Innovation of Media Science "Sensing System" with Android Platform: Feasibility Test

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Abstract: This research is a development research with ADDIE development model. ADDIE has five stages of development, including Analysis, Design, Development, Implementation, and Evaluation. However, this research is limited to implementation which aims to determine the feasibility of the developed media and conduct small-scale trials. The Feasibility Test carried out is a validity test and a PA test or Percentage Agreement to reach an agreement between validators. The feasibility test was measured by a questionnaire in 2 aspects, namely the media aspect and the material aspect, each of which was carried out by 4 experts and 1 science teacher from SMPN 3 Bangkalan. Trial and taking responses with a questionnaire, given to students from SMPN 3 Bangkalan. The results of the feasibility test from 2 aspects resulted in an average value of 92% with a very feasible category. The PA test also states that each validator's data has reached an agreement. The response of students after testing the Android-based science flipbook media with the theme of the sensing system resulted in an average value of 89% with a very good response category.

Keywords: Android; Feasibility test; Science flipbook; Sensing system

Introduction

The nature of science is the main foundation for studying science (Tursinawati, 2016). The achievement of effective science learning is when there is good development of scientific attitudes by students, by understanding the process of a scientific phenomenon, event, and object. The essence of science or science consists of science as a process, a product, and finally an attitude. The nature of science learning is closely related to science learning itself. That's because through learning science, students can find out that there are processes, products, and scientific attitudes in every science material (Jamaluddin et al., 2020).

Science learning has a role to develop the knowledge, thinking skills, and attitudes of students (Astuti, 2019). Because learning science can make students familiar with science and technology as a whole, besides that through science education students can also instill the habit of thinking and behaving scientifically (Jamaluddin et al., 2020). Science learning is an important lesson for students, because this learning should be learning that is very close to the lives of students because everything around them can be explained through science (Kusumaningrum, 2018).

Good science learning in schools is an important concern. This is because learning science can have a huge impact on the development of a nation (Dewi et al., 2019; Diani et al., 2018; Pertiwi et al., 2019). Through the science process in science learning, students are prepared to become a generation that can solve life problems related to science, technology and society (Prasetya et al., 2017). These three components are interconnected with science learning.

Science which is closely related to technology is one of the important points in learning science. Technology is one thing that is growing rapidly in this era. This developing technological development can be utilized by incorporating elements of technology in learning, one example with technology-based learning media (Efendi et al., 2021). Learning media is not only an intermediary in learning, it can also be an important component in giving meaning to learning (Arini et al., 2019). Technology and science learning can be a collaboration

that really attracts the attention of students. Student interest in learning can improve the final results of learning science. Students will not feel compelled to know the process of forming scientific knowledge in themselves (Kartini et al., 2020). The main key to integrating technology and learning science is to make students feel interested and feel happy with the process they are experiencing. Thus, students will process by themselves and will finally know the products of science learning, it will even become a scientific attitude that continues to exist within them.

Flipbook is one of the new technologies that can be used in the world of education. Flipbook is a software or software that can make electronic books that look like books in the real world. Flipbook is a development of electronic books that can be accessed via the internet or not by displaying books or other teaching materials in it (Apriliyani et al., 2021). Flipbook can display pictures, videos, and add audio (Amanullah, 2020). The use of flipbooks in science material that students can easily access anywhere, such as on smartphones, androids, computers, and other technological items can increase students' interest and enjoyment, besides that, the use of flipbooks can be used anytime and anywhere (Triwahyuningtyas et al., 2020).

The use of smartphones in the current era has increased, especially in the world of students. Android smartphones are no less used by people. Many students use Android smartphones because it is very easy to access many things with the various applications presented (Kuswanto et al., 2018; Setiadi et al., 2020; Sintaro et al., 2020). The average student in Indonesia has an Android-based device, but only a few are used as learning resources (Syaputrizal et al., 2019; Wijayanti et al., 2021). Android itself is an open source that can make applications or you could say it is a Linux-based mobile device (Maiyana, 2018; Megawaty et al., 2020). Utilization of android in learning can be utilized so that students who use android smartphones can also easily access learning wherever and whenever. So, the learning process is not only limited if there are only printed books.

