Improving Student Learning Outcomes Through The Use of Interactive Visual Learning Media (MIVI)

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Abstract: Students' learning outcomes after using visual interactive learning media (MIVI) to study the human motion system were studied. The purpose of this study is evaluate student learning. The study was conducted in state high schools in Bandung in the odd semester of the academic year 2017-2018. 35 students were studied using the Pretest-Posttest One-Group Pretest method. The cognitive aspect scores in a pretest averaged 42.70, and in the posttest 82.46. The N-Gain test score result was 0.69 which is in the medium category. Then, average aspect score was 85 and the right category and psychomotor aspect average score was 86 which is in the very good category. From this data it can be concluded that the use of visual interactive learning media can improve student learning outcomes in the topic of the human motion system.

1 INTRODUCTION

The developments of the 21st century requires the community to have greater communication ability with the wider community that has been supported by the development of information and communication technology that is increasingly rapidly. Especially with the enactment of the free market in Southeast Asia region Indonesian people should be more prepared to face globalization that requires better communication across ASEAN countries. Increasingly stringent demands require teachers to provide a good education for all students with innovative methods, models and learning plans for all students. This is especially true for biology where students assume that biology means memorizing boring lessons. Good learning, which is interactive and inspirational, can motivate students to learn actively, has challenges to stimulate students' adrenaline, can provide enough space for students to be initiative, creative, and independent according to their talents and interests and adjusts to the physical and psychological development of students (rahayu, 2013)

21st-century learning is learning that prepares people for 21st century skills. One alternative learning that can be used to do this is the scientific learning approach. The scientific learning approach is learning carried out using a scientific method which consists of a process of observing, asking questions, gathering information from various sources, analyzing or processing information, and communicating to others (Hapsari and Nurcahyanto, 2015). This is a paradigm shift in the learning process which was initially centered on the teacher (teacher centered) to student-centered learning makes the teacher apply more interactive learning models and strategies with various additional components when teaching, such as preparing tools, materials and learning media.

Learning media is everything that can channel messages, can stimulate the mind and emotions of students so that it can stimulate the student learning processes (Devi, 2017). Rudy Bretz (2012) classifies media according to its main characteristics into three elements, namely: 1) sound, 2) visual, and 3) motion. The three media elements were then developed into seven media groups, namely: 1) audio-visual-motion media, 2) audio-visual-silent media, 3) audio-semi-motion media, 4) visual-motion media, 5) media visual-silent, 6) audio media, and 7) print media. Of the seven media, audiovisual motion media is the most effective media to support interactive learning expected by a teacher. Audiovisual media with motion is better known as interactive multimedia.

Interactive multimedia is a form of information technology used in the optimization of teaching and learning activities (Sanjaya, 2016). Multimedia presents different phenomena and processes more

clearly, simulates complex content, and presents different levels of abstraction. The process of simplifying concepts that are considered complicated in biological material is one of the advantages of interactive multimedia-based learning. Interactive multimedia research, shows that it can help improve students' motivation and achievement in addition to improving understanding of ideas, concepts and abstraction process (Rahmatan, 2013). The results of that study resulted in the use of computer learning to improve the effectiveness of learning time, creativity, expertise and critical thinking of students (Rahmatan, 2013).

Given the abstract nature of biological material that is quite difficult for students to understand, interactive multimedia-based learning certainly helps the teaching process carried out by the teacher, especially in understanding biological concepts that are systemic such as the digestive system, the motion system and also inheritance. Mastery of concepts is expected to increase with the use of interactive multimedia-based learning in addition to the interaction process in learning which is also expected to increase.

2 METHODS

The research method used in this study is a mixed research method with a pre-experimental research design with a Pre-Test Post-Test design in One Group (One-Group Pre-Test Post-Test Design). This study was conducted on 35 students in the 2017-2018 odd semester in high school. In this study, the researchers only used one group of samples (A), and the sample was given pre-test treatment and post-test. Here is the research design (One-Group Pre-Test Post-Test Design) (Creswell, 2016).

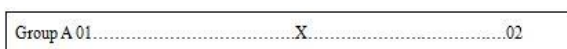| Group A 01	X	02

Figure 1: Research Design

The study design included one group observed at the pretest stage followed by treatment and posttest. The population in this study were all students of class XI of state high school 20 in Bandung. The study sample consisted of 60 students The sample was chosen with several considerations in mind so the researcher used a purposive sampling technique (Sugiono, 2016). The object of research that was tracked was an increase in student learning outcomes after using Interactive Interactive Multi-Media

learning media (MIVI) on the topic of human motion systems.

