

Development of interactive e-book for science learning in fifth grade elementary school students

Submitted: Imroatul Khofifah^{1*}, Meirza Nanda Faradita^{2*}, Fajar Setiawan³
27 February 2023 Imroatul.khofifah-2019@fkip.um-surabaya.ac.id¹,
Accepted: meirzananda@fkip.um-surabaya.ac.id²,
18 Juli 2023 fajarsetiawan@um-surabaya.ac.id³
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Abstract: *The type of research used by the researchers is generally aimed at developing a learning media or improving existing products to make them more effective. This study is development research, specifically focusing on the development of an interactive E-book-based media for Science learning in fifth-grade elementary school students, specifically covering the topic of the human movement organ. The method employed in this research is Research and Development (RnD), using the 4-D Thiagarajan model (Definition, Design, Development, Dissemination). The research instruments used include Validation Sheets (media experts and subject matter experts), Questionnaires (student responses), and Test Sheets (Learning Outcome Tests). The study results in the creation of an electronic medium, an interactive E-book, that completed high-quality criteria in terms of validity, practicality, and effectiveness. The media's validation results by the subject matter experts were 87.5%, and by the media experts were 86.5%, both categorized as "Highly Feasible." The practicality of the media was rated at 92.2% with the criterion of "Practical" based on student learning outcomes. The effectiveness test showed that 87% of students achieved scores that completed the Minimum Mastery Criteria (KKM). In conclusion, the developed product obtained high-quality criteria in terms of suitability, practicality, and effectiveness.*

Keywords: *Interactive E-Book, Science Learning Outcomes.*

PRELIMINARY

According to the Republic of Indonesia Law No. 20 of 2003, Article 1, point 1, education is described as the national education system, which involves conscious and designed efforts to create a conducive learning environment and learning processes to enable learners to be active and develop their potential abilities (Afiani & Faradita, 2020). Education is the process of drawing out something from within a person through structured learning experiences in formal, non-formal, and informal educational settings, with the objective of optimizing an individual's abilities, so that they can apply their roles properly and well (Suprpto, Apriandi, & Pamungkas, Putri, 2019). Based on these explanations, it can be concluded that education is an effort to provide skills and

capabilities to individuals so that they can adapt to future changes and apply their roles suitably and responsibly.

Developing technology-based electronic learning media to facilitate the learning process is a manifestation of the profound impact of technological advancements in various fields, including education (Laili, Putriani, & Widiastuti, 2021). The rapid development of technology has penetrated every aspect of life, including the realm of education, which was previously untouched by any form of technology. As a result, conventional methods were considered the most effective means of delivering educational content to elementary school students.

Based on observations involving teachers of fifth-grade students at MI Muhammadiyah 25 Surabaya, it is noted that the teachers primarily use traditional teaching methods such as using chalkboards and delivering lectures. They rarely utilize varied learning media, such as interactive PowerPoint presentations, and the use of multimedia is limited to showing YouTube videos occasionally. Moreover, during the learning process, students tend to focus mainly on their textbooks. Learning through textbooks is considered monotonous due to their ordinary and uninteresting appearance. In contrast, smartphones offer a wide range of exciting features, easy accessibility from anywhere, practicality, and portability, making them more appealing to students.

The researchers leverage the fifth-grade students' preference for diverse and digital learning experiences by developing an interactive E-book media. *The interactive E-book* serves as a learning tool that creates an enjoyable atmosphere for students, preventing feelings of boredom and disinterest in learning. An E-book is an electronic or digital book, also known as an electronic book (E-book). It is a book presented in an electronic format. E-book has various output formats, including: 1) AZW (Amazon World), 2) EPUB (Electronic Publication), 3) KF8 (Kindle Fire), 4) MOBI (MobiPocket), 5) PDB (Palm Database), 6) PDF (Portable Document Format), 7) Apart from these formats, there are also PRC (Palm Resource), HTML (Hyper Text Markup Language), CHM (Compressed HTML), XHTML and XML formats.(Lestari et al., 2016). The various E-book formats mentioned above mostly follow the device used to read them. The E-book developed by the researchers was created using the assistance of Flip PDF Corporate Edition software. This software provides various features that enable the creation of a book that can be displayed on desktop devices. The interactive E-book

includes images, audio, and educational videos, all of which are designed to capture the interest of elementary school students, encouraging them to delve deeper into the material and enhance their understanding. Thus students can enjoy learning material with different impressions easily and according to the right technique.

