

Student Perception About 3D Object from Hologram Pyramid for Learning

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ABSTRACT

Students' perceptions of the type of learning environment are important to learn because it can support classroom success. The purpose of this study was to investigate students' attitudes about 3D objects through the Pyramid Hologram. The respondents were 29 seventh grade junior high school students. This 3D object is used by students for 2 weeks to study. The task that must be completed is to know and understand the 3D object. 3D object perception of the pyramid hologram is examined with a Likert scale and the data are analyzed descriptively. The results showed that students have a positive attitude towards learning using 3D objects from the pyramid hologram although there are still some problems that occur during implementation.

Keywords: student perception, hologram pyramid, learning

1. INTRODUCTION

Technology has proven various benefits, especially in the field of education. In education, using 3D as a teaching tool in classrooms is thrilling for both students and teachers. It attracts students' attention and makes learning more enjoyable and, therefore, more memorable [1]. On the other hand, the use of holographic pyramid prism can produce the holographic results that displayed the 3D objects in the real-world environment, by letting the user look at a different perspective of these holograms when viewing from different angles [2].

There are many types of technology that can display 3D objects, such as 3D stereoscopic screens that require additional equipment to be seen such as special glasses. An autostereoscopic display can also obtain 3D perception without requiring more equipment but reduces 3D resolution. 3D objects are produced through the projection of a holographic pyramid that comes from the reflection of light that is raised by LED TV as a participating medium, then the reflection of light taken by acrylics made with inverted pyramids. After that, a 3D object will be formed from the projection produced from the acrylic and as if forming a hologram. However, holographic displays offer an opportunity for users to perceive 3D images in natural depth perception and are considered as the next generation of 3D display technology [3], [4].

Research conducted by Roslan Rose Khairunnisa and Ahmad Azlina [5] is a 3D Spatial Visualization Skills Training Application for School Students Using Hologram Pyramid also received a positive response to the results being studied regarding the visualization abilities of students compared to Paper Folding Task (PFT), Mental Rotating Task (MRT) and Virtual Building Component

(VBC). Therefore, this hologram pyramid has the potential to be used in the classroom to supplement teaching and other learning materials. Besides, user responses can explain their use. These responses can be interpreted as opinions and behaviors that are very important in responding to 3D Objects through the hologram pyramid as their learning material [6], [7].

2. Review of Literature

a. 3D Object

3D objects are media that are included in the classification of media according to their shape and physical characteristics which have a length, width, and thickness and can be observed from any direction [8], [9]. This media can also be used as a teaching aid and included in the 3D visual media in media classification based on sensory perception. Then students can experience the object directly, this is following what was delivered by Edgar Dale on the cone of experience.

This visual media is also included in the projection media because the media format is a still image that is enlarged and displayed on the screen. Projections can be obtained from sending images by computer to the projector or television [10]. Therefore, 3-dimensional objects can be created through a computer by displaying objects that have length, width, and thickness can also be observed from various directions.

b. Hologram Pyramid

Dr. Dennis Gabor, a Hungarian physicist who first introduced the principle of holography in 1946 [11]. Holography is a technique/method of recording images

(optically) that is used to produce three-dimensional shadows based on interference events recorded on a two-dimensional medium, on this medium called holograms. The term hologram comes from the Greek “holos” which means intact and “gram” which means information. Holograms are commonly called three-dimensional images that contain information about the dimensions, shape, brightness and contrast of the object being recorded.

This information is then stored in microscopic sizes and complex patterns of interference. In this information stored information about the amplitude and phase of the light waves that come from recording the recorded object, this causes three-dimensional shadows to form. Thus, the projection results can be displayed and observed 360°, different from the 3 dimensions displayed on the monitor screen. The principle of holography is a technique for recording and reconstructing light waves. Recording light waves and references on the recording media is a process of recording that occurs. Reconstruction results from artificial waves of objects with different amplitudes but have the same phase and direction as the object waves.

The three-dimensional impression results are obtained from the amplitude and phase of the light waves recorded in a single shot. Initially holography needed a device for image recording, just like photography, the difference was in the way it was recorded even though both were using emulsions for images or objects. Other devices are lasers, optical pieces, glass, lenses, file separators and insulation tables. A pyramid hologram is a system in creating a 3-Dimensional visual object model. This system consists of hardware devices and software that are arranged in such a way as to create holographic images. The use of the term pyramid is to show that the hologram image will be displayed as if it were inside a pyramid. Pyramid shape functions to reflect the image that is raised by the display screen can be a monitor or television. This hologram arises because of the refraction of light from the monitor screen or LCD TV to the pyramid-shaped acrylic [12].

3. METHODS

This research uses a developmental research approach. The product developed is the material used for the learning process in class. For this reason, it is necessary to prepare and design using certain suitable development models. The model used is a Multimedia-based Instructional Design model [13]. A Development model that is procedural and detailed in each step. In this model six steps must be taken in developing products, namely needs assessment, initial analysis, design, development, implementation, and evaluation. Each of the steps contains procedures and criteria that must be followed, but not all steps must be done. This is because it depends on the product being developed based on the analysis conducted.

a. Participants

Participants in this study were seventh-grade students, second semester in science subjects. Trials are

conducted on students who take these subjects. There are 29 students involved in the trial in real conditions. This means that the test is carried out exactly when the material is in progress.

b. Instrument

Development of instruments to test the feasibility of instructional media to media experts and learning experts. His media expert is a lecturer majoring in educational technology with more than ten years of experience in the field of instructional media. The material expert is a Biology Education lecturer with more than five years of experience.