The instruments used in this study were pretest and posttest instruments consisting of attitude instruments, skill instruments, and students' cognitive assessment instruments. The assessment of attitudinal aspects included curiosity, responsibility, diligence, discipline, and ways of communicating between students when implementing interactive multimedia-based learning. The psychomotor aspect was used to assess students' skills in using the learning media; the way students use computers, the way students analyze material, the ability to answer questions, and the student notes on the results of analysis of material gained through learning media. Both of these instruments are non-test aspects. The cognitive aspects assessment consisted of 30 multiple choice questions that have previously been tested on experts.

Cognitive, affective and psychomotor data which is quantitative data was analysised using N-Gain Test data processing and statistical data processing, processing non-test data instruments consisting of affective and psychomotor assessment using affective domain assessment format calculation.

3 RESULT AND DISCUSSION

3.1 Result

The results of the study consisted of measurements obtained from the pre-test and post-test data, functions of the measurement results, psychomotor measurement results from the format of student performance during the learning process and student response questionnaire about the effect of visual interactive multimedia learning media (MIVI) on class XI students biology learning. To determine the pre-test and post-test scores, the researcher conducted interactive visual learning experiments.

Analysis of data showed that the cognitive aspects of mastery of the material before treatment, that is the pre-test results, had an average score of 42.70 from the 35 class XI students. This is a relatively low average score and below the minimum completeness criteria. Students were then presented with biology-based interactive multimedia learning for several class meetings. The post-test results showed that this had positive results with the average score almost doubling at 82.46.

Table 1: MIVI Score

Value	Research Result Data	
	Pretest	*Posttest*
N	35	35
$\overline{\overline{X}}$	42.70	82.46
SD	8,69	6,42
S^2	75.58	41,12
Max	67	95
Min	30	67

(*Data Source:* (Devi, 2017))

A normality test on the pre-test and post-test scores gave a value of > 0.05, the value for the pre-test data being 0.096 and the post-test data of 0.208, so it can be concluded that the data are normally distributed. A homogeneity test demonstrated that pre-test and post-test data had the same or homogeneous variance, the results of the homogeneity test being > 0.05 and the value of 0.124 so that it could be concluded that the population had homogeneous variance.

As the samples were shown to be normally distributed and homogeneous hypothesis testing was performed using the one sample t-test. The results showed the difference between the pretest and posttest marks was highly significant using the two tailed test with t = 0.000 <0.025, so Ho was rejected and Ha accepted. This result was strengthened by the average N-gain index of 0.69, which indicates that the achievement of learning outcomes was in the medium category. This proves that the achievement of student learning outcomes using MIVI learning media on cognitive aspects there are significant and real differences.

The N-Gain test measured the difference in the the post-test score data with pre-test score data. This test was conducted by researchers also to see an increase in students' ability to understand the concepts of biology when presented using interactive visual media (MIVI). The normality test was to avoid bias before the N-Gain test was conducted. The following table is the N-Gain test table t:
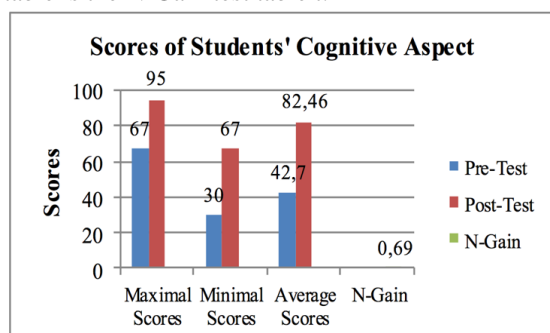

Figure 2: Graph of analysis of cognitive aspects [3]

The table shows that the highest pretest score was 67 and the lowest 30, while the highest posttest score is 95 and the lowest is 67 giving the N-gain score of 0.69 (medium). It shows that the application of MIVI learning media on the topic of human motion systems has a medium impact on improve student learning outcomes.

Data from the five aspects of the student affective domain assessment which has been adapted to the material and student learning abilities is shown in the chart below:
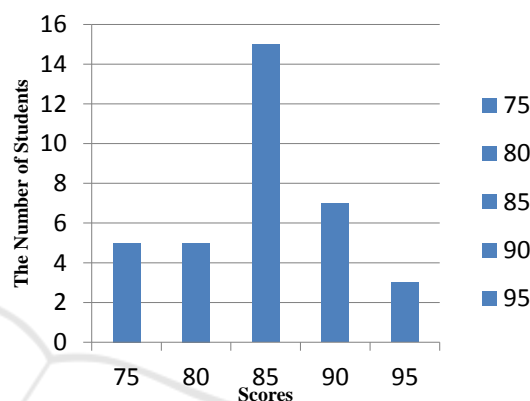

Figure 3: Graph the results of the affective aspect assessment analysis

The students obtained an average score of 85 with % students scoring 75, 5 scoring 80, 15 scoring 85 and 7 scoring 90, and scoring 3 95.

