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Developing Interactive Multimedia for Natural Science in High School

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Abstract

This study aims to create interactive multimedia products in learning Natural Sciences, as well as to analyze how the effectiveness of the products produced. This research uses the method Research and Development (R&D) model Borg & Gall. The research was carried out through five steps, namely planning, initial product development, product validation, product testing, and final product results. Product validity test results were assessed by three validators, one material expert and two media experts. Sources of data were taken using a questionnaire to twenty junior high school students to test the effectiveness of the product being developed. The research results show that; related to the product validity test, material experts gave an average value of 4.7 with a valid category, then related to media experts gave an average value of 4.78 with a valid category. While the results of the analysis of product effectiveness trials in learning obtained an average value of 4.66 meaning that the products that have been produced are in the "very effective" category. Referring to the results of this study, the product that has been produced can be used as a medium for learning natural sciences in junior high schools.

INTRODUCTION

Education is the main capital for everyone because in education there is an improvement in the mental attitude, intellectual and skills of students. Good quality education will produce quality human beings because education functions to educate the nation's life, form creative, active and independent human beings. To realize this educational function, various fields of knowledge are needed, including the Subject of Natural Sciences. Natural Science is a subject that studies events that occur in nature. Students are expected to be able to recognize and know these natural knowledge in their daily lives. Natural Science is an important subject because the knowledge can be directly applied in everyday life.

The development of students' self-potential will run more effectively if a teacher uses the right learning media (Widiana et al., 2015). Teachers must have the ability in making nor developinstructional Media, good using technology or not (Fauyan, 2019).

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Media is one of the factors that also determines the success of teaching because it helps students and teachers in conveying subject matter in relation to teaching objectives (Hartini et al., 2017; Pamungkas et al., 2018). One of the learning media that utilizes technology is interactive multimedia. Interactive multimedia is an intermediary tool that conveys messages with collaboration from various elements that are able to create active learning so that the message of the information conveyed can be well received. Multimedia is able to create active learning for students so that it can influence students' thinking power and can provide an input for the media (Nopriyanti & Sudira, 2015; Prasetyo & Prasojo, 2016). Conceptually, multimedia presents two elements, namely text (oral or printed) and images (illustrations, photos, animations, or videos (Prasetyo & Prasojo, 2016; Praditya et al., 2019; Iskandar et al., 2022). Interactive multimedia can be created with a variety of applications, one of which is Adobe Flash CS6.

When the author entered the class and interviewed students at Padang 25 Public Junior High School, a general picture was obtained that the difficulties faced by students were because teachers rarely used media to support learning. States that the optimal function of the brainneo-cortex in obtaining information (normally and creatively) the stimulus received is the environment in a happy, calm and relaxed state, so the brain can be active and used to think. one of the main functions of learning media is as an intermediary who is able to convey messages or information so that it is able to support and have a good impact on the quality of learning provided by educators, such as learning motivation for students, encouragement to learn, and students' emotional feelings to take part in learning so that it can involve students directly in its use (Astra et al., 2013; Hartini et al., 2017; Rahmi et al., 2019). Thus, the subject of Natural Sciences subject to the Circulatory System must be delivered by the teacher using fun learning media so that it can generate student learning motivation which in turn will achieve learning objectives.

The existence of media that can present images as well as sound, can help students divert their boredom and will be more interested in participating in learning that uses multimedia rather than just following conventional learning through lectures conducted by teachers (Maryanti & Kurniawan, 2018). Interactive multimedia also requires students to be active in participating in learning, in which students will be asked to interact directly in using interactive multimedia. Interactivity in multimedia provides a limitation that users are involved in interacting with application programs and aims to assist students in obtaining learning information (Nopriyanti & Sudira, 2015; Sanusi et al., 2015; Herdiansyah et al., 2019).

