

## DEVELOPMENT OF INTERACTIVE LEARNING MULTIMEDIA GATE (GEOMETRY OF SPACE BUILDING) TO INCREASE LEARNING MOTIVATION OF ELEMENTARY SCHOOL STUDENTS

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### Abstracts

This research is motivated by the lack of utilization of learning media in mathematics subjects. The purpose of the research is to know the development, feasibility and influence of the use of interactive learning multimedia GERBANG (geometry build space) in increasing student learning motivation. The development research uses the APPED development model consisting of five systematic and logical stages, namely analysis, planning, production, evaluation, and dissemination. The results of the development research show that the interactive learning multimedia GERBANG (geometry builds space) gets a qualification assessment Very Feasible based on the validation of experts, namely media experts and material experts with the results of the percentage of feasibility of 87.5% by media experts and material experts of 85%. Based on the results of the user test at the pretest stage obtained an average value of 51, 32, while at the posttest stage obtained an average value of 69.19. Thus, the use of interactive learning multimedia GERBANG (geometry build space) has an effect in increasing the motivation to learn.

**Keyword:**

Interactive Learning Multimedia, Mathematics, Learning Motivation

### Introduction

The success of an education can be realized if there is continuity between aspects of family, school, and society (Subiyanto, 2013). These aspects will determine the success or failure of the educational process, both including educational goals, students, educators, learning materials, media, methods, learning resources and evaluation. So in realizing the success of education, the learning process must take place effectively and efficiently. According to Adi Andhika, effective and efficient learning will make students motivated to continue learning and improve their knowledge and skills. In addition to the learning process, educators are someone who plays an important role in the teaching and learning process (Adi Andhika, Parmiti, & Sukmana, 2020). In addition to delivering material, educators must be able to instill values that can guide students towards maturity and broad insight. Learning that runs

optimally will shape the character of students into individuals who are able to think critically, creatively and innovatively (Sagala, 2011).

Mathematics is a subject that is taught at every level of education, namely, elementary school, secondary school, to college. There are various challenges in achieving the goals of learning mathematics, one of which is the students' perception of the subject. Many students consider math as a difficult and boring subject, so they are less interested and tend to avoid it. Abdurrahman revealed that among the various fields of study taught at school, mathematics is considered the most difficult by students, both those who do not experience learning difficulties and those who face learning difficulties (Abdurrahman, 2010). As a result, learners who dislike mathematics often experience anxiety that hinders their understanding of the material taught and negatively affects their mathematics learning achievement.

Educators as people who interact directly are expected to have good quality and skills in teaching, so that they are able to monitor and direct the development of students during the learning process. The skills of the educator in question are mastery of the material being taught and mastering the methods or ways of delivering it. Teaching skills absolutely must be owned and mastered by educators, because teaching skills will provide more understanding and understanding in learning.

Communication is one of the main factors involved in determining the achievement of educational goals, or it can be said that communication is a means or medium either oral or written to achieve learning goals (Sucia, 2016). The success of educators in delivering learning materials, one of which is greatly influenced by communication that goes well between educators and students, because with communication that goes well makes both of them integrated efficiently in achieving teaching goals where students can succeed in learning, educators successfully teach and educate in accordance with the goals to be achieved.

Learning media is one of the tools that can be used by educators in delivering messages or information so that it can stimulate attention, interest, thoughts and feelings in teaching and learning activities so that the objectives of learning can be achieved (Daryanto, 2016). The use of appropriate media in the learning process can attract the interest, attention and motivation of students to learn and improve their abilities. Learning media is very diverse, one of which is interactive learning multimedia, one of the learning media that can be quite reliable. Because it has advantages, namely, it can summarize or load various media, including writing, sound, images, graphics, and animation in one digital presentation (Andari, 2021). The problem obtained in this study is that during the teaching and learning process, educators explain learning material using only one method, namely using the lecture method, math lessons are also less attractive to students, besides that the school still has limitations in the media that support the learning process, especially in math subjects.

