

Development of 3-Dimensional Visual-Based Learning Media on Solar System Materials for Junior High Schools

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Abstract: This research aims to produce 3-dimensional visual-based learning media on Solar System Material that valid. The type of research used is Research and Development (R&D) research with the ADDIE development model (Analysis, Design, Development, Implementation, Evaluation). 3-Dimensional visual-based learning media developed through validation stages. The data was collected through a validation assessment sheet that was assessed by the validator. The results of the study indicated that the average value of Aiken's V validity index in the design aspect was 0.91, the pedagogical aspect was 0.89, the content aspect was 0.96, and the technical aspect was 0.95. The overall result of the average validity index value of Aiken's V was 0.93, in which the validity index value of Aiken's V has an indicator value of 0.40, hence it was declared as valid. Thus, it could be concluded that the 3-Dimensional Visual-based learning media on Solar System material for junior high schools was valid based on the design, pedagogical, content, and technical aspects. The results of validation of 3-Dimensional visual-based learning media are obtained on average >0.40 so that they can be declared valid.

Keywords: 3-Dimension, Learning Media, Validity Test, Solar System

1. Introduction

Learning technology is increasingly experiencing rapid development along with the changing times. In the implementation of everyday learning, there is often the use of technological tools to assist the learning process. For the example, teachers or lecturers use equipment such as tape recorders, television, films, direct broadcast satellites, computers, and videos in teaching and learning activities.[1]

Information and communication technology (ICT) is an integral part of human life, including in education. Utilization of technological developments such as the internet and multimedia can provide broad opportunities for teachers and students to gain new experiences and meanings in teaching and learning activities in schools. Utilization of this technology can also facilitate the teaching and learning process by connecting students with teachers or other online learning resources.[1]

The development of science and technology can have a positive impact by becoming more open and spreading information and knowledge throughout the world, but can also have a negative impact by changing behavior, ethics, norms, rules or morals that are inconsistent with that exist in society. The use of technology must be regulated properly so as not to have a negative impact on society.[1]

According to Daryanto in Oki Widodo, education is a conscious and systematic effort carried out by people who are given the responsibility to influence students so that they have the nature and character according to educational ideals. Education is a continuous process and is not limited to the school years, but also continues after graduating from school to help students develop themselves continuously.[2]

Low learning outcomes are often associated with learning problems faced by students in understanding learning material.[2] One way to improve learning outcomes is to use appropriate learning media. Learning media is a tool or means used in the learning process to make it easier for students to understand the learning material being taught.[1] Learning media can be in the form of printed, audio, visual, or electronic materials that can help students understand learning material in an easier and more effective way.

when studying celestial objects, for example humans cannot observe directly, using technology, 3D objects are made which can increase the understanding and knowledge of prospective teachers related to the visualization ability of moving 3D object models.[3]

The use of 3D animation learning media can be used as a means to provide convenience for educators in conveying information and provide understanding for students in understanding the concepts in the book. 3D animation media is a simulation media that is real compared to 2D animation media because this 3D animation is real as if it were in the form of an actual object and is easy for students to understand.[4] Three-dimensional

media can help students to understand more concretely.[5]

2. Method

The development research of this 3-dimensional visual-based learning media uses an ADDIE research and development model there is 5 steps: analyze, design, development, implementation and evaluation. This research is conducted on Laboratorium PMIPA, FKIP, Riau University.

Instrument in validity test used a validation assessment sheet. The validation assessment sheet used is in the form of a checklist and uses 5 levels of assessment. The aspect of the instrument is Design, Pedagogic, Content and Technique. The validation assessment sheet is used to obtain quantitative data from the validator's assessment.

Table1 Category of Validity Assessment Sheet

[6]

<i>Category</i>	<i>Score</i>
Strongly Agree	5
Agree	4
Neither Agree or Disagree	3
Disagree	2
Strongly Disagree	1

Table 1 is a category table for the validity assessment sheet which consists of 5 categories, starting from the Strongly agree to strongly disagree category. The category starts from a score of 5 to 1. This category of validity assessment sheets is used in this research. Furthermore, the assessment scores were analyzed using Aiken's V formulas with descriptive analysis.