Interactive multimedia is one of the learning media used to support the learning process to be more creative and interesting. Learning media that are used specifically for Natural Science subjects in various countries have not been developed much. This research is proven by data Your Viewers by looking at the base research data Scopus which one between learning with study still far away. This makes it possible to develop learning media such as interactive multimedia for Natural Sciences subjects and in developing media it is still widely used not for the learning process but more for non-learning matters. From these data, there is also no multimedia specifically for its use in Natural Sciences subjects on the circulatory system in humans. So that this research is feasible because there is still very little related to learning media for Natural Sciences subjects. Research related to learning media has been widely studied by previous researchers, but related to the use of interactive multimedia in learning Natural Sciences has not been studied much. Based on the database of Scopus, previous research using some say the key that refers to research on the development of learning media for learning Natural Sciences in figure 1 below:

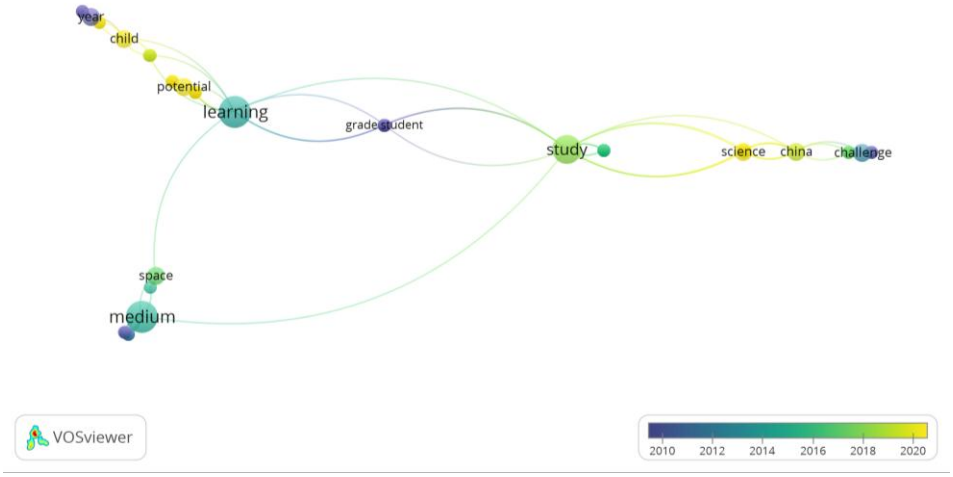

Fig 1. Several keyword which refers to learning media for Natural Sciences by world researchers (database Scopus)

METHODS

This type of research is development research which is better known by the term Research and Development (R&D). According to Tenopir et al., (2011) research and development methods can be interpreted as a scientific way to research, design, produce and test the validity of products that have been produced or produced which can be shortened to 4P namely research, design, production and testing. This development model uses the model proposed by Borg and Gall (Aka, 2019). Borg and Gall suggest that in research and development there are several cyclical steps, namely: Research and information gathering, planning, initial product development, initial field tests, product validation, main field tests, operational product revisions, operational field tests, final product revisions, dissemination and implementation (Engkizar et al., 2018; Aini et al., 2019; Asril, 2021; Asmaldi et al., 2022).

Borg and Gall also suggested limiting research on a small scale, including in this study, namely the researcher simplified the steps according to the needs of researchers into five research steps, namely: Planning, initial product development, product validation (validation and revision), limited trials, the final product. More clearly the product development procedure can be seen in figure 2 below:

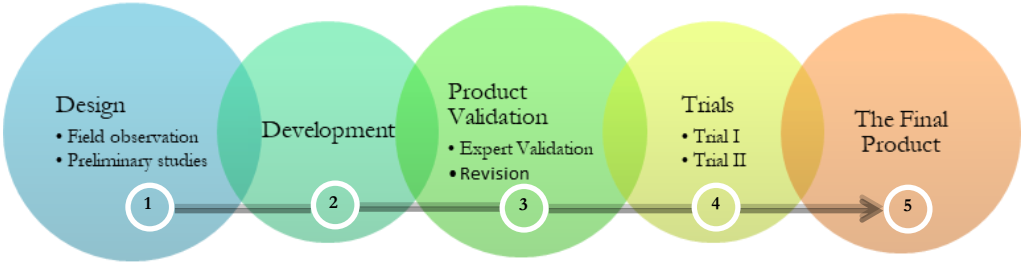

Fig 2. Research Procedures from the Development Model According to Borg & Gall

The assessment format uses a five-point response format from a Likert scale, where the response alternatives are very good/very clear, good/clear, sufficient/sufficiently clear, less/less clear, very less/very unclear. Determination of the Likert scale score is done a priori. For a positive-directed scale, there will be a score of 5 for those that are very

clear/very precise/very good/very appropriate, a score of 4 for those that are clear/correct/good/appropriate, a score of 3 for those that are quite clear/quite precise/good enough /quite appropriate, score 2 for unclear/inaccurate/not good/not appropriate, score 1 for very unclear/very inaccurate/very poor/very inappropriate. Whereas for a scale that leads to negative, the score is likely to be the opposite**.**