Based on some of the previous explanations, the researcher developed an android-based science flipbook with the theme of sensing systems. This development is carried out by taking into account the environmental conditions of society that are increasingly advanced with technology, and the current situation which requires students not only to learn to deal directly with the teacher but also to learn to understand the material independently. In addition, the use of one theme in the development of Android-based science flipbooks is intended so that this media can continue to be used at all levels of school related to existing material. Integrating learning materials into 1 theme can also provide a deeper explanation of the material to students (Marisya et al., 2020).

Method

The purpose of this study was to determine the feasibility of the media developed in the form of an android-based science flipbook with the theme of a sensing system that produces quantitative data. This research is development research with the ADDIE development model. The ADDIE model is one of several models commonly used to produce effective learning media products. ADDIE stands for Analysis, Design, Development, Implementation, and Evaluation which are the phases or stages in the development of a media. However, in this study the ADDIE stage was carried out only up to the Implementation stage after knowing whether the media being developed was feasible or not, so a small-scale trial was carried out on Grade VIII students of SMPN 3 Bangkalan.

The first stage is Analysis or analysis. This analysis consists of an analysis of student needs, material needs, and media needs. Analysis of the needs of students is carried out by observing and studying the literature on the needs of students when learning science. The material needs analysis contains a mapping of junior high school natural science materials that can be connected in 1 theme, namely the sensing system. The materials taken are, the sense of sight, the sense of touch, the sense of hearing, light and optics, vibrations and waves, conductors and heat insulators, as well as mirrors and lenses. Media needs analysis was carried out by obtaining flipbook application software and Microsoft Word to make flipbooks.

The second stage is Design or design. This stage contains the design of the next stage. Designs such as making flipbook designs, creating content in flipbooks, looking for material references, images, and videos. The design made at this stage has not been carried out, the design is only made into a process flow for making or developing Android-based science flipbook media with the theme of the sensing system.

The third stage is Development which is the development stage. This stage is the main stage in this research. This stage is the realization stage of the previous stage. The development of an Android-based science flipbook with a sensing system theme was carried out to completion. Then the media that has been produced, carried out a feasibility test. This feasibility test is carried out with 2 aspects, namely the media aspect and the material aspect. Each aspect was measured individually by several validators namely, 4 media experts and 1 science teacher from SMPN 3 Bangkalan. The following are the media aspects and material aspects that are measured (Table 1).

Table 1. Aspects of Feasibility

Aspects	Aspects Measured
Media	Aspects Feasibility of Language
	Aspects Feasibility of Presentation
	Aspects Feasibility of Media Effect
	Aspects Feasibility of Appearance
Material	Aspects Feasibility of Content
	Aspects Feasibility of Presentation
	Aspects Feasibility of Language

Each aspect was analyzed with 2 tests, namely the validity test and the PA test. Validity test to find out whether or not the media used is appropriate. The validity value of each validator is tested using Equation 1 (Bahri, 2018).

$$score = \frac{\text{score obtained}}{\text{max score}} \quad (1)$$

Each result from the validator is then averaged using Equation 2 (Ernawati, 2017).

$$\bar{x} = \frac{\sum x}{n} \quad (2)$$

Description:
$\bar{x}$ = average score
n = number of validators
$\sum x$ = the number of values from the validator

After producing the averages of several validators, determining the feasibility of the media aspects and material aspects are categorized in the Table 2.

Table 2. Feasibility Criteria

Score (%)	Feasibility Category
75.01 – 100.00	Very Feasible
62.01 – 75.00	Feasible
50.01 – 62.00	Less Feasible
01.00 – 50.00	Not Feasible

The PA test or Percentage Agreement test by Borich was also carried out in this study. This test is carried out so that there is data compatibility and agreement between validators. The PA test states that the data are in accordance with several validators, when it produces data > 75%. The PA value can be searched using Equation 3 (Viana et al., 2016).

$$PA = \left(1 - \frac{A-B}{A+B}\right) x\ 100\% \quad (3)$$

Description:
A = a larger rating score
B = a smaller rating score

The last stage in this research is Implementation or application. This stage is also known as the trial phase. The trial was carried out by providing Android-based science flipbook media with the theme of sensing systems in learning. After that, students were given a validated student response questionnaire. The collected student responses were analyzed using Equation 4 (Fitriani et al., 2019).

$$P = \frac{F}{N} x\ 100\% \quad (4)$$

Description:
P = Percentage
F = number of Respondents Answers
N = the maximum number of respondents

The responses of students who have been analyzed are then categorized using the following category (Table 3).

