developed but sometimes in their use some of them are still not maximized properly. The current modernization of education refers to the digitalization of current learning making digital media not only used as a media of communication but also as a medium of learning so that students can carry out learning activities online or blended learning. Online learning or blended learning requires students to be skilled at using digital devices. Besides that, now we are also in the digital era which demands that all aspects of life, including learning activities, participate in training students to use digital systems, one of which is as a learning media. The way to train students' skills in using digital devices is to introduce and familiarize students with using digital media when the learning process starts from the simplest, such as flipbook e-modules. This study aims to determine the feasibility of the digital physics flipbook module in guided inquiry-based sensing. The research method used is research and development research with the ADDIE model (Analysis, Design, Development, Implementation, Evaluation). The methods used to collect data are observation, interviews, and questionnaires. The instrument used to collect data is a questionnaire. The feasibility test was carried out by distributing validation sheets to junior high school science teachers, high school physics teachers, and science education students. The research results obtained are the digital physics flipbook module in the sensing system has been feasible to use with a percentage of 80% and is in the very good category. Thus the guided inquiry-based e-module flipbook on physics material in this sensing system has been worthy of being used as teaching materials and learning media for students.

Key words: digital flipbook, physics module, sensing systems

INTRODUCTION

The development of information and telecommunications technology (ICT) towards digital is increasingly rapid. The use of the internet and smartphones remains a testament to this development. The use of smartphones cannot be separated from the support of the internet network. The growth of online learning methods forces teachers or instructors to follow paths that can be used for learning to take place (Purnamasari, Siswanto & Malik, 2020). As a result, digital technology supports the development of learning materials that can be used in various conditions, including in locally and globally. Without a doubt, technology will be a crucial part of the education in the digital era (Hashim, 2018)

Education is undergoing major changes around the world due to the rapid development of technology. As our world becomes more digital, the education sector is becoming more and more saturated with digital games, apps, websites, social media and learning environments (Decuypere, Grimaldi & Landri, 2021). The rapid development of technology has made it possible to copy information from the real world into virtual form (Ayu, 2020). Technological developments also affect the field of education which is often referred to as digital native student learning which is different from student

learning in the previous era (Smaragdina, 2020). The current generation is more interested in educational materials available on digital devices (Fadieny & Fauzi, 2021). Today's students tend to prefer things that are digital because apart from their attractive appearance, they are also easy to access anytime and anywhere.

Digital native is the ability to carry out different activities simultaneously and across cognitive structures (Prensky, 2021). The digital native generation is a generation of technology, flexible, smarter and tolerant of cultural differences (Rastaty, 2018). For digital natives, technology cannot be separated from their lives. This is reflected in the use of computers, digital music players, smart phones, and many other digital devices to fill their lives (Mardina, 2011).

The implementation of online learning activities makes parents take part in the activities of the science learning process (Khaerunnisa, Jumadi, Indahsari & Utami, 2022). With access to digital information, the learning process can be carried out anywhere, including at home. Learning activities at home make the family also participate in helping the learning process including providing easy internet facilities.

A good e-module must contain learning material that can guide students in solving the problems contained in the material content of the module (Kurniawan, 2021). To support the learning process using e-modules, it is necessary to integrate learning models in it, one of which is the guided inquiry model. Learning through the guided inquiry model can develop students' self-confidence and increase their thinking skills to find alternative answers to problems, which increases students' conceptual understanding and creativity (Kurniawan, 2013). Therefore e-modules whose use is assisted by the guided inquiry model besides being able to help improve student understanding of concepts and student creativity can also train student learning independence because digital e-modules can be easily accessed anywhere.

Digital-based interactive learning programs are more valuable than conventional printed learning materials. Interactive learning can allow students to learn with great motivation because of their interest in multimedia systems capable of presenting animation. The following are the characteristics of learning multimedia. Contains representative document content in the form of images, sounds, audio-visuals; using various media; having strength in language, color, and language-solving objects; various types of learning; can be used offline or online.