The validity used in this research is logical validity. In making logical validity in this study, the making of the instrument must follow the correct and careful steps, by breaking down the variables into several indicators, then formulating the questions, so that logically the validity of the instrument as desired in this study will be achieved. The second validity is empirical validity. According to Abbasi et al., (2019) empirical validity is the validity obtained based on experience by being tested. To be able to see whether the data obtained when the product was tested is valid or not, the value of the questionnaire that was previously filled out by students will be calculated. The data obtained after going through trials are divided into two types, namely qualitative and quantitative data. Qualitative data were obtained from filling in criticisms and suggestions presented by media experts, material experts, and students which would then be collected into one unit to improve the products that had been developed. Meanwhile, quantitative data was obtained from filling out a questionnaire conducted by material experts, media experts, and students. Then from this data will be presented in the analysis of quantitative descriptive data or presentation of data through tables.

RESULT AND DISCUSSION

Based on the database of Scopus, previous research used several keywords that refer to research on the development of instructional media for learning Natural Sciences in figure below:

Fig. 3 Initial View of Starting Media

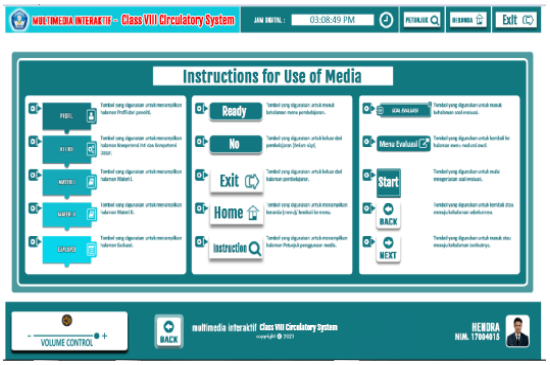

Fig. 4 Instructions for Use of Media

Fig.5 Material Menu Display

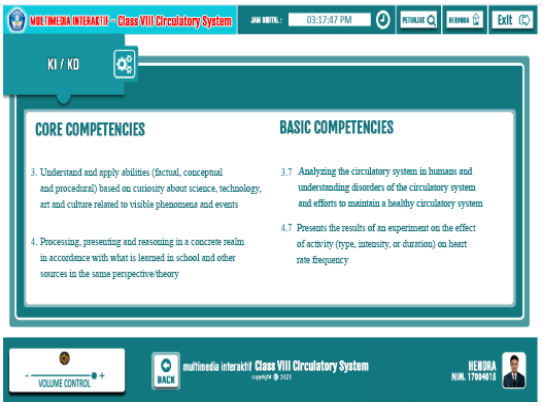

Fig. 6 Display of KI & KD

Fig.7 Display of Material Contents

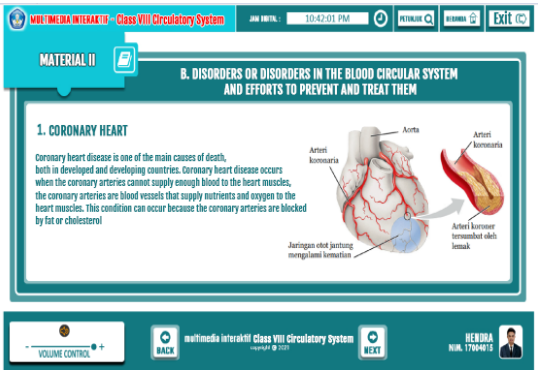

Fig. 8 Display of Material Contents

Fig. 9 Display Evaluation Page

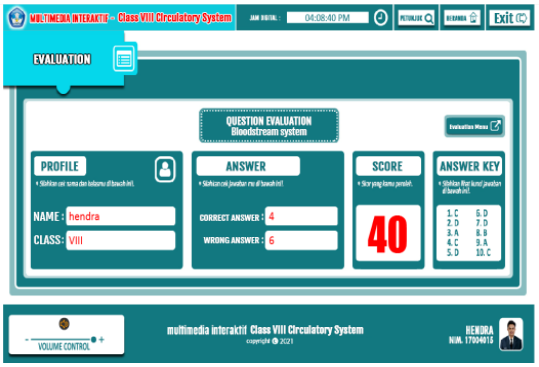

Fig.10 Display Score Evaluation

The results of the acquisition of material assessment include content and objectives, presentation of material, tests and efficiency can be seen in table 1 below.

Table 1. Results of the Validation Assessment of Interactive Multimedia Materials

No	Variable Criteria	Average	Information
1	Content and Purpose	4,5	Valid
2	Material Presentation	4	Valid
3	Hands	4	Valid
4	Efficiency	4	Valid
Average		4.70	Valid

From the data above it can be seen that the result of the assessment obtained from the material validator is 4.70 with the "Valid" category. Overall, the material aspect is already in the very good category. The content and objective variables obtained a score of 4.5, the material presentation variable obtained an average score of 4, the test variable obtained a score of 4 and the efficiency variable obtained a score of 4. So that the overall average score according to the material validator in accordance with all aspects of the material is 4 .70 out of a maximum score of 5 in the "Valid" category.

The results of the acquisition of media assessment in terms of appearance, ease of use and tests can be seen from table 2 below:

