
Fostering the Learning Outcomes Achievement of Class X High School Students on the Protist Concept Using The Visuospatial Wimba Learning Model

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ABSTRACT

The study was conducted to determine the influence of the visuospatial Wimba learning model for the student learning outcome of class X on the protist concept. The method used in this research was quasi-experiment with the design of the posttest only control group design. The population of this research was all X MIPA of publi madrasah aliya in Kota Cilegon. The sample of this research was X MIPA 1 as the experiment class and X MIPA 2 as control class carried out by simple random sampling. The data collection techniques used were a multiple-choice test and a 3D media assessment. The results showed in cognitive and psychomotor aspects for the experimental class were 84 and 85.14, while in the control class was 63 and 73.04. The result of the hypothesis test analysis showed the significant value of learning outcomes on cognitive and psychomotor aspects was 0,00 and 0,03 respectively which is < 0,05. Thus it can be concluded that the visuospatial Wimba learning affects student learning outcomes.

Keywords: learning outcome, protist, visuospatial wimba

INTRODUCTION

Learning outcomes are skills acquired by students due to their education for their life improvement (Paolini, 2015). Learning outcomes are broadly divided into cognitive, affective, and psychomotor domains. Those often used as material for assessing learning outcomes are cognitive because they are related to students' ability to master lessons. Students' thinking skills can be enriched with curiosity and invite them to analyze rationally. Thus students can learn teaching materials and create positive changes in themselves. (Wahono et al., 2020). The cognitive domain is concerned with mental activity (brain), whereas cognitive learning is concerned with the process of changes in the cognitive area (Ilma et al., 2020).

Creativity is one of the characteristics that influence learning outcomes. (Bachri & Setiani, 2018) which can stimulate students' thinking ability. Creativity in psychomotor abilities may be enhanced through learning biology, as evidenced by goods committed to

addressing scientific challenges. Educational environments that allow students to maximize their potential may also develop students' creativity (Ritter et al., 2020). According to the regulation of the Minister of Education, Culture, Research and Technology of the Republic of Indonesia Number 58 of 2014, the curriculum 2013 is designed to provide learning that requires students to apply innovative approaches to solve issues. The term creativity can relate to a student's ability to think creatively.

During the Covid-19 epidemic, synchronous online learning is possible through direct online contact and face-to-face engagement between teachers and students, facilitated by video calls and chat. Moreover, asynchronously used indirect online communication, communication can be done using media such as email, forums, and working on online documents (Dhawan, 2020). Biology education is also available online in this epidemic situation. However, it is still important to shift the biology learning paradigm, which is still obsessed with comprehending the concepts, principles, and mechanisms found in biological content, and has a significant impact on student learning results.

According to the findings of interviews with a biology teacher in one of the state madrasah aliyah in Cilegon. Banten Province, there was a topic on the Biology material concept for class X MIPA that students find challenging to comprehend, protists. Students were more likely to remain passive during the learning process, especially during online learning, when the teacher couldn't watch them as closely, resulting in students' capacity to capture knowledge being less than optimum. Furthermore, as the teacher rarely includes students in activities that encourage them to develop their creativity during the learning process, students are less engaged in the learning process. Teachers' domination in conventional lectures and questions and answers are still employed as teaching strategies. This is in line with Sugilar (2013) that students' creative capacities do not develop properly if the learning process remains concentrated on the instructor and does not include students in active concept formulation.

Based on the description above, one way to overcome the existing problems is to apply a model that can improve learning outcomes on the Protista concept by the visuospatial Wimba learning model. According to research conducted by Suprpto et al., (2018) the Wimba learning model is a model that can improve students' cognitive learning outcomes on plant anatomy material. This opinion is reinforced by (Atikah et al., 2018) which state that visuospatial representation in Wimba learning is very influential on students' mastery of concepts in immune system learning. As a result, it is envisaged that using the visuospatial-Wimba learning paradigm would impact students' cognitive and psychomotor abilities when creating a learning product.

RESEARCH METHODS

The research was conducted using a quasi-experimental method in one of the state madrasah aliyah in Cilegon during the even semester of the 2020-2021 academic year. All class X MIPA was the population, whereas the research sample was two classes selected based

on the random sampling method. MIPA 2 and MIPA 1 were used as a control and experiment, respectively. The test instruments used objective cognitive tests with 17 questions in multiple-choice format.