In e-learning, communication can be done in two ways, namely synchronous and asynchronous, this term comes from the word syncron which comes from German and then absorbed into English. Romiszowski and Mason in (Dian & Rakhmat, 2017) explain that synchronous is real-time communication while asynchronous is non-real-time communication. The explanation explains that synchronous communication requires the communicator and the communicator to communicate at the same time, but not in the same place. Unlike asynchronous communication, this type is done at different times, so there seems to be delays and prolongation of communication time. People. This is what makes synchronous communication able to increase social interaction for its users.

The user manual contains only document text with supporting images. Modular and student worksheets contain document summaries, assignments and daily test questions. The presented power point contains only a summary of the less informative, less interesting topic and discourages students' curiosity about the topic being studied. Educational materials were used that did not support video (audio-visual) to minimize the abstraction of the literature on the human body's defenses (Octaviyantari, Suarni & Widiana, 2020; Junaidi, 2019). The development of technology, as in all fields, affects the education system. This affects the use of computers in teacher training and its application in the education system (Yaghobi & Razmjoo, 2016) Therefore, it is important to consider other factors that may influence student motivation to use in addition to technology. Sousa and Rocha (2019) view digital learning as delivery in the form of digital media (e.g. text or images) via the internet; and, learning content and teaching methods are provided for the purpose of enhancing

student learning and for enhancing teaching effectiveness or for enhancing individual knowledge and skills. One of the learning mediums in biology can be information and communication technology (ICT) based media. In the age of rapidly developing information and communication technologies (ICTs) as one can now use them in student learning in the form of multimedia learning development in a computer context like Flip Book (Prasetyono & Hariyono, 2020; Rusli & Antonius, 2019; Riyanto, Amin, Suwono & Lestari, 2020).

The presence of digital books (digital flipbooks) occurs because they are inseparable from technological and informational advances through features found in digital book creation applications. In addition, in the midst of the current industrial revolution books have changed from printed to digital form to make it more convenient to operate and keep the quality of the book, without being worn out over time (Divayana Bina Marga, Suyasa PWA, 2019). Flipbooks are different from textbooks or regular books. The manual has weaknesses in terms of form, manufacturing process, and usage. Ordinary books or printed books are very easily damaged, torn, used in learning less attractive, on the contrary, flipbooks have an interactive electronic form by combining elements of text, images, and videos to process. learning can be attractive to students (Diani & Hartati, 2018). Flipbooks help someone or a student make words and images more active in their mind. It is very effective in acquiring knowledge and facilitating the learning process (Jain, 2017).

Several studies have shown that the use of digital books packaged as flipbooks has a positive impact on improving the quality of the learning process and student outcomes (Isnaeni & Agustina, 2018). In addition, the use of flipbook-based digital books with website support can improve students' logical thinking skills in math learning (Prasetyono & Hariyono, 2020). The development of innovative teaching materials will help prepare students for new skills relevant to the 21st century. One of the innovations in providing teaching and learning materials is the use of e-books. Interactive digital technology called flip books, is one of the solutions in science learning with the aim of improving students' critical thinking skills (Riyanto *et al.,* 2020). Based on the above background, the purpose of this study is to determine the feasibility of the digital physics flipbook module in sensing.

METHOD

The method used in this research is research and development (Research and development). This study adopts the ADDIE development model, an acronym for Analysis, Design, Development, Implementation, Evaluation (Pramana & Pudjawan, 2020). The selection of the ADDIE model is considered very suitable for creating learning products. In this study, the research instrument was in the form of a validation sheet by media experts and users, namely junior high school science teachers, high school physics teachers, junior high school students, high school students, and college students. Validation sheet to get the quality of learning media developed from two validators and 10 users including high school physics teachers, junior high school science teachers, and students. The module experts consist of two validators, namely media experts and material experts (lecturers and teachers). While the users are junior high school students, high school students, and college students. Student response questionnaire aimed at exploring the quality of the module from student assessments. Instruments for validation can be reviewed from several aspects of the module. The module aspects used in the validation sheet are didactic aspects, construction aspects, technical and linguistic aspects.