Table 2. Interactive Multimedia Validator Assessment Results

No	Variable Criteria	Assessment		Information
		V1	V2	
1	Appearance	5	4.5	Valid

2	Ease of Use	5	5	Valid
3	Hands	4,5	4	Valid
	Average	4, 92	4, 61	Valid

The assessment of the media validator is assessed by 2 validators. From the data above, it can be seen through validator 1, that the results obtained from the media validator 1 are 4.92 with the category "Valid". Overall, the material aspect is already in the very good category. The display variable gets a score of 5, the ease-of-use variable gets an average score of 5, and the test variable gets an average score of 4.5. So that the overall average score according to media validator 1 is obtained in accordance with all aspects of the media with a total of 64 with an average score of 4.92 out of a maximum score of 5 in the "Valid" category.

As for validator 2, it can be seen that the results obtained from the media validator 2 are 4.61 with the category "Very Good". Overall, the material aspect is already in the very good category. The display variable gets a score of 4.5, the ease-of-use variable gets an average score of 5, and the test variable gets an average score of 4. So that the average score is obtained according to the media validator 2 according to all aspects of the media with a total of 60 with an average score of 4.61 out of a maximum score of 5 in the "Valid" category.

After trial I, revisions were made. Then the interactive multimedia products were tested at the trial stage II, which can be seen in the following table:

Table 3. Interactive Multimedia Practicality Assessment Results

No	Variable Criteria	Average	Information
1	Ease of Use	4,68	Practical
2	Benefit	4,66	Practical
3	Appearance	4,61	Practical
4	Material Presentation	4,70	Practical
	Average	4.66	Practical

Overall, the level of practicality from the results of trial II on students as many as 20 students obtained an average of 4.66 with the "practical" criterion. The ease-of-use variable obtained an average value of 4.68, the benefits variable obtained a value of 4.66, the display variable obtained a value of 4.61 and the material presentation variable obtained a value of 4.70. Based on data on the practicality of learning media in the Natural Sciences class VIII subject in table 3, it can be seen from the aspects that are assessed in general that the response of class VIII students at Padang 25 Junior High School to the media used is positive with the "Practical" criterion.

CONCLUSION

The results of testing the validity of learning media products that have been developed on the material aspect obtain a material validator value of 4.7 with a valid category and media aspects obtain an average of 4.78 from each validator with a valid category. The results of the practicality test obtained an average score of 4.66 in the practical category on the practicality aspect with the criteria variables including ease of use, benefits, appearance, and presentation of the material.

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