A non-psychomotor assessment sheet was utilized as a non-test instrument to assess the results of 3D media production across four areas. In addition, observation sheets on the implementation of the learning model used by the observer during learning activities were utilized, and interviews were accomplished directly by instructors and students. The instrument's validity, reliability, discriminating power, and complexity level are evaluated first. Based on the students' cognitive and psychomotor scores, categorization is used to classify students' skills. Finally, the scores of students in each category are analyzed according to Purwanto (2011), as shown in Table 1.

Table 1. The range of scores and criteria for the cognitive and psychomotor domain

Range of Score	Criteria
86 – 100	Excellent
76- 85	Very Good
60 – 75	Good
55 – 59	Fair
≤ 54	Poor

The normality and homogeneity tests were employed in the data analysis, while the t test was used in the hypothesis test with the assistance of the SPSS version 22 application.

RESULT AND DISCUSSION

According to the findings, the visuospatial-wimba learning model has an impact on student learning outcomes in the cognitive and psychomotor domains characterized by a high average score in the experimental class compared to the control class (Table 2).

Table 2. The effect of the visuospatial wimba learning model on student learning outcomes and its statistical tests

Parameter	Experiment Class	Control Class	Statistical test result	Conclusion
The average score of cognitive aspect	84	63	0,00 < 0,05	H0 is rejected and H1 is accepted, the visuospatial-WIMBA learning model influence students' cognitive learning outcomes
Average score of psychomotor aspect	85.14	73.14	0,03 < 0,05	H0 is rejected and H1 is accepted, the visuospatial-WIMBA learning model influence students' psychomotor learning outcomes

The learning process in the experimental and control classes has been carried out online, both synchronous and asynchronous learning, direct through online and indirect communication. According to Kim (2020), asynchronous learning occurs when students

choose their own time to participate in learning through different media tools such as email or discussion boards. Students can log in to communicate and complete their activities at chosen times and learn at their own pace. In contrast, synchronous learning activities occur through live video and audio conferencing with live feedback. Both learning processes were facilitated by google meet for face-to-face meetings with students. While WhatsApp, google drive, and google forms were used for student assignments as learning evaluations.

The visuospatial wimba learning model has five stages that can affect students' cognitive abilities by creating concept maps presentations, observing two-dimensional images, designing two-dimensional images, and creating three-dimensional media. According to Rosenthal et al., (2010), humans can detect and integrate associations between unrelated but adjacent items in time and space, depending on high visuospatial abilities. Visuospatial wimba learning prepares students to present the object being studied to be more accurate and meaningful. The implementation of the Wimba learning model was divided into two learning sessions.

At the first meeting of the experimental class, students created a concept map, which they subsequently presented. The stage of concept maps creation was carried out individually. The concept map aimed to compile information and comprehend the extent of students' initial knowledge. A concept map is a concept network with the main concepts or ideas placed at the top, usually within an oval. In contrast, other more specific concepts are arranged in descending order of importance or specificity on the map. Concepts are linked to each other through connecting words that combine the concepts to give them meaning. Two or more concepts combined with connecting words form a proposition with a specific meaning (Romero et al., 2017). Before the learning process began, the worksheet was provided to the student. Through activity one, instructed in the worksheet, students created a concept map. The teacher then asked students to search and read diverse literature and sources from books and the internet about protist material concepts. Then students identified concepts from general to specific until a concept map connected successfully. The concept map products produced by students varied. However, in general, students created good concept maps. The next stage was discussion and question-and-answer activities. This activity is intended to encourage students to communicate and exchange ideas with their peers to access additional knowledge. According to Wattiaux & Crump (2006), classroom discussions designed and implemented in the learning process can provide more interaction between teachers and students and interactions between students that allow for rapid feedback and help students achieve learning goals and respect diversity and learning styles. The control and experimental classes were in charge of the discussion process.

Students then studied the structure of protists to gain a general understanding of the structural components of protists. This activity was continued with the creation of three-dimensional media videos. Finally, students were instructed to make 3-dimensional shapes using Playdough.