Aiken's V Formulas:

$$V = \frac{\sum s}{n(c - 1)}$$

Explanation:

s = r-Lo

V= Aiken Validity index

Lo = Lowest score of validity

c = Highest score of validity

r = score by validator

n = amount of validator

3-dimensional visual-based learning media is valid if score of validity Aiken's V > 0,4 on all aspects.[7]

After the validation assessment process, the developed 3-dimensional visual-based learning media were revised based on suggestions from the validator. If the assessment score from the validator on each 3-dimensional visual-based learning media assessment item is less than 3 (scale 1-5), then the items are corrected according to the suggestions and then returned to the validator to be assessed. This process is carried out until all validators give a score > 3. Then the average score of each assessment item is calculated. If the average score obtained is between 0,40 and 1,00, it can be concluded that the 3-dimensional visual-based learning media is valid.

3. Result

This development research will produce a product in the form of a learning media 3-dimensional visual-based on solar system material for junior high school.

The development model of this type consists of 5 stages of development :

1. Analyze, which is the stage where the researcher find the problem so that it is necessary development of 3-dimensional visual-based . The analysis that will be carried out by the researcher consists of several development analyses including needs analysis, namely analyzing problems / difficulties and characteristics of students in Solar System learning as explained in the study and task analysis, namely material structure analysis by examining the achievement of goals (CP) and the flow of learning objectives (ATP) contained in the independent curriculum, after knowing the structure of the material, it is expected that learning media that will be designed to achieve these learning outcomes.

2. Design, namely designing the 3-dimensional visual-based learning media according to the analysis carried out previously. The steps taken at this stage include designing layout, creating history boards, creating storyboards, and compiling materials that will be included in learning media.
3. Development, which is a real step to realize a predetermined design. The development is tailored to the needs that have been analyzed and the systems that have been designed. The development steps of the 3-dimensional visual-based learning media are as follows:
 - a. Create a display of the learning media using Powerpoint software.
 - b. Insert content of 3-dimensional visual-based learning media that have in accordance with the history board design.
 - c. Create a button for command in learning media.
 - d. Record the voice to add audio for helping user(teacher) explaining the material.
 - e. Create hyperlink to link all part of media.
 - f. Save the 3-dimensional visual-based learning media.

The results of the development of learning media can be seen in Table 2.

Table 2 Learning Media Development Results

Aspect	Development Results
Login Page	
Main Menu	

Exercise

LATIHAN

No	Nama Planet	Berdasarkan Posisinya Terhadap Bumi		Berdasarkan Pembatas Sabuk Asteroid		Berdasarkan Ukuran dan Komposisi Penyusunnya	
		Planet Inferior	Planet Superior	Planet Dalam	Planet Luar	Planet Terrestrial	Planet Jovian
1	Merkurius						
2	Venus						
3	Bumi						
4	Mars (contoh)	-	X	X	-	X	-
5	Jupiter						
6	Saturnus						
7	Uranus						
8	Neptunus						

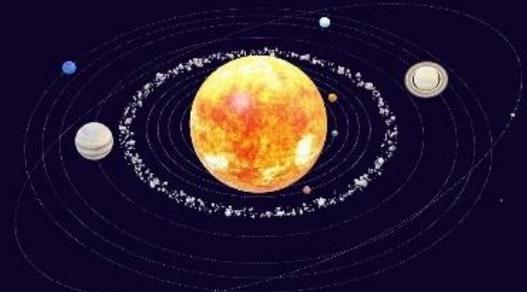
Content

TATA SURYA

SEKOLAH MENENGAH PERTAMA

PLANET-PLANET

*klik pada planet untuk melihat planet lebih detail



Landing Page

TATA SURYA

SEKOLAH MENENGAH PERTAMA

PERTEMUAN 1

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4. Implementation, namely testing the use of the 3-dimensional visual-based learning media which was completed by researchers. The product is implemented by opening the learning media so that researchers can see whether this learning media is in accordance with previous planning.
5. Evaluation, which is to pay attention to the shortcomings and mistakes that exist in the learning media. This evaluation stage is carried out at each stage of ADDIE. Based on the results of the evaluation, researchers can revise the product so that it produces the desired game learning media. Prawiradilaga in

Haya stated that according to Mollenda, the revision (Evaluation) can occur continuously in every stage that is passed but is not clearly stated.[8]

The five stages of the ADDIE learning design model that have been carried out, will finally produce an 3-dimensional visual-based learning media on solar system materials that are ready to be tested for validity by validators. This validation aims to obtain a valid 3-dimensional visual-based learning media. The validation results of the learning media of 3-dimensional visual-based learning media on solar system material for junior high school were carried out for design feasibility aspects, pedagogical feasibility aspects, content feasibility aspects and technical feasibility aspects. The validation results on the design aspect are presented in Table 3.

