

# Development of Digital Teaching Materials Assisted by Flipbooks on Momentum and Impulse Materials to Improve Students' Conceptual Understanding

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## ABSTRACT

*This study aims to determine the results of the validation test of digital teaching materials made using Flipbooks and to see an increase in students' understanding of the concept of momentum and impulse material. This research is included in research and development (R&D). Three experts carried out validation to assess the product developed from content, presentation, language and graphics. Based on the results of the validity test of the content feasibility aspect, the results obtained in the very high category, the presentation aspect in the High category, the language aspect in the high category and the visual aspect in the very high category. Furthermore, students are given a pretest and posttest questions to understand the physics concept. The average score for the pretest was in a low category; for the posttest, the average score was high. Based on these results, the digital teaching materials using FlipBook are valid, included in the high category, and can improve students' understanding of concepts.*



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## INTRODUCTION

The learning process in academic units is interactive, stimulating, fun, and challenging, motivating students to participate actively and providing opportunities for initiative, creativity, and, by the talents, interests, and independence of students' physical and mental development (Indariani, 2018). So in an academic unit, the learning carried out must be carried out in an inspiring, interactive, fun, motivating, and challenging manner so that students can participate actively and must be able to provide sufficient space for their initiative, independence, and creativity, according to their interests. , talent, and student development. Psychological and physical students. In the 2013 Curriculum, revised in 2017 and also known as the National Curriculum, students must be more active in the learning process; in this National Curriculum, the teacher is only a facilitator during the learning process (Sunarti, 2020).

Improving the quality of education is a focal point for every country in the world today, and our country, Indonesia, is no exception. The government has made various efforts

and strategies to improve this country's education quality. Human resources are needed to improve the quality of education and be able to compete in global competition and the current rapid development of technology (Bakri, 2016). In the learning process, the development of science and information technology is needed to encourage better learning processes in the future. Teachers must be able to use technology for effective learning (Ruhiat, 2019). A teacher must have sufficient understanding and knowledge about developing technology to use it so that the learning process can be more interesting for students. In the era of information technology which is currently developing in everyday life, students always interact with digital technology (Rahimah, 2021). For example, the use of computers is growing in education. The benefits are not only for tools used for administrative matters but also used as learning tools.

One of the subjects in the branch of science is physics which studies various objects that exist in nature, symptoms, and phenomena that occur in nature (Khumaidi, 2018). By studying physics, students are invited to be able to understand various natural phenomena and everyday problems, think, analyze, and solve problems. One subject that is difficult for most high school students to understand is physics learning (Septarini, 2021). When researchers made observations at SMA N 2 Solok, researchers found that the problem that students often encounter when studying is misunderstanding when studying physics material. One of the materials that are difficult to understand when studying physics is the matter of momentum and impulse. This momentum and impulse material contains many physics concepts that apply in everyday life (Hasanah, 2017). The quality of school physics education depends on several factors, including facilities, laboratory tools, materials, and good learning media to carry out the learning process. Increasing students' understanding of learning material through learning processes supported by learning resources (Ngurahrai, 2019). Teaching materials are learning resources obtained during the learning process.

The world of education in this era is closely related to the development of information and communication technology (Hapid, 2021). Physics is one of the natural sciences that studies nature and natural phenomena and all human-observable interactions (Nabilah, 2020). Student curiosity should also be encouraged and encouraged. The learning process in schools uses students as a determinant of the success of achieving goals in the learning process (Hayati, 2015). Because physics is an experimental science, by conducting experiments, students not only understand and master the concepts, theories, principles, and laws of physics but also apply the scientific method and develop a scientific attitude of these students (Zulhaini, 2016).

It is a conceptual understanding when one shows a structural understanding relationship that is free from errors (Chusni, 2016). In this case, contextual understanding is related to the quality of students' understanding of individual structures. Teachers need to pay attention to the relevance of the material to the concepts applied in real everyday events (Setiawati., 2018 ). The importance of understanding concepts can be seen in the curriculum, which contains the importance of understanding concepts at every level of education. Curriculum Knowledge Competence formulates the dimensions of students' knowledge, including actual conceptual and procedural knowledge (Ramadani, 2020).