Table 3. Student Response Criteria (Khairiyah et al., 2020)

Range (%)	Category
85 ≤ P	Very Good
70 ≤ P < 85	Good
50 ≤ P < 70	Not Good
P < 50	Bad

Result and Discussion

The development of an android-based science flipbook with the theme of the sensing system is one of the developments of learning media that utilizes technology. This is because the media developed is based on technology using flipbooks. Flipbooks that can display images, videos, and also audio can make science materials abstract in nature so that they can be easily described in the media that has been developed. The material on the theme of the sensing system has some abstract material, so that Android-based science flipbook media with the theme of the sensing system can help students. In addition, material that is connected in one theme can make it easier for students to learn the material. So, this media can be used by students at the next level with appropriate material.

The feasibility test of Android-based science flipbook media with the theme of the sensing system was carried out by assessing aspects of the media and also aspects of the material in it. The feasibility test uses a validation test and PA test. The due diligence was carried out by 4 experts and 1 science teacher at SMPN 3 Bangkalan by being given a due diligence questionnaire sheet on 2 aspects. The questionnaire provided contains statements representing each aspect of the media as well as material aspects. Each statement has a Likert scale with a different value. SS for strongly agreeing has a value of 4, S for agreeing has a value of 3, KS for disagreeing has a value of 2, and TS for disagreeing has a value of 1. Each validator can assess media developed according to statements that represent each aspect. The validator can also provide input and suggestions for improvements to the media.

The results of the due diligence on media aspects and material aspects are presented in the form of diagrams and tables. This is done to make it easier to read the resulting data. The results of the media aspect feasibility test can be seen in the Table 4 and Figure 1.

Table 4. Media Aspect Feasibility Test Results

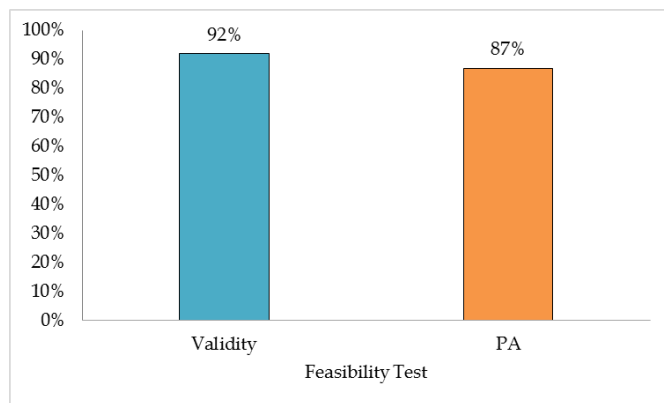| Aspects	Validity	PA
Aspects Feasibility Language	95%	86%
Aspects Feasibility Presentation	88%	86%
Aspects Feasibility Media Effect	93%	86%
Aspects Feasibility Appearance	92%	89%
Range	92%	87%
Assessment criteria	Very Feasible	Match Data

Figure 1. Media aspect feasibility diagram

Based on the results of the media aspect feasibility test, it can be seen from the average of all media aspects that produce 92% data with a very feasible category, and the data obtained has also reached the Percentage Agreement test criteria or PA test with a value of 87%. Android-based science flipbook with the theme of a sensing system is feasible to be tested on students measured from several media aspects which contain language feasibility, presentation feasibility, media effect feasibility, and display feasibility. The feasibility of the media aspect seen from each aspect produces an average very feasible category from the 4 existing aspects. The feasibility of the discussion contains 2 statements about the proper use of language and the clarity of the material presented in the media being developed. The feasibility of presentation contains 2 statements regarding the presentation of images, icons, videos or symbols, as well as the presentation of examples of material in the media being developed. The feasibility of media effects contains 3 statements about ease of use, media support for student independence, and the ability of the media to add to students' knowledge with the developed media. Finally, display feasibility contains 8 statements about the appearance of the media being developed, such as the attractiveness of the design, color selection, selection of writing fonts, selection of added videos, ease of reading of writing, selection of images, and ease of use of displaying the

media. Then, the results of the material aspect feasibility test can be seen in the Table 5 and Figure 2.