Based on the potential and problems that exist, researchers are trying to develop interactive learning multimedia which later users can operate the media anytime and anywhere so that students can learn freely according to their own abilities, this media is expected to be able to make students interested and more active in learning the material of building space, so that it is expected to increase student learning motivation. The advantages of interactive learning multimedia that will be developed by researchers are, there are interactive questions that can hone students' knowledge skills, videos explaining learning materials that make it easier to understand the material presented, and equipped with questions to evaluate student learning outcomes. And equipped with companion books including instructions for use, lesson plans and material summaries.

### **1. Learning Media Function**

Learning media is now an inseparable part of the teaching and learning process, where it is hoped that the existence of learning media will be more effective and efficient and make it easier for students to learn, in general, learning media has the following functions:

are as follows: (a) Clarify messages so that they are not too verbal, (b) Overcome the limitations of space, time, energy and senses, (c) Generate enthusiasm for learning, (d) Enable students to learn independently, (e) Provide the same stimulus, equalize experience and create the same perception.

According to joko sutrisno, the functions of learning media include: activating learner responses, providing immediate feedback, promoting harmonious practice and repeating what is learned (Miftah, 2022). Meanwhile, according to Wina Sanjaya, the functions of using learning media are: (a) The communication function is used to facilitate communication between the messenger and the messenger, (b) The motivation function can motivate students in learning, (c) The function of meaningfulness increases the ability to analyze and create, (d) The perception equalization function can equalize the view of the information conveyed, (e) The individuality function accommodates the needs of each individual (Sanjaya, 2014).

## **2. Types of Learning Media**

Along with the times, learning media continues to develop from time to time, in accordance with the demands of conditions and the world of work, in general, learning media consists of: (a) objects, namely objects in the environment, (b) visual media, media consisting of photos, schemes, diagrams, and many others, (c) audio media, media related to the sense of hearing or in other words have sound, (d) audio-visual media, combined media between can be seen and heard, (e) reality media, real media in the natural environment such as animals, plants and others.

According to Ahmad Rivai, learning media are classified into several aspects: first, the media seen from its nature, consisting of auditive media that can only be heard, visual media that can only be seen, audiovisual media media that can be seen and heard. Second, judging from the range of learning media, it is classified into media that have broad and simultaneous input power such as television and radio, then media that have limited input power such as films, videos and slides. Third, judging from the way of use, learning media are classified into projected media such as films, slides and non-projected media such as pictures, photos, paintings, radio (Rivai, 2011).

## **3. Selection of Learning Media**

According to Sudjana, good learning media must meet criteria such as accuracy with objectives, support for teaching content, ease of obtaining media, teacher skills in using it (Sudjana, 2011).

In choosing learning media, there are several considerations that need to be considered, including: (a) Suitability, when choosing media must be in accordance with the wishes of students, (b) Level of difficulty, facilitated by the media itself, (c) Cost, adjusting to the existing budget, (d) Availability, adjusting to the facilities provided or existing, (e) Technical quality, can be used for everything (Pakpahan & Ardiana, 2020).

According to Arief S. Sadiman, there are several criteria that educators need to consider in choosing learning media, namely: First, analyze needs and characteristics. Second, formulate instructional objectives. Third, formulate detailed material items that support the achievement of goals. Fourth, develop a success measurement tool. Fifth, write the media script. Sixth, conduct tests and revisions (Sadiman, 2012).

## **4. Selection of Learning Media**

Some considerations that must be considered in selecting learning media are first the media must be in line with the objectives to be achieved. The objectives set need to refer to a combination of several aspects (cognitive, affective, and psychomotor). Second, suitability to the conditions and needs of users. Knowledge about their social background, motivation and interest in learning, and so on are needed. Third, understanding the characteristics of the media chosen and adjusted to the objectives to be achieved. Teachers

cannot choose media well if they are not familiar with the characteristics of each media. Because the activity of choosing is basically an activity of comparing one another, which one is better and more suitable than the others.

Fourth, the time needed to make the selected media. Also the time needed to present the media in learning. Fifth, the costs involved in production. Basically, expensive media is not necessarily more effective in achieving learning objectives than simple, cheap media. Fifth, the need for target grouping. There are media that are appropriate for large groups, medium groups, small groups, and individuals. Sixth, the media needs to pay attention to technical quality. Technical quality can be in the form of clear visual images and the elements should not interfere with the message to be conveyed (Setianawati, 2018).