Assessment of aspects of students psycho-motor skills was obtained from observations of students' performance in the classroom with the 35 students getting an average score of 86 which is in the excellent category. For more details, can be seen in Figure 4 below:
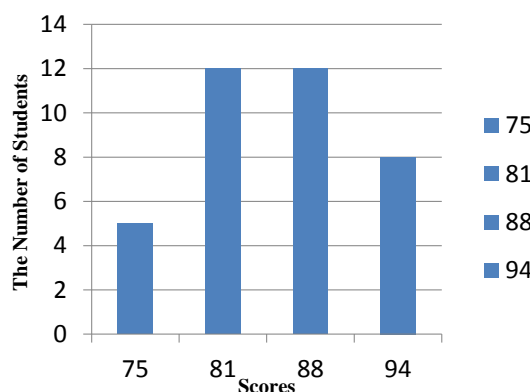

Figure 4: Graph of analysis of psychomotor aspects

66

The student response questionnaire consisted of 4 positive statements and 3 negative statements. 86% of the students chose positive statements in almost all categories and 72% chose negative statements from more than half the categories. Then the overall average of the positive response rate of students was 79% and reached in almost all categories.

3.2 Discussion

Student assessments in cognitive, affective and psychomotor areas when learning biology using visual interactive multimedia (MIVI) showed improvement. In the cognitive assessment, students mean score which was 42.70 before the MIVI lessons and below the minimum completeness criteria became 82.46. This supports the hypothesis that MIVI supported learning can improve student learning outcomes in the topic of human motion systems.

Learning media is everything that functions as an intermediary or means or a tool in conveying a message so that the message to be conveyed can be easily understood (Rahayu, 2013). Students as recipients of the message will certainly experience difficulties if the material presented has very complex abstractions, with interactive visual learning media students understand the concepts which are conveyed visually more easily. This supports a previous study that found that learning using audiovisual technology will improve learning abilities by 50% without using learning media (Munir, 2014).

Improving students' biology learning at the secondary level requires simplification of abstraction, Siman and Pedaste (2014) explains that a biology curriculum should focus more on the learning process that the structure of learning. The 3D concept of visual interactive multimedia (MIVI) provided by researchers was chosen to be age appropriate so that it would be more useful because understanding the level of complexity of the corresponding 3D content is dependent on the age or level of prior knowledge of the students (Siman and Pedaste, 2014). By improving student learning outcomes with the use of (MIVI) and providing a visual learning experience students' learning motivation will be increased as well. The function of learning media is known to be a tool that provides visual experience to students in order to encourage motivation in learning, clarifying and simplifying complex concepts, and results in students' attention to learning will be higher with more interesting content (Aina, 2013).

The affective aspect assessment score of 85 places it in the good category. Before learning took place the teacher explained several things to be considered by students during learning on a powerpoint slide. In the field of science education, students may have more learning experience in different learning environments so influencing the attitudes students develop during interactive multimedia learning (Shah and Khan, 2015). The learning environment was arranged in such a way to increase student motivation. Initial learning settings and games arrangement on interactive multimedia are several factors which will improve students' attitudes and motivation during learning. Students' attitudes can be predicted to be positive if the person has mastered the material (Sudjana, 2014). This can be used as a reference for researchers if they see the results of the pre-test that has been given at the beginning of learning.

The psychomotor aspects assessment had an average score of 86 (very good category) with the highest score being 94 This was made possible because of several factors including the teacher's explanation about what would be assessed during learning activities so that students understood what to do. The lowest score of 75 might be due students being less serious in learning and less precise in answering questions.

The use of technology in learning makes students use their hands when in analyzing available multimedia displays. Technology can change the traditional learning process of hearing, seeing and imitating things that come from a teacher or textbook (Widayat, 2014). Using technology students can construct knowledge with social understanding so that the process of collaboration in the group will take place well.

The student response questionnaire assessment showed 86% agreement with the positive statements in almost all categories and 72% with negative statements in more than half the categories, the overall average number was 79% in almost all categories. Assessment of the results of student response questionnaires used values ranging from 0-100 with interpretation as follows: all: 100, almost entirely: 76-99, more than half: 51-75, half: 50 , almost half: 26-49, a small percentage: 1-25, none: 0 (Meidawati, 2013). Thus the results of the assessment of student responses to learning with an overall average of 79% could be said to be more than half. Therefore, the results of student response questionnaires can strengthen the results of the study that show an increase in learning outcomes after applying MIVI learning media to the topic of human motion systems.

Based on the results of cognitive, affective, and psychomotor data analysis, the use of MIVI learning

media can improve student learning outcomes. This is supported by the results of student response questionnaires.

4 CONCLUSION

Based on the research data it can be concluded that the Interactive Visual Multimedia learning media (MIVI) can improve student learning outcomes in the topic of human motion systems with medium N-Gain results of 0.69 for affective aspects with a good catergory score of 85, psychomotor aspects score of 86 and student responses showing 79% of students have a positive response to learning.

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