Table 5. Material Aspect Feasibility Test Results

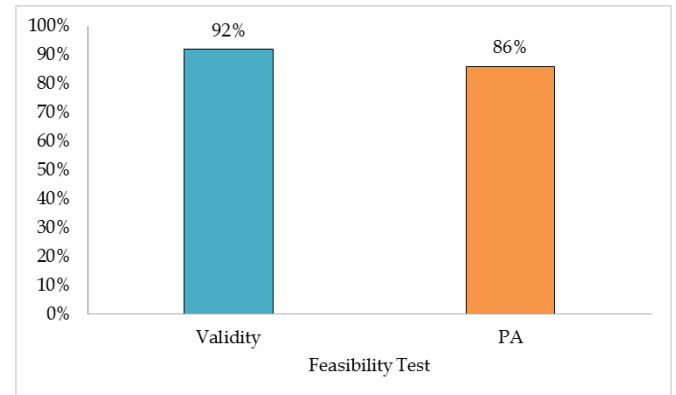| Aspects	Validity	PA
Aspects Feasibility Content	93%	86%
Aspects Feasibility Presentation	92%	86%
Aspects Feasibility Language	92%	86%
Range	92%	86%
Assessments criteria	Very Feasible	Data Match

Figure 2. Material aspect feasibility diagram

Based on the results of the material aspect feasibility test, it can be seen from the average overall material aspect that produces 92% data with a very feasible category and produces data that is in accordance with the provisions of the PA test with a value of 86%. This material aspect contains content feasibility, presentation feasibility, and language feasibility. From all material aspects, on average, it produces data with very decent categories. Content eligibility contains 3 statements regarding the suitability of the material with SK and KD, the accuracy of the material, and the suitability of the material with the examples. The feasibility of presentation contains 3 statements regarding the suitability of the material with images, videos, and the completeness of the material presented in the media. Language feasibility contains 6 statements about straightforward, communicative, dialogic and interactive, suitability for students' thinking levels, coherence of language flow, and appropriateness of the use of symbols in the material presented.

Android-based science flipbook media with the theme of a sensing system that has been tested for its feasibility in terms of the aspects of the media and the material presented, then the media was tested on a small scale on 10 students at SMPN 3 Bangkalan. This trial was carried out online so that students can feel the help of technology in learning independently. After the trial was carried out, students were given a response questionnaire that had been validated beforehand. The results of student responses can be seen in the Table 6.

Table 6. Student Response Results

Aspects	Score	Description
Content Quality and Purpose	76%	Good
Quality of learning	85%	Very Good
Technical Quality	79%	Good
Range	89%	Very Good

Based on the results of student response data, it can be seen that the average overall response yielded a value of 89% in the very good response category. Based on the results of the feasibility test and student response tests on Android-based science flipbook media with the theme of the sensing system, this is in accordance with previous studies. Research by Amanullah (2020) and Andini et al. (2018) stated that flipbooks can make students feel more independent in learning and also not boring because flipbooks display a variety of animations, pictures, videos, and also audio. This is in line with the results of the due diligence and also the good responses of the students in assessing the appearance of the android-based science flipbook media with the theme of the sensing system. Study Marisya et al. (2020) states that integrating subject matter can make it easier for teachers to learn and students also feel more understanding of some of the material connected. The results of this study are in line with the results of the due diligence in terms of media effects and student responses in terms of technical quality, which both contain the impact of using Android-based science flipbook media with the theme of sensing systems in learning. Study Ramdani et al. (2020) and Jamaluddin et al. (2020) who stated that the use of technology in science can have a positive effect on learning, such as high curiosity, can increase critical thinking, to student learning independence.

Conclusion

The conclusion of this study is that Android-based science flipbook media with the theme of the sensing system that has been developed is a very suitable medium for students to use in learning. In addition, the response of students to this media is also very good. So that it can be said, this media is very well used in learning. Suggestions for further research are that this research can be continued until the last stage of ADDIE, namely Evaluation or evaluation and then tested on a large scale in various schools.

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