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The utilization of mind map painting on 3D shapes with curved faces

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Abstract. This paper aims to study on the use of mind map painting media on material with 3D shapes with curved faces and its effect on student's interest. Observation and literature studies were applied as the research method with the sake design of utilization of mind map painting. The result of this research is the design of mind map painting media can improve students' ability to solve problems, improve the ability to think, and maximize brain power. In relation, mind map painting in learning activities is considered to improve student interest.

1. Introduction

Mathematics is a compulsory subject that is given to all the students from elementary schools to universities to equip students with the ability to think logically, mathematical, analytical, systematic, critical and creative, as well as the ability to work together. Besides mathematics also has an important role in the development of modern technologies and disciplines to develop the power of human thought.

TIMSS (Trends in International Mathematics and Science Study) showed that in 2011, Indonesia is ranked 41 out of 45 countries. As for the results of the PISA (program for International Student Assessment) in 2015, showed that Indonesia has increase in the ranks, from rank 63 to 69 for all the countries evaluated. Although there is an increase, but the score of Indonesia is still below the average set by PISA. With the improvement of our education rankings, we should be able to be encouraged to improve education issues that have been unresolved. A lot of breakthroughs, creativity and cooperation of various parties to improve the quality of education in Indonesia are still needed.

Within a week the number of subjects studied by students with limited time was considered too much. Students are required to study all subjects without having enough time to explore the material. It also applies in the subjects of Mathematics, which is incidentally an abstract subject, and requires a lot of time in depth. If students are not optimal in learning the material, it will impact on the result of learning Math.

In addition, the implementation of Mathematics learning becoming less attractive and tend to be boring is also caused by factors such as: from the teacher, such as: a) the role of the teacher is still dominant in the learning process, b) the lack of use of multimedia learning, c) the teacher is less able using multimedia, d) less than the maximum of classroom management. Factors of the students; of course there are several factors to consider as well, including: a) a low student interest, b) lack of attention to the students' learning materials were submitted by teachers, and c) lazy to finish the homework assigned by the teacher. Both of these statements can be concluded that learning is less optimal and low student interest due to factors of teachers and students.



3D shapes with curved faces is one of the materials in class 9 which is a matter of National Examination. The results of the national exam mathematics in Surakarta in 2015/2016 showed the material with curved faces is still below 60%. It is triggered by several factors contained in the study, which is the low interest of students, learning difficulties and less optimal learning process.

Because time is less than optimal and there is low student interest, one of the solutions that require media teachers can support students in optimizing their learning activities. This media is called mind map painting. Mind map painting is a development mind map, which is equal in helping students and teachers in the learning process in the classroom. Through mind map painting, all the key information and the importance of each of lessons can be organized using radians structure that corresponds to the natural mechanisms of the brain, making them easier to understand and remember. Learning media mind map painting that is the audio-visual is also able to evoke the emotions of students so as to increase student interest in learning the material.

Reviewed from the concept of expediency media that the concept of acquisition of one's experience through the media used, the more concrete the media used, the higher the value of the experience gained. According to the experience cone (Cone of Experience) Edgar Dale in educational media Sadiman [1], suggests that a person's learning experience: 7.5% is obtained with a sense view (eye); 13% sense of hearing; and the rest by other senses. Direct experience a bigger part in the analysis of Dale. With the experience high gained provision, the learning material to be absorbed by the pupils more meaningful, and eventually clarify or advance the objectives of a lesson.

2. Literature Review

The study uses literature study. Literature is a way of solving the problem stracing the ancient sources that have been made previously. The kind of literature used in this paper is the literature of primary and secondary literature. Primary literature are works of original writing which contains a study on the new theory, or explanation of an idea in various fields. While the secondary literature is literature that contains information about the primary literature. Secondary literature offers primary literature by way of summarizing index, so the secondary literature does not contain new knowledge, but merely repeating an existing organize knowledge.

Holland [2] said that established of mind mapping to be a valuable teacher with more effectively for helping someone plan, structure projects and assignments more. Testimony that a mind map is an invaluable tool for planning and organizing your thinking for any projects. Boyson [3] said a mind map is an excellent tool for collaborating with others to develop plans or implement key project. It allows you to harness the input of all members of group in a dynamic and creative way. When used for group brainstorming sessions, min mapping was seen to enhance critical thinking and co-operation as well as providing a solid basis for collaborative problem solving. The student enjoyed expressing their opinions in a participative and open climate Groups involved in the sessions [4] [5]. It is hoped that all description all of management job description can be conducted by executing program that model has been made appropriate.