The data analysis technique used in this study is descriptive qualitative analysis, namely by analyzing expert validation data and user data. The data is also interpreted with qualitative sentences. The data obtained from the assessment of the experts are used as a reference for revising the physics module in the sensing system. The results of the analysis of the validation sheet are used to determine the feasibility of the developed module with score interpretation. The module that has been validated is said to be of high quality if the average score obtained is categorized as feasible or very

feasible. The formula used in calculating the average validation results from each criterion is:

$$\text{average} = \frac{total\ score}{total\ number\ of\ aspects}$$

The feasibility test was carried out by distributing validation sheets to junior high school science teachers, high school physics teachers, and science education students. The methods used to collect data are observation, interviews, and questionnaires. The instrument used to collect data is a questionnaire. From the questionnaire results, the data will be analyzed based on each respondent, using data analysis techniques. The data analysis was used to determine the feasibility level of instructional media products, which was a flipbook using percentage descriptions and categorization. The following is a descriptive data analysis using a percentage referring to (Arikunto, 2010; Bustanil, Asrowi, & Adianto 2019; Anwari, Shodiqin, & Priyolistiyanto 2020).

Table 1. Eligibility Level Category

Range	Category	Decision
81% – 100%	Very Good	Feasible
61% – 80%	Good	
41% – 60%	Enough	Inadequate
21% – 40%	Less	Not feasible
< 20%	Not Good	

RESULT AND DISCUSSION

The product developed in this research is a physics module in sensing in the form of a guided inquiry-based digital flipbook. This digital flipbook module contains learning materials, learning videos, glossary, index, pictures, and also a simple practicum. The following is the appearance of the e-module flipbook in the simple practicum video simulation section and glossary. For more details, please look at Figure 1. below.

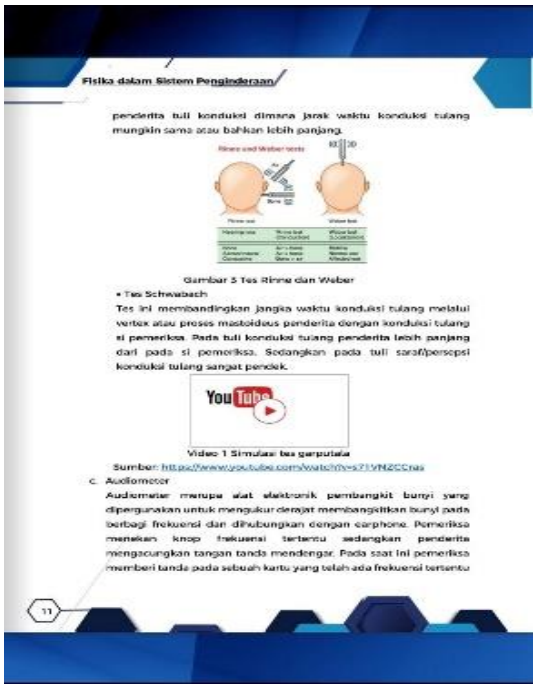

Figure 1. The Snippet of E-Modul Content

Flipbook e-modules for learning physics in sensing systems can be accessed on digital devices via the following: http://emodulipaterpadu.byethost7.com/E-Modul%20Teori/mobile/index.html

The following is a grid of validation sheet instruments made by researchers which are then given an assessment by science education students, junior high school science teachers, and high school physics teachers.

Table 2. Instrument Feasibility Validation Sheet Digital Physics Flipbook E Module in The Sensing System

Aspect	Indikator
Didactic	Learning materials are in accordance with SK, KI, KD, indicators, and learning objectives to be achieved (1). Learning objectives are in accordance with SK, KI, and KD(2). The material contained makes it easier to understand the concept (3). The initial questions presented can be understood by students well (4)
Construction	Have a preface (5). have a table of contents (6) Has instructions for use (7) The summary of the material for each topic presented is systematic (8). Assignments are given to attract students' motivation (9). The tasks presented are easy to follow (10) Learning materials can encourage students to think scientifically/work scientifically (11) Has a motivational part (12) Have a bibliography (13). Have an author profile (14).
Technical and language	The design and layout of the learning material is attractive, proportional, and representative of the content contained (15). Use communicative and interactive language and sentences (16). Use a font size that can be read clearly (17). The appropriateness of punctuation and spelling used (18). The use of sentences in learning materials is in accordance with good and correct Indonesian rules (19). The suitability of colors, text, and images that are combined (20). Description of pictures and videos in accordance with the picture (21). The suitability of the use of the color composition of learning materials (22). The display design of learning materials is simple and attractive (23). Easy to operate (24).

