STUDENTS' PERCEPTIONS ON USABILITY PRINCIPLE AND INTERFACE DESIGN OF FLIPBOOK AS M-LEARNING IN HIGHER EDUCATION

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Abstract: This study aims to determine the practicality of learning media developed by using flipbook applications and what students think about the use of e-module based on flipbook. Flipbook makes it easy to prepare e-modules that are more modern, creative, innovative and competitive. Flipbook is an application that can be used to create e-books, e-modules, e-papers, e-magazine. This application is very interesting because it can add sound, graphics, images, links and videos. This research is a design and product development research (Design and Development), used the Research and Development (R&D) method and analytical through a qualitative approach (Borg & Gall, 1983). Data collection in this study is the form of e-module validation and user responses in tertiary institutions. The validators in this study are linguists and media experts. The samples and data in this study were taken at one of the higher education in Aceh, namely Jabal Ghafur University. The development of this e-module allows users to learn independently because they can access it anytime and anywhere on mobile. The validation results of media experts stated that the aspects displayed in the e-module were feasible to be used, 66.7% stated that the e-module was appropriated to use without revision and 33.3% stated that it was appropriated to use with revision. The results of the students' survey showed that the material presented in writing in the media is easy to understand, also effective and efficient in the development and use oflearning media, and Communicative: visual and audio elements support teaching materials, so that students can easily digest it with the percentage 66.5%. The results of the evaluation of students' perceptions on usability principles and interface design of Flipbook in higher education showed that Flipbook as M-Learning will give good impact on students learning.

Keywords: *flipbook maker; e-learning; e-modul;m-learning*

INTRODUCTION

A significant influence of technology on education in recent years has been change ways that students learn in a way that is changed by the teachers. Some of the ways in which technology has influenced education include; Increasing access to information, Enhancing interactivity, and Facilitating distance learning (Al-Samarraie *et al.,* 2018; Dangaiso *et al.,* 2022). The access to a variety of information or material has become simpler for the students because of technology, both in and out of the classroom. Students can use the internet and other digital resources to research and learn about a variety of topics, and they can access educational materials and resources from anywhere, at any time (Syahidi *et al.,* 2020). in addition, technology has made students to engage with educational content in more interactive and engaging ways (Yaniawati*et al.,* 2021). For example, students can use technology to participate in virtual simulations and experiments, or to collaborate on projects with other students

online.

Technology facilitated students to access educational materials and resources online, and enabled them to participate in distance learning programs. Students who might not be able to attend a typical classroom now have easier access to education. Nowadays, the advanced of technology made promoting personalized learning possible for educators. Thus, the teachers may adapt their instruction to each student's unique needs and learning preferences. Creative, innovative and competitive technology-based learning is one of the elements demanded in the Merdeka *Belajar Kampus Merdeka* (MBKM) learning curriculum. Technology-based learning strategies have become an inevitably elements in the process of teaching and learning because of changes in systems and learning patterms.

The modern learning media used can support changes in technology-based education systems that are easy to learn and accept. Currently, universities have provided e-learning to support easy and efficient learning. One of them is Flipbook that can be an effective teaching tool. There have been numerous studies on the use of flipbooks in education, and the research generally suggests that the use of flipbooks in education has the potential to engage students in a hands-on and creative way, while also helping them develop important skills related to animation, storytelling, and visual communication.It provides a user-friendly and intuitive interface which allows students to easily access course content, participate in interactive activities, and access course materials from any device (Astutik, & Milarisa, 2021; Eliyasni*et al.*, 2021;Siregar*et al.*, 2022). With the help of FlipBook, students can easily access and review course materials and access relevant information quickly, which can help them improve their learning and performance. However, the study about usability principles and interface design in qualitative perspective is still rarely found in any resources.

Therefore, this study examined (a) students' perceptions on the usability principles and Flipbook interface design in higher education and (b) the impact of Flipbook as M-Learning Media on students' experience in Learning.

Mobile learning media encompasses a diverse range of digital materials, applications, and services designed for use on mobile devices such as smart phones and tablets. Mobile learning media can be used to supplement classroom, home, and on-the-go learning. It has the potential to support traditional instruction, current digital media resources, or as a self-contained learning experience. This media provides personalized learning experiences, allowing teachers to tailor content to meet the specific needs of each student. Mobile application media can also be used to provide remote access to learning materials and to facilitate communication between students and teachers.