Other instruments are in the form of a questionnaire to determine user responses after utilizing 3D objects through the hologram pyramid in learning. User responses are accumulated from filling out each questionnaire item with answers that agree strongly and agree. The number of participants who answered is accumulated and percentage.

c. Needs Assessment Stage

At this stage, the focus is on establishing the current and desired conditions and the types of problems that arise from needs. This digital 3-dimensional object media is deemed necessary to be brought to class, considering that some objects are not possible to be confronted and studied by students. At this time there is no educational institution that implements 3-dimensional object learning media by utilizing pyramid holograms in the classroom.

d. Front-end Analysis Stage (Front-end)

Audience Analysis, Audiences who gave responses to this development were students of Mts Raudlatul Ulum 7th grade semester 2. Technological Analysis, digital 3-dimensional object media by utilizing the hologram pyramid is still in the development stage so that when it has become a product it will be equipped with guidance to use it. Thus, the product can proceed to the next step, to obtain effectiveness and efficiency in classroom learning. Situation Analysis, product development is planned for the learning needs in the classroom, in the product trial phase, the test is carried out in two conditions namely the class is made in a group with enough light and the class is made circling the media. This is done considering the products developed will be greatly affected by outside light as well as the ability of the media to reach students in the classroom.

Task Analysis, Students are positioned as recipients of information or people who study in class to know and understand the 3D objects of animal and plant cells delivered in the pyramid hologram. Analysis of Significant Events, Product development also gives results about anything related to the delivery of good 3D objects, which are important, which must be done, and things that are not important that must be conveyed. Objective Analysis, The

learning objective is to know and understand the understanding of the function of animal and plant cells along with the details that exist in these cells. Problem Analysis, this development provides a new perspective on the emergence of technology applied in the classroom, because it is needed by students in knowing and understanding the understanding of the functions of each component in animal and plant cells.

Thus it can be utilized and provide new alternatives in conveying artificial objects in the class. Media Analysis, this development product is a media in the form of a 3-dimensional video of two animal and plant cells that are most commonly used in the form of small files but do not reduce the quality of the resulting image, so that the delivery media in any form there are no significant problems. Analysis of data, For the hologram pyramid table, because it is already in the department of Education Technology Workshop & Workshop so there is no need to make a hologram pyramid table. 3D objects themselves are also not available on the Internet or the market, so develop yourself 2 pieces of these animal and plant cells. Cost Analysis, 3D objects can be found in various shapes and sizes, but what will be developed in this study is in the form of a file so it does not take up space. For the holographic pyramid table, it can be used repeatedly for other subjects that require the delivery of artificial objects in the form of 3D, so it is more efficient in its use in a school.

e. Design Stage

This stage is the stage where the process of 3D object media is done. Whereas for the hologram pyramid table work has been designed and is a modification that has been designed previously by Roslan and Ahmad (2017).

f. Development Stage

The stage requires a variety of skills in developing a digital product, of course in this development in the form of 3D objects.

g. Implementation and Evaluation Stage

The Implementation and Evaluation phase has not yet been carried out because it is still in the testing phase of devices with the technology readiness stage / the technology readiness stage at rank 4 (validation of codes, components, and/or collections in a laboratory environment). 3D objects from the pyramid hologram are done in the same class with the same teacher for 2 weeks. Implementation in the classroom made by students to be upgraded into reflections produced by pyramid holograms.

Students who take part in this activity are seventh-grade students from semester two to 29 people who are divided into six groups in one class at Raudlatul Ulum Karangploso Malang, Indonesia. Each group consists of 4-5 people, so there are 6 groups. After completing the activity, students fill in the instrument response. The

instrument is a questionnaire that uses a Likert scale: strongly agree (4), agree (3), disagree (2), or strongly disagree (1). This was done to test students' perceptions about 3D objects from the Pyramid Hologram as a tool for teaching. To analyze quiz items for student responses after doing 3D objects through the hologram pyramid using descriptive statistics.

4. RESULTS AND DISCUSSION

Descriptive statistical analysis was carried out to identify students' perceptions of 3D objects through the Hologram Pyramid developed into learning media. The results of the analysis of user responses are presented in Table 1. Based on user responses to aspects of the material easily understood, the speed of movement of 3D objects and languages obtained 100% results. Aspects arouse interest and motivation, object size, object clarity, use of light, and sound. Users who gave a positive response of 96%.

The second-lowest aspect with a percentage of 86% and 72%, is about the colors, backgrounds, images, animations, and writing used. In addition to filling out questionnaires, users also provide comments and suggestions for 3D objects that they have used. Comments and suggestions in general, are almost the same as those in the questionnaire items that are easy to understand, interesting, and clear objects. Some comments that need attention are learning that the hologram pyramid becomes very interesting, fun, useful, and provides innovations for education.

Table 1 Analysis of User Response Data

Statement Item	Percentage
The material in this 3-dimensional video is easy to understand.	100
Generating student interest and motivation.	96
Attractive colors, backgrounds, images and animations.	86
The size of the object displayed is clear.	96
The object displayed is clear.	96
The light used is bright enough.	96
The speed movement of 3D objects in this video is appropriate.	100
The sound can be heard clearly.	96
The language used is easy to understand.	100
The writing used is easy to read.	72

5. CONCLUSION

The results of the development have been carried out with 3D object products through the holographic pyramid. 3D object products get positive responses from users. Students expect that learning using 3D objects through the holographic pyramid can give the impression of being interesting, fun, useful, and providing innovations for the advancement of education to come.

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