## **5. Definition of Interactive Learning Multimedia**

Etymologically, multimedia comes from Latin, namely from the word multi which means many, various, and medium which means intermediary or introduction. According to Wahyudi, interactive learning multimedia is one of the learning media that can be used in presenting material by utilizing technological sophistication, while according to Daryanto, interactive multimedia is a control tool that can be operated by the user where the user plays an important and full role in the operation of the media, which contains material, methods and ways of evaluating that have been arranged systematically and as interesting as possible in order to achieve subject competencies according to their complexity (Napitupulu, 2022).

Meanwhile, the link between interactive multimedia in learning is a message device that contains a combination of text, video, graphics and audio that is used to convey messages or information that makes strong interaction between the sender and receiver.

Based on the description above, it can be concluded that interactive learning multimedia is a tool or communication medium from text, video, graphics and audio that can be controlled by its users.

## **6. Benefits of Interactive Learning Multimedia**

In general, the benefits obtained from interactive learning multimedia include lessons that will be more interesting, more interactive, time effectiveness, increasing the quality of student learning, and the possibility of being accessed anytime and anywhere.

According to Fenrich, the benefits of interactive learning multimedia are as follows: (a) Learners can learn according to their abilities, (b) Learners can learn from patient tutors, (c) Learners are encouraged to understand knowledge, (d) Learners face objective forms of evaluation, (e) Learn when the need arises, (f) Learn at any time, (g) Can enjoy privacy (Putra, 2021).

## **7. Interactive Learning Multimedia Components**

Interactive learning multimedia is a combination of several components that are packaged as interesting as possible. The components of interactive learning media according to Sutopo are as follows: First, components consisting of text, the text itself is a combination of letters that become words or sentences that explain a purpose or material. Second, the image component, the image is a component that includes images. Third, the animation component, animation is a sequence of image or video movements that are made as interesting as possible. Fourth, the audio component, audio which contains sound as an alternative in delivering messages or information. Fifth, the video component, video is a combination of three-dimensional moving images. Sixth, interactive links, programs contained in an interactive media such as buttons, home and many others (Widyana, 2022).

## **8. Definition of Learning Motivation**

Learning motivation comes from the word motive which can be interpreted as strength. Motivation is the driving force that encourages a person to achieve a goal. Motivation and learning are both considered as the main driving force of a person. In learning activities,

motivation is needed to learn new things for someone who has no desire to learn. Learning motivation is the motivation or driving force to motivate someone to study/research a topic. Motivation plays a very important role in learning activities, there is no learning activity without motivation, so motivation plays a strategic role in achieving goals.

According to Nurul Indah, motivation is the overall driving force for students to generate learning activities, ensure learning activities and provide direction for learning activities, so that the expected goals are achieved. The same thing was also stated by Krisma Widi that motivation is the driving force of students who lead to learning activities that provide direction to achieve the expected expectations (Wardani & Setyadi, 2020).

Based on the explanation above, we can know that learning requires motivation to achieve learning goals. Motivation itself is what drives learning activities. So it can be said that learning motivation is a condition that causes a person to want to carry out learning to achieve a goal.

## 9. Types of Motivation

According to Indah Sari, motivation is divided into 2 types, namely extrinsic motivation that comes from outside and intrinsic motivation that comes from within a person. As follows:

### a. Intrinsic Motivation

Intrinsic motivation is the desire within a person to be competent, and to do something for its own sake. Intrinsic motivation is the motive that drives a person to do something. The stronger the motivation, the stronger the behavior to achieve the goal.

### b. Extrinsic Motivation

Extrinsic motivation is motivation that arises due to external stimuli, this motivation is a driving motivation from the sea given from the individual's own inability. Extrinsic motivation is the desire to achieve something because you want to get external rewards. Extrinsic motivation is the encouragement given by others, for example, giving praise, encouragement, advice from teachers, and parents (Sari, 2018).