Based on the author's observations at one of the Solok City Public High Schools when carrying out Physics Learning Innovation practices, students are currently very interested in digital technology. They are very enthusiastic about learning to use laptops and cell phones. Therefore, a trainer must be able to study the situation and prepare learning resources and master the media according to what students like so that students can focus on getting to know. Due to the absence of mastery resources in virtual form to assist learning and the limitations of available learning resources and media, the authors are interested in making digital teaching materials. Moreover, the teaching materials used by teachers in schools are

printed books. Some students find it difficult to carry printed books, especially if there are more than two lessons in one day. In contrast to digital teaching materials that can be opened with a mobile phone, the objects made are light and easy to carry anywhere.

Digital teaching materials are teaching materials packaged in digital form, which can be audio, audio-visible, or interactive multimedia (Sa'diyah, 2021). To the initial understanding of coaching materials, digital teaching materials are hard and fast materials that are systematically arranged and show a desire to master skills by using students in mixed mastery methods in interactive multimedia. Some of the teaching materials included in digital teaching materials include books such as e-books, digital magazines called e-magazines, interactive multimedia CDs/DVDs, flash models, e-learning, and others. (Fonda., 2018)[18]. One of the applications used to create digital teaching materials is Flipbook (Hamid, 2021). Make training materials digital using Flipbook as this app is not only centred on writing, But it can be in motion animation, video, and audio to become an interesting and interactive learning media so that mastery is not monotonous (Riduwan, 2015).

Based on the description above, a study titled "Development of Digital Teaching Materials Using Flipbooks to increase students' understanding of the concepts of Momentum and Impulse" was carried out. This study aims to determine the results of expert validation tests on digital teaching materials developed using Flipbooks on Impulse and Momentum Material and to see an increase in students' conceptual understanding.

## METHODS

This research was conducted at SMA N 2 Solok in May 2022. This development research produced digital-based knowledge products using four stages of development. First, define, design, develop, and disseminate. The development phase of digital teaching materials was carried out at the Faculty of Physics Education, FMIPA UNY; then, it was exclusively tested on 25 students of class X MIPA 2 SMAN 2 Solok. Data acquisition methods used include validation, observation, and testing with pretest and posttest questions and using a questionnaire distribution method. Observers used the observation method, namely observing student activities in class. The testing technique is carried out directly by distributing teaching materials virtually through the flipbook program to students and certain work institutions. The checkout method is carried out by giving pretest questions before learning and posttest after mastering the application of flipbook-assisted digital teaching materials on momentum and impulse material. Data analysis was carried out with validation by experts. With the following validity criteria:

**Table 1.** Validity Criteria

| Criteria      | Information |
|---------------|-------------|
| 0,800 – 1,000 | Very high   |
| 0,600 – 0,799 | High        |
| 0,400 – 0,599 | Quite High  |
| 0,200 – 0,399 | Low         |
| 0,000 – 0,199 | Very low    |

(Riduwan, 2015)

## RESULTS AND DISCUSSION

### Results

The results of the product developed are in the form of Flipbook digital physics teaching materials on momentum and impulse material. Figure 1 shows the cover page of digital flipbook teaching materials.

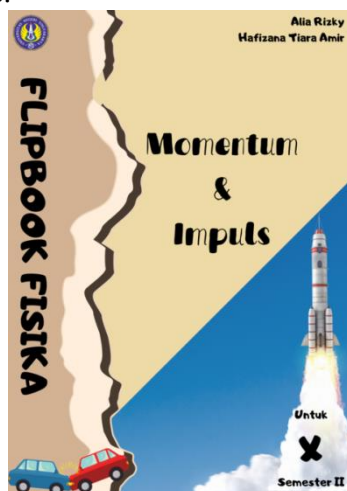


Fig. 1. Cover Page

Figure 1 shows momentum and impulse learning materials, author names, class and semester descriptions, and the Yogyakarta State University logo. The aspects of digital teaching material validation that are assessed are content feasibility, presentation feasibility, language, and graphics, as shown in table 1 below:

**Table 2.** Validation of Digital Teaching Materials

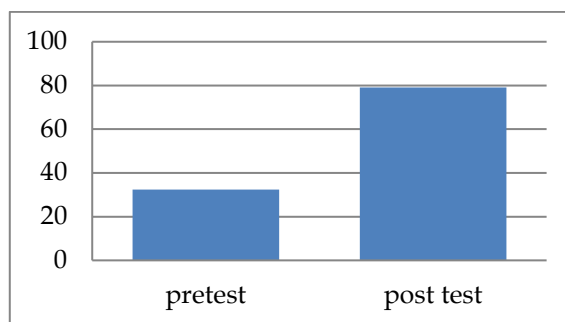
| Aspect               | Score | Information |
|----------------------|-------|-------------|
| Content Eligibility  | 0,85  | Very high   |
| Eligibility to Serve | 0,78  | High        |
| Language             | 0,78  | High        |
| Chart                | 0,82  | Very high   |

Table 1 shows that for content feasibility, the result is 0.85 for very high information, a presentation feasibility value of 0.78 for very detailed, a language value of 0.78 for very high information, and a graphics value of 0.82 for very high information. Thus, the overall average value of the validation results of digital teaching materials is as follows:

**Table 3.** Average Flipbook Validation Results

| All aspects | Validator |     |     | V   | Information |
|-------------|-----------|-----|-----|-----|-------------|
|             | 1         | 2   | 3   |     |             |
|             | 135       | 128 | 118 | 0,8 | High        |

Based on the average table of flipbook validation results, the Aiken V value of the flipbook validation indicator is 0.8. The increase in students' conceptual comprehension skills can be seen from the average pretest and posttest scores, as shown in graph one below.



**Fig. 2.** Graph of Pretest and Posttest Scores

The graph shows an increase in students' conceptual understanding abilities. In the pretest before learning using digital teaching materials, an average score of 34.2 was obtained. For the posttest, which was carried out after giving learning using digital teaching materials, an average score of 79.04 was obtained. Based on these values, there is an increase in students' understanding of concepts.

## Discussion

The digital teaching materials produced in this study are flipbook-assisted digital teaching materials which can increase the understanding of the concept of momentum and impulse material, which is used to improve students' conceptual understanding of the material momentum and impulse.

The digital teaching materials obtained in this study are digital teaching materials that can improve students' understanding of concepts on momentum and impulse material. The Teaching Materials section that was developed includes the front cover, cover with an identity column, introductory terms, features, indicators of understanding the concept, table of contents, topics, time allocation, essential competencies, learning indicators, learning objectives, and digital instructions for the teaching materials used.

The digital teaching materials developed in this Flipbook can be accessed from a PC/laptop or smartphone with an active internet requirement. Digital teaching materials are packaged as e-books that can be filled out immediately; for example, students may experience working with printed books. In addition, digital teaching material data is supported by images and videos that can help students understand. To open flipbook-assisted digital teaching materials, click the link sent by the researcher. Therefore, digital teaching materials are needed as learning media inventions that can arouse student learning interest to deepen understanding and achieve student learning success.

In Figure 1, there are momentum and impulse learning materials, author names, class and semester descriptions, and the Yogyakarta State University logo for the validation aspects of assessed digital teaching materials: content feasibility, presentation feasibility, language, and graphics. Table 1 shows that for content feasibility, the result is 0.85 for very high information, presentation feasibility with the value of 0.78 for very detailed, language with the value of 0.78 for very high information, and graphics value 0.82 for very high information. Based on the average table of flipbook validation results, the Aiken V value of the flipbook validation indicator is 0.8. In Figure 2, a graph shows an increase in student's conceptual understanding abilities. In the pretest before learning using digital teaching materials, an average score of 34.2 was obtained. For the posttest, which was carried out after giving learning using digital teaching materials, an average score of 79.04 was obtained. Based on these values, students' understanding of concepts increases.

## CONCLUSION

Based on the data, data analysis, and discussion that has been described, it can be concluded that Flipbook Assisted Digital Teaching Materials on Momentum and Impulse Material have been validated by experts, namely:

1. Flipbook-Assisted Digital Teaching Materials are appropriate for use based on the validation results using Aiken V carried out by validators in the high category.
2. Students after learning to use flipbook-assisted digital teaching materials on momentum and impulse material based on the results of the Pretest and Posttest, students experienced a significant increase in their ability to understand concepts.

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