Mind mapping, which uses a multi-sensory learning approach, can support a student's ability to explore associations amongst information because it is a free-form learning technique in which creative thinking is fostered [6]. For the learner, exploring these relationships engages a deep approach to learning rather than a superficial dive [7]. The interconnection created by the branches in the mind map also allows for dual coding [8] of information which supports association and links to be made.

Mind map must be explore and then inform others of diverse teaching and learning strategies that may support the academy's role to enlighten students not only with knowledge but the ability to act upon the knowledge as scholars of teaching and learning [9].

3. Result and discussion

Mind map painting can transform verbal techniques in image visualization in learning activities. Image is one way to help convey the message concretely making it easier for students to strengthen the understanding of the concept of mathematical learning material as a whole. Mind map painting is developed with different colors, pictures/paintings and stories in it. Jensen [10] argues that each color has a wavelength of color ranging from ultraviolet to infrared waves can affect the brain and body are different

depending on the person's personality and state of mind. Therefore, the use of color will create a mind map painting more alive, visually stimulating, and adding energy to the creative thinking of students.

Mind map this painting was introduced in Indonesia by Erika [11]. This painting of Mind map is basically a mind mapping presented in the form of paintings. In contrast to the mind map in general the use of colors, images, or photos a simple, mind map painting is more expressive and varied according to the artist's viewpoint. Therefore, the mind map painting does not only improve the ability to think, but also enhances creativity. Erika and Abdul Gafur [11] states that the use of mind mapping painting through Madjoe Jaya Productions has enhanced the learning outcomes as much as 44.36% of the gain score. Here are the differences between mind map and mind map painting (Figure 1 and 2)

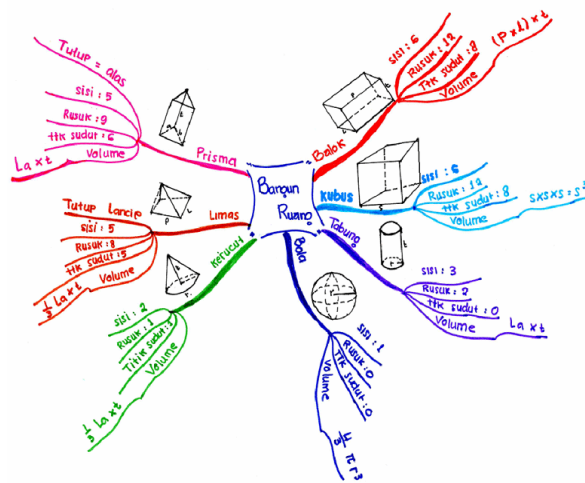


Figure 1. Mind map 3d shapes with curved faces

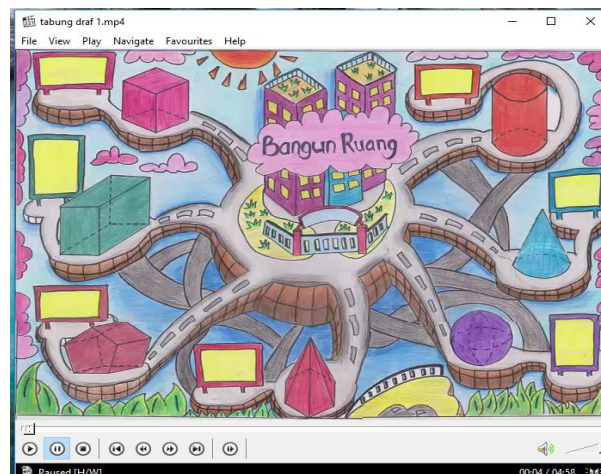


Figure 2. First view mind map painting on 3d shapes with curved faces

Video of mind map painting is divided into three sections corresponding to the basic competencies on the material of 3D shapes with curved faces in order to help students understand the material elements every waking space.