Research with the title "Development of Animation-Based Interactive E-books for Vocational High School Students". From the results of this research, it can be concluded that the developed interactive E-book learning media is highly practical and capable of significantly improving student learning outcomes, achieving a completion rate of 97.19%. From these results, it showed that the developed interactive E-book media based on animation is very feasible to be used to support learning activities in class (Suprpto et al., 2019). The second study, titled "Development of Interactive Taxi E-book (Fictional Story) as a Media for Literature Appreciation Skills." From the results of this study it can be stated that the feasibility of the interactive E-book "Taxi". Based on the material experts scored 86% and media experts scored 86%. Additionally, the readability results were remarkably high, with 88% for teachers and 99% for students. Therefore, it can be concluded that the interactive E-book media "Taksi" is deemed suitable and appropriate for use as a learning media in the teaching and learning process (Laili et al., 2021).

The objectives of this development research are 1) to produce development products in the form of interactive E-book media on human movement organ material, 2) to describe the quality of the product being developed in the form of interactive E-book media on human movement organ material based on eligibility (media validity), media practicality, and media effectiveness.

The type of research used by researchers generally aims to develop a learning media or improve existing products to make them more effective. Researchers need to develop E-book-based teaching materials for learning Organs of Human Movement in the fifth grade of MI Muhammadiyah 25 Surabaya and become the latest innovative solution in technology-based learning media. So the researchers proposed research with the title "Development of Interactive E-books in Learning Science for Fifth Grade Elementary School Students".

METHOD

This study used the Research Method *and Development* (Rnd). Research on interactive e-book development for fifth grade elementary school students. The learning

device development model used by researchers is 4-D which was developed by Thiangharajan learning device development strategy (Afiani, 2015). Which includes 4 stages, as follows:

1. Defining
2. Design
3. Development
4. Dissemination

This research was conducted at MI Muhammadiyah 25 Surabaya for the academic year 2022/2023, the subjects in this study were students in class 5A MI Muhammadiyah 25 Surabaya, for the academic year 2022/2023 with a total of 30 students. The object of this research was learning media based on Interactive E-books on the material "Human Organs of movement for elementary school students in grade 5A". The research instruments used in data collection for the development of interactive E-book research include validation sheets in the form of feasibility aspect of the material and the feasibility of media design, practicality sheets, including student responses and student learning outcomes tests.

Data Analysis Technique

1. Validity Analysis

With the following formula (Akbar, 2013) :

$$V_{ah} = \frac{\text{Total Score obtained}}{\text{Maximum Total Score}} \times 100\%$$

Description: V_{ah} = Expert Validity

The conclusions were obtained using the percentage table (Sudjana, 2016). Test results whose percentages are known can be equated with the validity criteria presented in the following table.

Table 1. Assessment Guidelines

Percentage	Criteria
81%-100%	Highly Feasible
61%-80%	Feasible
41%-60%	Quite Feasible
21%-40%	Less Feasible
0%-20%	Not Feasible

Source: (Akbar, 2013)

2. Practicality analysis

presented below (Akbar, 2013)

$$x = \frac{\text{Total Score obtained}}{\text{Maximum Total Score}} \times 100\%$$

Description:

X= Number of Responses Students then conclude the results obtained using the percentage table. The following table presents practicality assessment guidelines

Table 2. Practicality Assessment Guidelines

Percentage	Criteria
81%-100%	Very Practical
61%-80%	Practical
41%-60%	Quite Practical
21%-40%	Less Practical
0%-20%	Impractical

Source: (Akbar, 2013)

3. Effectiveness analysis

With the following formula (Sudjana, 2016):

$$DP = \frac{F}{N} \times 100\%$$

Description:

DP = Percentage value

F = Number of students who complete

N = Total number of students

To determine the effectiveness of the student learning outcome test indicators, the students' learning outcomes must meet the Minimum Mastery Criteria (KKM) of 85, reaching 85% of the total number of students.