Table 3 The Result of The Validation Assessment of 3-Dimensional Visual-Based Design Aspect

No	Aspect	V	Category
1	Interesting learning media design	0,92	Valid
2	The letters used are appropriate or easy to read	0,92	Valid
3	Object in media according to content	0,92	Valid
4	The illustrations used help students understand	0,83	Valid
5	The illustrations used help to learning process	0,83	Valid
6	The colors used are in accordance with the reading	0,92	Valid
7	The sound used is appropriate and unobtrusive	0,92	Valid
8	Buttons or signs used are easy to recognize	1,00	Valid
9	The position of text, images or signs is consistent	0,92	Valid
10	The media complete with the instruction how to use	0,92	Valid

Table 3 above shown the result of the assessment with Aiken's V Formulas in Design aspects. Every indicator score is more than 0,4 its mean every indicator already valid. The result of the assessment with Aiken's V Formulas in pedagogic aspects is shown below.

Table 4 The Result of The Validation Assessment of 3-Dimensional Visual-Based Pedagogic Aspect

No	Aspect	V	Category
1	Teaching competencies are written clearly	1,00	Valid
2	Learning media helps achieve competency	0,92	Valid
3	The competency formulation is a guideline for media users	0,92	Valid
4	Topics according to competence	1,00	Valid
5	Submission of topics attracts students' attention	0,92	Valid
6	The information conveyed is easy to understand	0,75	Valid
7	Learning media encourage students to think creatively	0,83	Valid
8	Submission of material is organized and easy to follow	0,75	Valid
9	The questions given are in accordance with the material	0,92	Valid
10	The learning method is suitable for learning media	0,92	Valid

Table 4 above shown the result of the assessment with Aiken's V Formulas in pedagogic aspects. Every indicator score is more than 0,4 its mean every indicator already valid. The result of the assessment with Aiken's V Formulas in content aspects is shown below.

Table 5 The Result of The Validation Assessment of 3-Dimensional Visual-Based Content Aspect

No	Aspect	V	Category
1	The learning media is in accordance with the 2013 curriculum	0,92	Valid
2	Subject matter according to competence	0,92	Valid
3	Learning media according to the level of student ability	1,00	Valid
4	Learning media according to students' basic knowledge	1,00	Valid
5	Learning media contain educational values	1,00	Valid
6	The study material is accompanied by exercises	1,00	Valid
7	Exercise according to the topic of the lesson	0,92	Valid

Table 5 above shown the result of the assessment with Aiken's V Formulas in content aspects. Every indicator score is more than 0,4 its mean every indicator already valid. The result of the assessment with

Aiken's V Formulas in technique aspects is shown below.

Table 6 The Result of The Validation Assessment of 3-Dimensional Visual-Based Technique Aspect

No	Aspect	V	Category
1	Users can be assisted in controlling the learning process	0,92	Valid
2	Users are not stuck when using the media	0,92	Valid
3	The use of media in conveying material is easy to follow	1,00	Valid
4	There is more than one acquisition of information	0,83	Valid
5	Users can easily find the information they need	1,00	Valid
6	Users can easily exit the media	1,00	Valid
7	The media easy to use	1,00	Valid

Table 6 above shown the result of the assessment with Aiken's V Formulas in technique aspects. Every indicator score is more than 0,4 its mean every indicator already valid. Therefore, it can be concluded that the developed of 3-dimensional visual--based learning media are valid.

The validation results obtained have met each of the indicators. Therefore, it can be concluded that the 3-Dimensional Visual-Based Learning Media on Solar System Material is declared valid to be used as a learning media in school.

4. Conclusion

Based on the results of research and development that have been carried out, it can be concluded that the 3-Dimensional Visual-Based Learning Media on Solar System Material are valid. Thus, the learning media can be used by the teacher as flexible learning media. As a recommendation, the researcher recommends the next researcher to continue research on the effectiveness of 3-Dimensional Visual-Based Learning Media on Solar System Material.

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