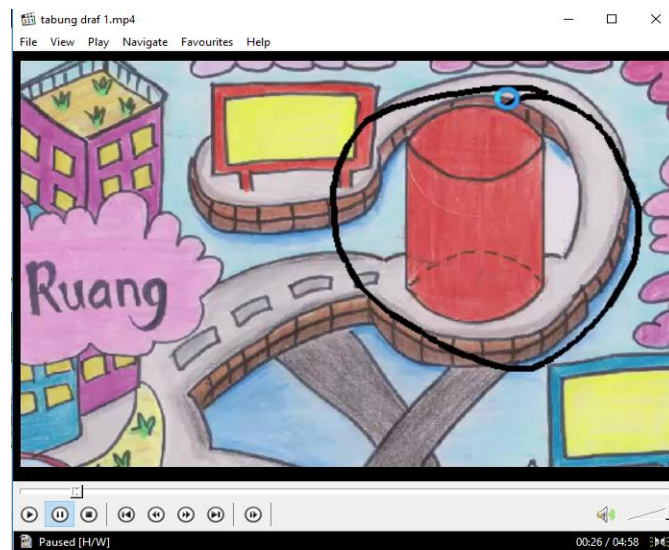


Figure 3. Views of cylinder

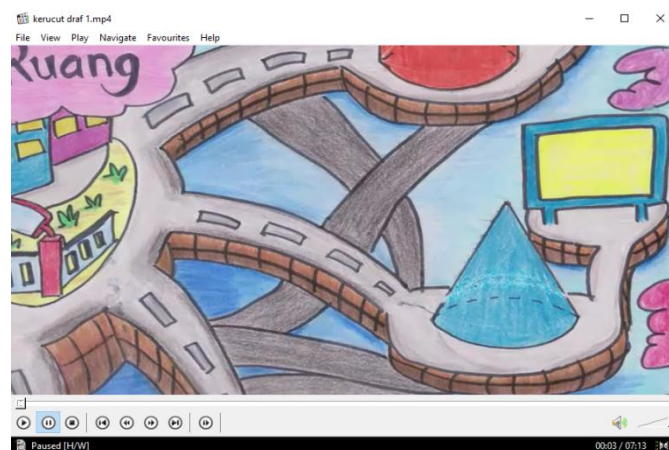


Figure 4. Views of cone

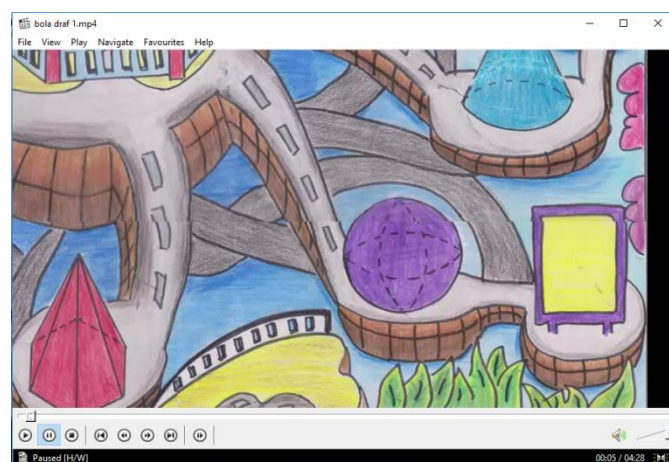


Figure 5. Views of sphere

The presence of mind map painting media in the form of video provides more free time for teachers in performing strategic roles in the classroom, as a facilitator and concept discovery process. Mind map painting media is made with Wacom Intuos tools and Camtasia Studio applications. Mind map painting media will be packed in a compact disc so that it can be used anytime and anywhere according to the needs of learners or students. Mind map painting video is divided into three sections corresponding to the basic competencies on the material 3D shapes with curved faces.

In a video of making this mind map painting, grating instrument in validating a video media refers to the theory [12-15], among others.

Table 1. Lattice instrument

No	Variable	sub-variables	Aspect
1	Instructional	Content	Up to date, clarity, usefulness, and a bias-free
		Design	Stating the purpose, presentation content, application for students, reflection for students, student interaction, integration with the learning environment, student motivation, student learning outcomes and reusability
2	Media	Technical production	design characteristics in accordance the formula visual quality, audio quality, the relationship between the audio and visual equipment, additional material
		Feature Specialty of Video	Paintings of mind map painting, a compelling story and elements and formula geometrical curved faces

4. Conclusion

Mind map mind is presented in the form of paintings and stories are packaged in an instructional video media. Mind map painting media is divided into three sections that are adjusted to the material basic competence. Media will be set forth in a compact disk (CD). The benefits that can be gained in the use of mind mapping painting on the material 3D shapes with curved faces: a) easy to use anytime and anywhere, b) students have to draw to increase students interest, c) to provide more time for teachers to freely undertake strategic roles in the classroom, d) the material can be completed on time, e) more optimal learning process, f) improve students' skills in problem solving, g) improve the ability to think, h) maximize the brain works, i) increased creativity

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