After conducting a feasibility assessment on the physics digital flipbook module in the sensing system, further analysis is carried out and then the average percentage is obtained for each indicator item in the following table.

Table 3. The Results of The Feasibility Test of The Digital Physics Flipbook Module in The Sensing System

No. Items	Scores	No. Items	Scores
1	100%	13	80%
2	80%	14	70%
3	90%	15	70%
4	80%	16	80%
5	90%	17	90%
6	100%	18	100%
7	100%	19	90%
8	70%	20	80%
9	80%	21	80%
10	100%	22	70%
11	90%	23	90%
12	80%	24	90%

Based on table 3. above, it can be seen that the average percentage of validity is 85%. this shows that the digital physics flipbook module in the sensing system is feasible to use and is included in the good category, according to the eligibility criteria according to Arikunto (2010); Bustanil, et al*.,* (2019); Anwari, et al.,(2020). The developed modules are feasible based on the assessment of didactic, constructional, technical and linguistic aspects that have been assessed by experts and users.

From the assessment that has been obtained, the highest score results are obtained on the indicators of learning materials, module construction which contains tables and instructions for use, and language in accordance with EYD. While the lowest scores were obtained for systematic summaries, author profiles, material design and layout, and the use of color composition. However, the developed module is still said to be feasible to use. Because in fact the module is not only used as a learning media but also a source of learning.

The very rapid development of technology makes students required to be proficient in using digital device technology or in other terms students are asked to practice digital literacy competencies. Digital literacy is closely related to technology and multimedia devices. Technology or multimedia that is used as a means of learning media is made so that students can maximize the existence of technology to support learning. In addition, the use of technology or multimedia as a learning medium is expected to attract students' motivation in learning.

The current learning process prioritizes the modernization of digital education. where learning activities can be done anywhere and anytime. To be able to continue to support learning activities properly, it is necessary to develop learning media that can be accessed easily anytime and anywhere so that students can always access learning materials without being hindered by place and time.

Flipbook e-module is a simple technology-based learning media. Before using more innovative technology-based learning media such as virtual laboratories and so on, students should first be introduced to simple technology-based learning media such as flipbook modules. Apart from being practical and simple, it also has a complete explanation and is accompanied by learning videos that can help students better understand the learning material. Apart from curriculum requirements and development. The technology, E-Module, was chosen due to its advantages; easy to learn anytime, anywhere; colorful pictures and photos can be displayed; easy to edit; it can be easily integrated with other learning that is blended learning (Ridwan, Hamid, & Aras*,* 2020; Roberts, 2009; Sorokin & Rougier, 2018; Sukhothai Thammathirat Open University, 2019).

The use of e-module flipbooks, both as learning media and learning tools, is also expected as a means for students to train them to be accustomed to using digital devices as a learning

tool and to maximize the use of technology-based learning media properly. In addition, the use of technology in learning activities, especially flipbook e-modules, is expected to increase students' digital literacy.

E-module learning physics and science learning on certain material on physics material in sensing systems is still very rarely developed. Meanwhile, the current needs of students to support learning activities both inside and outside the classroom are always needed. In this e module, there is physics learning material in the sensing system which includes the vision system, hearing system, olfactory system, taste system, and touch system. In each of these senses there are integrated physics learning materials such as optical physics in the visual system, sound wave physics in the auditory sense, and thermodynamic physics in the touch or skin system. The learning material contained in the e-module is of course studied both at school and university.

CONCLUSION

In this digital era, students are required to be skilled in using technology devices. For this reason, to train students' skills in using digital devices, it is necessary to introduce and familiarize students to use digital devices in learning activities starting from the simplest, namely the e-module flipbook. Based on the research that has been done, it can be concluded that the digital physics flipbook module in the sensing system is feasible to use with a percentage of 80% and is in the very good category. Thus the guided inquiry-based e-module flipbook on physics material in this sensing system has been worthy of being used as teaching materials and learning media for students.

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