A rapidly growing form of education impacts on increasingly popular of Mobile learning (M-Learning) media in higher education. M-Learning leverages mobile technology, including smartphones, tablets, and laptops to provide students with access to learning material and resources that are available anytime, anywhere(McDougall, & Potter, 2019).Mobile technology is used to augment traditional learning methods such as lectures and textbooks, and provides students with the ability to access content and resources on the go. M-learning technology provides students with the opportunity to learn in a more flexible and interactive manner than traditional classroom learning. Students can access lectures, readings, and materials from anywhere, at any time. In addition, mobile technology provides students with the capability to collaborate with peers and to engage in asynchronous discussions, allowing them to connect with each other and with their professor in a more meaningful way. They can also provide immediate feedback to students, moreover, access to resources and materials it may not be offered in traditional classroom setting. M-Learning is quickly becoming a popular form of learning in higher education, and it is likely.

Usability principles refer to a set of guidelines that help designers create products and interfaces that are easy to use and intuitive for users. In the context of flipbooks, usability principles can be applied to the design of the flipbook software or tool, as well as to the design of individual flipbooks created by users. a wide variety of new smart devices and digital applications are becoming available to academics as the use of technology in education progresses. (Luna-Nevarez& McGovern, 2018).

The following are some key usability principles that can be applied to flipbooks: (1) Simplicity; A flipbook should be structured in a concise and user-friendly manner, with clear navigation and controls. This allows users to concentrate on the content of the flipbook rather than figuring out how to use the tool. (2) Consistency; A flipbook should be designed consistently, with elements like buttons and icons

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arranged consistently across all sections. This can boost user confidence and shorten the level of difficulty for using the tool. (3) Accessibility; A flipbook should be designed so that all users, including those with disabilities, can use it. This can include making the flipbook compatible with assistive technologies like screen readers and using clear and descriptive text labels for buttons and controls. (4) User-centered design; A flipbook should be created with the user's needs and goals in mind. This can include conducting user research to understand how users will interact with the flipbook and what they hope to achieve, as well as designing the flipbook to meet those needs and goals as effectively as possible.

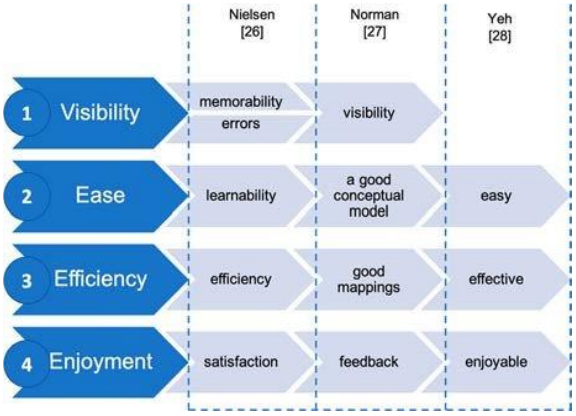

Figure 1. *Usability principles*

Figure 1. Usability principles adopted from Yeh (2010)can help designers create flipbooks that are easy to use, intuitive, and accessible to all users. The interface design of a flipbook refers to the way that the flipbook software or tool is laid out and organized, and how users interact with it to create and view flipbooks. Good interface design is essential for creating a flipbook that is easy to use and intuitive for users. Some key considerations for interface design in flipbooks include:

Layout; the layout of a flipbook should be organized in a logical and consistent way, with important elements such as buttons and controls placed in easily accessible locations.

Navigation; the navigation of a flipbook should be clear and straightforward, with options for moving between pages and sections of the flipbook easily accessible.

Controls; the controls of a flipbook should be intuitive and easy to use, with clear labels and instructions for how to use them.

Visual design. The visual design of a flipbook should be clean and simple, with a clear hierarchy of information and effective use of color, typography, and other design elements.

A well-designed interface can help users feel more confident and motivated to use a flipbook, and can contribute to their overall positive perception of the tool. The electronic module with the Flipbook maker is appropriate for use as a learning tool and can be tested in direct learning. (Roemintoyo *et al.*, 2021; Situmorang *et al.*, 2020).It is generally believed that students have positive perceptions of mobile technology as a teaching tool (Ng & Nicholas,2018).

Learning is not limited to classroom settings in the mobile digital age a single location or period of time, the teacher's job is to challenge students, give students direction on what needs to be learned and advice on how to do so, as well as teach them how exercise critical thinking and review their knowledge . The reading habits of the young participants were influenced by the iPads' built-in reader friendliness and accessibility features. Wulandari & Suparman (2019) stated; e-books that are used as learning resources in Problem Based Learning need to be designed and developed.