## 10. Learning Motivation Indicators

According to Uno, learning motivation is classified into six indicators. As follows:

### a. The desire and desire to succeed

Desire and desire in learning success to get the expected achievement, the desire to achieve is an element of personality and human behavior, which comes from within the human being himself.

### b. The existence of encouragement and needs in learning

The urge to do tasks is not only motivated by the drive to achieve and succeed, but it could be due to the urge to avoid failure which comes from the fear of failure.

### c. The existence of future hopes and aspirations

Desire or hope based on their feelings regarding the description of the results of their actions.

### d. The existence of appreciation in learning

Awards given in the form of statements or actions are the easiest and most effective way to increase students' learning motivation.

### e. The existence of interesting desires in learning

An interesting and fun atmosphere will make students interested in learning and learning will also be more meaningful.

### f. The existence of a conducive environment that allows students to learn well

A person's desire to learn is generally of a person's own nature, one of which is with conducive environmental conditions, which will make students able to develop what they have, improve their shortcomings and change their learning style (B Uno, 2011).

## Method

The Research and Development model applied in this research is the APPED model (analysis, planning, production, evaluation and distribution) adopted from Herman Dwi Surjono. The APPED model is an interactive learning multimedia development model inspired by the needs of RnD (Research and Development) type research where in the early stages research efforts are made as part of research and development. The APPED model consists of five systematic and logical steps, namely Analysis, Planning, Production, Evaluation, Dissemination (Surjono, 2017).

### 1. Analysis and Initial Research

The first stage in this research is needs analysis. The purpose of this needs analysis is to determine the targets required for media development. Furthermore, an analysis is carried out between the desired situation and the situation that occurs, and finally determines the solution that must be used. After analyzing, then conduct preliminary research in an effort to obtain information about the required media including analysis of learner characteristics, analysis of learner needs and curriculum analysis.

### 2. Design

The second stage is to do instructional design, at this stage researchers make instructional design in detail and structured. The process starts with making an outline, then flowchart, screen design and storyboard. Outline as an overview that includes sub-materials, media components, and learning resources. Flowchart is used to organize the overall material framework using certain symbols. Screen design includes a display on the menu provided in the form of material, video, quiz and evaluation. Storyboard that displays all elements on the screen in the form of visual scenarios.

### 3. Production

The third stage is production, the stage of producing a product, in this case multimedia interactive learning gates. At this stage, prototypes or learning media components (images, audio, video, etc.) will be made to produce learning media products using authoring tools. Each production step refers to the design document which consists of making an outline, then flowchart, screen design and storyboard.

Production activities begin with preparing the teaching materials to be used in accordance with the outline, paying attention to the media components needed in the storyboard, and continuing with the creation of prototypes using authoring tools. Media components in the form of images, audio, animation, video, and others that need to be adjusted to the material needs and user demands.

After the prototype of the media component was completed, at this stage, researchers used authoring tools in the form of a codular. The selection of Kodular was adjusted to the needs of the program and the available media sources. Kodular has features that meet the criteria of multimedia creation, such as accommodating the needs of learning design, interactivity, assessment, animation, customization, and compatibility.

### 4. Evaluation

Evaluation is the most important stage in the development of interactive learning multimedia GERBANG (geometry build space). Before implementing the interactive learning multimedia GERBANG (geometry build space). must first test the feasibility of the product by experts (subject matter experts, learning design experts, and learning media experts) using a questionnaire sheet, whether the multimedia developed is feasible to implement or not. The instrument grids of media experts and material experts are as follows:

**Table 1.** Media Expert Grid

No	Aspect	Indicator	No. Question
1	Learinung Design	Content coverage, and display presentation	1, 2, 3

2	Display Design	Desain tampilan, dan elemen yang digunakan	4, 5, 6, 7, 8
3	Software Engineering	How to use learning media	9, 10, 11, 12
4	Visual Communication	Presentation of material	13, 14, 15, 16

**Table 2.** Material Expert Grid

No	Aspect	Indicator	No. Question
1	Suitability Of Content	The material used	1, 2, 3, 4, 5, 6
2	Organization Of Content	Media presentation	7, 8, 9, 10, 11, 12, 13
3	Language	Use of language	14, 15, 16

Evaluation is done to improve and perfect the media being developed to produce a product that is valid and suitable for use.