RESULTS

The results of this development research produced a product in the form of Interactive E-book learning media created using Flip PDF Corporate on Human Organs of Movement material for fifth-grade elementary school students. There are three concepts of menu distribution in the media that the researcher developed which consists of: the main menu section, the content section, the material presented in the learning

media in the form of : the human skeleton, joints, muscles, and how to maintain the health of the human locomotor and in the closing section there are evaluation questions.



Figure 1. Main Menu

Source: Processed by Researchers, 2022

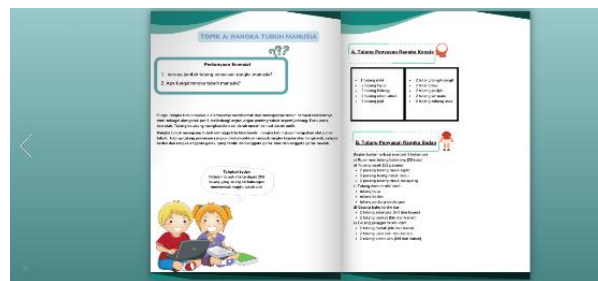


Figure 2. Content

Source: Processed by Researchers, 2022



Figure 3. Closing

Source: Processed by Researchers, 2022

Results of the Validity Test of Interactive E-book Learning Media

Material Validity Test Results

The following table presents the results of the material validation test data from the four validators

Table 3. Material Expert Validation Test Data

Amount	Validator								Average	
	1		2		3		4			
	I	II	I	II	I	II	I	II	I	II
Amount	29	63	33	71	38	66	44	63	36	66
Average	2,9	6,3	3,3	7,1	3,8	6,6	4,4	6,3	3,6	6,6
Percentage	38%	84%	44%	94%	50%	88%	58%	84%	47,5	87,5%
Feasibility	Less	Hig	Quit	Hig	Quit	Highl	Quit	Hig	%	S
	Feas	hly	Feas	hly	Feas	Feasib	Feas	Feas	Quite	Highly
	ible	Feas	Feas	Feas	Feas	le	ible	Feas	Feasi	Feasibl
		ible	ible	ible	ible		ible	ible	ble	e

Source: Processed by Researchers, 2022

Based on Table 3, the content validation test was conducted twice, and the average results obtained from the first validation were 47.5%, while in the second validation, it increased to 87.5%. This percentage falls under the category of "highly feasible" within the percentage range of 81-100%.

Media Validity Test Results

The following table presents the results of the media validation test data

Table 4. Media Validation Test Data

Amount	Validators								Average	
	1		2		3		4			
	I	II	I	II	I	II	I	II	I	II
Amount	36	67	30	63	32	68	36	62	33	65
Average	3,6	6,7	3,0	6,3	3,2	6,8	3,6	6,3	3,3	6,5
Percentage	48%	89%	40%	84%	42%	91%	48%	83%	44,5	86,5%
Feasibility	Quit	Hig	Quit	Hig	Quit	Highl	Quit	Hig	%	Highly
	e	hly	e	hly	e	y	e	hly	Quite	Feasibl
	Feas	Feas	Feas	Feas	Feas	Feasib	Feas	Feas	Feasi	e
	ible	ible	ible	ible	ible	le k	ible	ible	ble	

Source: Processed by Researchers, 2022

Based on Table 4, the media validation test was also conducted twice, and the average results obtained from the first validation were 44.5%, while in the second validation, it increased to 86.5%. This percentage falls under the category of "highly feasible" within the percentage range of 81-100%.

Results of the Practicality Test of Interactive E-book Learning Media

Media practicality test data obtained based on student responses. In the following, the results of the practicality test data are presented based on the responses of 5A MI Muhammadiyah 25 Surabaya students.

Table 5. Practicality Test Results Data

Aspect	Average	Criteria
Student response questionnaire sheet	92.2%	Practical

Results of the Effectiveness Test

The effectiveness of learning media is based on learning achievement tests given to students after learning using interactive e-book learning media. The following presents the percentage of classical completeness of student learning outcomes.