The benefits of reading eBooks on mobile devices are discussed along with ways to make readers more motivated. There is little discussion of the importance of emotions, human assistance, and personal efficacy in the integrating of new technology. However, the combination of the two dimensions of self-efficacy (human-assisted self-efficacy and individual self-efficacy) there are three dimensions of emotional attachment (affection, passion, and connection) can be used to enhance online learning by providing a more interactive and engaging way for students to learn. For example, a teacher could use flipbooks to create interactive lessons or quizzes that students can access and complete online. Additionally, students may find flipbooks to be a more interactive and hands-on way to learn, as compared to more traditional teaching methods such as lectures or readings. Thus, students tend to have positive perceptions of mobile technology as a teaching tool, finding them to be engaging, interactive, and enjoyable to use.

Supplementing in-person instruction, flipbooks can be used to supplement in-person instruction by providing additional visual and interactive resources for students to engage with. For example, a teacher could use flipbooks to demonstrate key concepts or principles, or students could create their own flipbooks to illustrate what they have learned. Promoting collaboration: Flipbooks can be used to promote collaboration between students, both in person

and online. For example, students could work together to create a flipbook as a group project, or they could use flipbooks to share their work with their classmates. Overall, flipbooks can be a useful teaching tool in a blended classroom, providing a visually engaging and interactive way for students to learn and collaborate.

METHOD

This study is a design and product development research (Design and Development), which employs a qualitative analytical framework and Research and Development (R&D) methodology (Borg & Gall, 1983) proposed ten steps in conducting R&D Method.

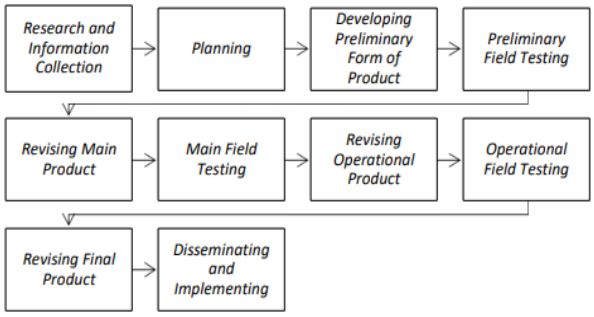

Figure 2. *R&D Method steps*

The data collection technique in this study was an online questionnaire consists of Likert-style items to determine user responses and flipbook maker based on e-module validation. Validation is measured by expert tests, namely media experts and linguists. So that flipbook-maker can be used to increase creativity in preparing e-modules. Then in the e-module validation stage, it was carried out by 2 experts from each expertise, a media expert and a linguist.

The data analysis method employed in this study is a qualitative descriptive analysis method that explains the outcomes of product development in the form of electronic modules created utilizing a flipbook maker program.

RESULTS AND DISCUSSION

The creation of this Flipbook maker-based e-module makes it makes easier for them to learn independently because they may access it wherever they are.

According to the media experts' validation results, 66.7% of the features presented in the e-module could be used without revision. Media experts in this study also stated that e-module is very creative and feasible to use; the display was very attractive and easy to understand. 33.3% stated that it was appropriate to use it with revisions to the material evaluation section, author biographies, and preferably could be used offline.

This is main concept in the development of ICT-based teaching materials, in other words, in the teaching and learning process the teachers/lecturers should be creative and innovate to following new technological developments. Despite the creative and easy usage, e-module has a significant role in improving students' critical thinking skills and learning outcomes, engaging students and promoting their independent learning (Roemintoyo *et al.*, 2021;Safitri, A.*et al.*, 2021). Furthermore, this media can be used to facilitate collaborative learning and provide personalized learning experiences for students (Sunitha *et al.*, 2020; Suzanne, 2022; Triwahyuningtyas *et al.*, 2020;Wahyuni *et al.*, 2018).Figure 5 shows the result of media expert validation of feasibility and practicality of the use e-module based on flipbook maker.