## 5. Dissemination

Dissemination is the last stage in development, namely the field testing stage carried out by students. This stage is carried out to determine the effect of interactive learning multimedia on student learning motivation.

## Result and Discussion

### 1. Expert Validation

Validation is carried out to experts to provide an assessment of whether or not the media being developed is feasible, the validation includes media experts, material experts and learning experts.

Media expert validation pays attention to aspects including learning design aspects, display design aspects, software engineering aspects and visual communication aspects. Meanwhile, material expert validation pays attention to aspects of content suitability, content organization aspects and language aspects.

**Table 3.** Recapitulation of Expert Validation Results

No	Validator	Value	Criteria
1	Media Expert	87,5%	Very Feasible
2	Material Expert	85%.	Very Feasible

Table 1 shows the percentage value of the feasibility of interactive learning multimedia development efforts GERBANG (geometry build space) with a value of 87.5% by media experts with the category "Very Feasible" and material experts of 85% with the category "Very Feasible".

### 2. User Test

The user test was carried out by means of a hypothesis test, according to Sugiyono the hypothesis is a temporary answer to the formulation of research problems, where the formulation of research problems has been stated in the form of a statement sentence, said to be temporary because the answers given are based on relevant theories, not yet based on empirical facts obtained through data collection. The hypothesis test used in this study is the paired sample t-test. The t-test is one of the testing methods used to assess the effectiveness of treatment, characterized by a difference in the average before and average after treatment.

The basis for hypothesis test decision making is:

- If the Sig value  $< 0.05$   $H_0$  is rejected,  $H_a$  is accepted.
- If the Sig value  $> 0.05$   $H_a$  is rejected,  $H_0$  is accepted.

The hypotheses of this study are:

- a. Ho: There is no increase in students' learning motivation after using interactive learning multimedia GERBANG (geometry build space).
  - b. Ha: There is an increase in students' learning motivation after using interactive learning multimedia GERBANG (geometry build space).
- The results of the paired samples t test are as follows:

Table 3. Paired Sample Test Results

Paired Samples Statistics				
	Mean	N	Std. Deviation	Std. Error Mean
Pretes	51.32	31	2.960	.532
Postes	69.19	31	3.936	.707

Paired Samples Test								
Paired Differences								
	Mean	Std. Deviation	Std. Error	95% Confidence Interval of the Difference		T	df	Sig. (2-tailed)
Pre – Pos	-17.871	3.374	.606	-19.109	-16.633	-29.492	30	.000

Based on descriptive analysis, the average value of the pretest was 51, 32. While the average value of the post-test was 69.19. While based on the results of paired sample t-tests obtained Sig value of 0.000 which means  $0.000 < 0.005$ , then there is an increase in student learning motivation after using interactive learning multimedia GERBANG (geometry build space).

Thus, it can be concluded that the use of interactive learning multimedia GERBANG (geometry build space) has a significant effect on increasing students' learning motivation.

### Conclusion

Based on the results of the analysis and study of the development of interactive learning multimedia GERBANG (geometry build space) to increase the learning motivation of elementary school students can be concluded as follows:

1. This development research produces interactive learning multimedia GERBANG (geometry build space). Where the development stage of this media uses development procedures adapted from those put forward by Herman Dwi Surjono, this research model uses several procedures including. The first stage begins with analyzing then planning, which is the stage where the product is designed, the production stage of the process of making media. Evaluation stage where the media is validated to experts, then dissemination, namely the stage of applying the GERBANG interactive learning multimedia to students.
2. The feasibility of this media is obtained from the results of feasibility test data by media experts and material experts. Based on the results of the experts' assessment, interactive learning multimedia GERBANG (geometry build space). Rated very feasible to use. The validation results from media experts and material experts obtained a feasibility value of 87.5% and material experts of 85%.
3. The results of user test data analysis from the pretest and posttest results show an increase, namely the pretest stage obtained an average value of 51, 32, while at the posttest stage obtained an average value of 69.19. Thus, it can be concluded that the use of interactive



learning multimedia GERBANG (geometry build space) has an effect in increasing learning motivation in students.

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