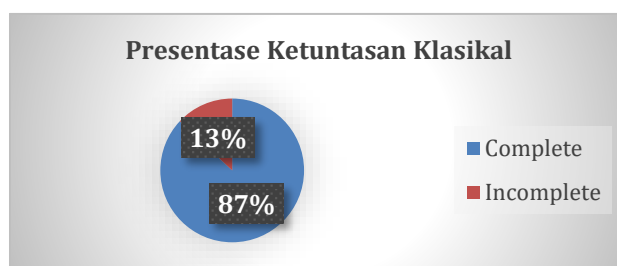


Figure 4. Classical Mastery percentage diagram

Source: Processed by Researchers, 2022

Based on the diagram above, the results of classical completeness percentage are 87%, from the learning outcomes test 4 students are getting the "Incomplete" category. The learning outcomes of students who meet the KKM of 85 reach 87% of the total number of students.

DISCUSSION

This research is development research which produced a product in the form of interactive E-book media for elementary school science learning with the material "Human Movement Organs" with material content on the human skeleton, joints, muscles, and how to maintain the health of the human locomotor. This product is a digital media, interactive learning media made with Flip PDF Corporate software and published in html5. The learning media packs several media elements including text, images, audio,

video, and backsound. The development of this interactive E-book media is expected to be a solution in creating varied learning.

Flip PDF Corporate is software that can be used to open the pages of a module like a book, besides that it is also easy to operate. Access to this media can be used without having to install the Flip PDF Corporate software because the media that has been created is in the form of html 5 format, the produced media cannot be changed or edited.

Material Validation

Based on the material suitability calculations by the four subject matter experts, the interactive E-book media received a score of 87.5% in the second validation, the material on the interactive E-book media is said to be "Highly feasible" for use in the learning process. The use of learning media in science learning is expected to create interactive media capable of providing an understanding of the material, attracting student motivation and concentration to increase student understanding of the material, increasing enthusiasm for learning and increasing student learning concentration (Layona, Yulianto, & Tunardi, 2017). The use of learning media, especially in Science education, indeed facilitates students' understanding of the subject matter and enhances their motivation and concentration during learning.

Kepraktisan Media

Data uji kepraktisan media didapatkan berdasarkan respon siswa. Respon siswa ini didapatkan dari siswa kelas 5A MI Muhammadiyah 25 Surabaya, jumlah siswa yang mengisi angket adalah 30 siswa. Hasil data uji kepraktisan berdasarkan respon siswa memperoleh hasil presentase sebesar 92,2% dengan kriteria "Praktis". Penggunaan media dalam proses pembelajaran mampu menciptakan pembelajaran yang sistematis oleh guru kepada siswa (Deni, 2012). Dapat ditarik kesimpulan bahwa penggunaan media pembelajaran dalam proses pembelajaran mampu menciptakan pembelajaran terstruktur dan inovatif untuk mencapai tujuan pembelajaran yang telah ditentukan.

Media Effectiveness

The data on the effectiveness test of the interactive E-book media was obtained from the scores of the 5th-grade students when they completed the essay-type test on the

topic of the human movement organs after viewing the interactive E-book media that had been developed. The results of the effectiveness test data are based on the results of students' scores that completed the KKM as much as 87% of one class, the interactive E-book media is said to be "Effective" because according to the learning achievement test indicators, it is said to be effective if student learning outcomes are completed with KKM scores of 85 reaching 85% of the total number of students.

CONCLUSION

The conclusions of this study are 1) An interactive E-book learning media has been produced in science learning for fifth grade elementary school students on science material for human movement organs with the help of Flip PDF Corporate software with development procedures using a 4-D model which has 4 stages, which are define, design, develop, and disseminate. 2) the validity of learning media in the form of interactive e-books in science learning for fifth grade elementary school students has been tested to be very valid and feasible to use with a validity percentage of 87.5% with the "Highly Feasible" criteria. Furthermore, the results obtained for the validity of the media were 86.5% with the criteria of " Highly Feasible ". The practicality of the media based on the results of the student response questionnaire was 92.2% with the "Practical" criteria.

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