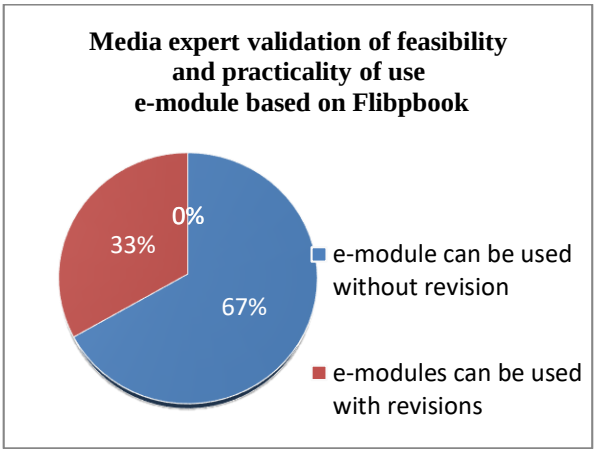

Figure 3. *Media expert validation of the feasibility and practicality of using e-modules based on Flipbook*

The results of media expert show that 67% of the e-modules are useable and practical for the educational process. 33% stated that appropriate to use with revisions. The pictures below show some point to setting the e-modules by using FlipBook.

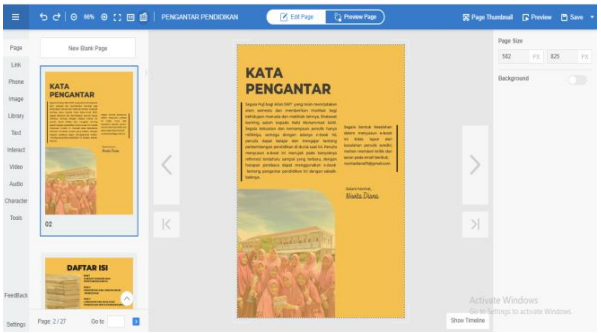

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Figure 4.*E-modules setting by using Flipbook*

Flipbooks allow educators to add some videos and animations or moving images on learning media pages. Through this feature, the flipbook makes it simpler for students to understand abstract material as multimodal resources to promote sociocultural understanding through digital tools Njenga, J. K. (2018).

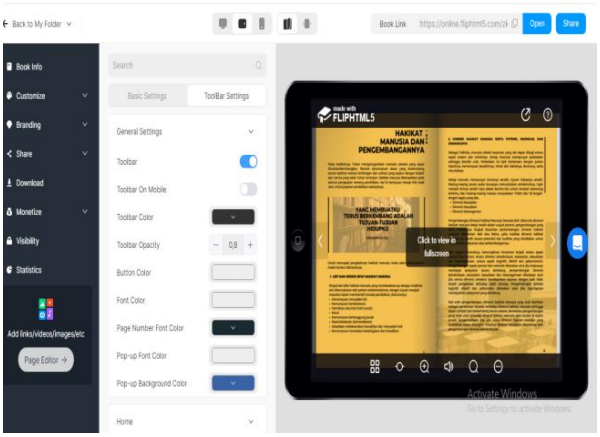

Figure 5. *Flipbook features*

E-Modules can be designed in the Canva Application before importing files into the Flipbook application. It aims to make the design more attractive and easier for readers to read and understand as the pictures above.

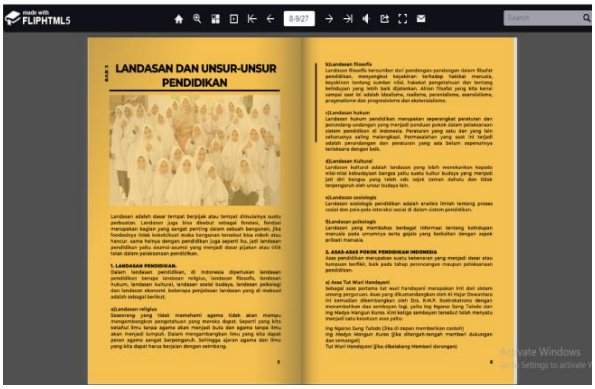

Figure 5. *E-modules design*

Apply the flipbook application to students in higher education and to create digital literacy which is expected to increase students' knowledge, skills, interest and learning motivation, and also can increase students' literacy interest (Saputri*et al.*, 2022).

Rahmawati & Gusniwati (2022) state that the innovation in the teaching learning process is needed in solving problems for online learning. The design of e-module which can be accessed online is one of the innovations in education.

The Table below shows the result of the students' perception on usability principles and interface design of Flipbook in higher education. Some of the aspects assessed by students are shown in the table below. This is an aspect commonly encountered in an electronic-based learning design; especially the aspects used in designing E-Modules based on flipbook maker (1) Lack of material concepts presented, (2) The accuracy of the sentence structure used in the digital book, (3) The material presented in writing in the media is easy to understand, (4) innovative and creative (new, adaptable, interesting, and unique), (5) Communicative (clear, accurate, and usefull language that is simple to understand), (6) Excellent (has advantages compared to other learning multimedia or traditional techniques), (7) Effective and efficient in the development and use of learning media, (8) Usability (easy to use and simple to operate), (9) Complete learning multimedia documentation includes: troubleshooting (clear, structured, and anticipatory), program design (clear, and describes program workflow), and (10) Communicative: teaching materials are supported by audio and visual components, so that students can easily digest them. The percentage of each aspects shows in the table below;

Table 1. *Results of students' responses*

No	Aspects	Percentage %
1	Lack of material concepts presented	88.9%
2	The accuracy of the sentence structure used in the digital book	77.8%
3	The material presented in writing in the media is easy to understand	66.7%
4	innovative and creative (new, adaptable, interesting, and unique),	66.7%
5	Communicative (clear, accurate, and useful language that is simple to understand),	55.6%
6	Excellent (has advantages compared to other learning multimedia or conventional methods)	55.6%
7	Efficient and Effective in the development and use of learning media	66.7%
8	Usability (simple to operate and easy to use)	55.6%
9	Complete learning multimedia documentation includes: troubleshooting (clear, structured, and anticipatory), program design (clear, and	55.6%

	describes program workflow)	
10	Communicative: teaching materials are supported by audio and visual components so that students can easily digest them	66.7%

The information in the table above demonstrates that the design layout, the program design, and the multimedia documentation are good. The navigation of the e-module based on the flipbook maker was easy to use, effective and efficient, and simple to operate on mobile. The controls of e-module were very support by flipbook maker, beside easy to use, e-model base on flipbook maker also communicative, its mean that easy to understand and the visual elements very support the students to used that e-module everywhere and this e-module was colorful so that, e-module makes the students interested in reading and learning the material presented in it. The usefulness, ease of use, and interactivity of e-books can be an effective tool in enhancing students' achievement and perceptions (Alimiah *et al.* 2022; Almekhlafi, A. G., 2021). The incorporating e-books into teaching practices promote student engagement and learning (Acesta ,*et al.* 2021; Daud,*et al.* 2022; Ermawati, *et al.* 2021; Fahmi *et al.* 2019).

The results of the evaluation of students' perceptions on usability principles and interface design of Flipbook in higher education and also the impact of Flipbook as M-Learning Media on students' experience in Learning showed that the percentage of scores; Lack of material concepts presented is 88.9%, The accuracy of the sentence structure used in the digital book with percentage 77.8%, The material presented in writing in the media is easy to understand is 66.7%, innovative and creative (new, adaptable, interesting, and unique) also 66.7%, 55.6% in aspect Communicative (clear, accurate, and useful language that is simple to understand), Effective and efficient in the development and use of learning media is 66.7 %, Usability (easy to use and simple to operate) is 55.6%, the aspect of Complete learning multimedia documentation includes: troubleshooting (clear, structured, and anticipatory), program design (clear, and describes program workflow) is 55.6%, and Communicative: visual and audio elements support teaching materials, so that students can easily digest them is 66.7%. It means that the e-module based on Flipbook will give good impact on students learning with percentage 66.5%.Flipbook can be an innovative digital learning media that prepares education for facilitating 21st-century learning. However, it is important to note that the effectiveness of any learning tool or technology depends on various factors such as the quality of content, the teaching approach, and the student's individual learning style. Therefore, it is important to carefully evaluate the effectiveness of e-modules based on Flipbook or any other technology in specific contexts and for specific learning outcomes (Astuti*et al.* 2021; Fowler*et al.* 2020; Nita *et al.* 2023)

CONCLUSION

This study investigated two research questions; (a) students' opinions on usability principles and interface design of Flipbook in higher education and (b) the impact of Flipbook as M-Learning Media on students' experience in Learning. The result showed that learning by using e-module based on Flipbook maker as M-learning in higher education is needed to explore more, so that will give the students good impact. Based on the percentage of score scored it appears that Flipbook as M-Learning Media on students' experience in Learning are well-category and worth using in Higher Education. The innovation in the teaching learning process is needed in solving problems for online learning in this era. The findings of the current study have implications for researchers, students, lecturer, and teacher etc.

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