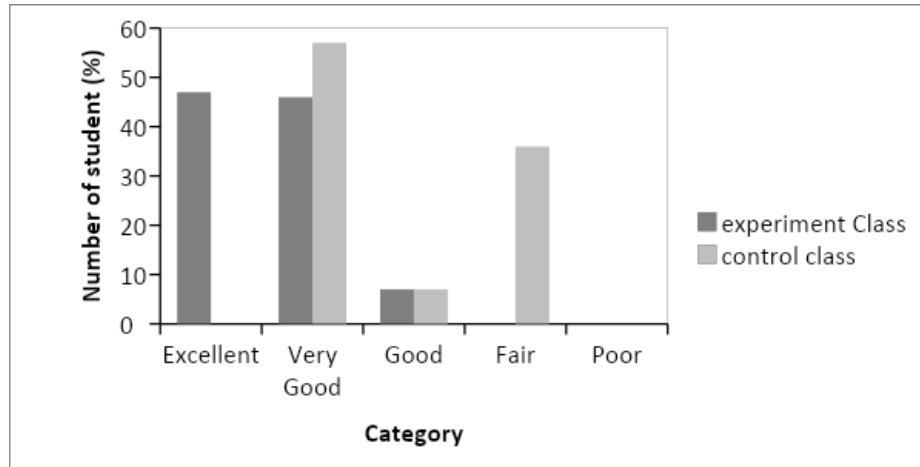
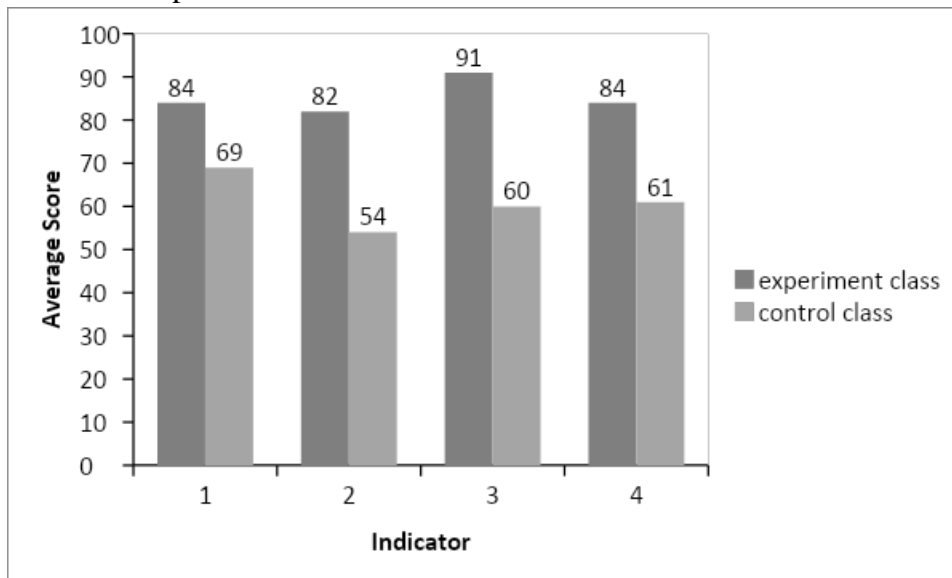


Figure 1. Distribution of students' cognitive abilities by category

Based on Figure 1, in the experimental class, students' cognitive abilities were categorized as excellent -good. It is different in the control class. Students' cognitive abilities were categorized as very good-fair. In the control and experimental classes, there were no students in the poor category. Based on this profile, it can be noticed that the high cognitive value of the experimental class is due to the stages of the Wimba model. First, students can observe and draw an object in a natural form according to the imagination ability of each student so that there is no compulsion for students to understand protist material. Then, following Riski & Widayati (2016), creating various two-dimensional and three-dimensional shapes will be more impressive to students.



Indicator description:

1. Mention the definition and general characteristics of protists,
2. Identify protists based on the general characteristics of the class,
3. Classify protists as well as make on a connection their role that protists play in the ecosystem.
4. Create a three-dimensional media design based on the animal-like protist phylum

Figure 2: Value of achievement for each cognitive ability indicator

Based on Figure 2, the experimental class's average learning mastery indicator value was higher than the control class. There were four indicators with levels C1 (understanding) to C6 (creation) in this study. The test instrument used consisted of the questions which indicated by the operational verbs referring to each cognitive level. Students considered the question in C4-C6 level as difficult to answer. It needs high order thinking skill to answer the question. Here with the sample question for the C6 level. Procedures need to be carried out if there are teacher assignments to build a 3D media product based on the structure of the protist phylum are consists.

- a. use the necessary tools and materials-choose the structure of the protist phylum-compose the design
- b. selecting the protist phylum-preparing the tools and materials needed-composing the design structure
- c. see the design-choose the structure of the protist phylum-prepare tools and materials
- d. choose the structure of the protist phylum-make the design-prepare tools and materials
- e. see the design-prepare tools and materials-choose the structure of the phylum Protista

Based on the analysis, the highest experimental class indicator value was found in the third indicator: classify protists as well as their role in life relations. The high score on the third indicator is due to the stages in the Wimba model that are implemented in the learning process: students make concept maps and make presentations. Both of these activities are used by students to make it easier to remember the material. In line with Ramdhani et al., (2019) the concept map aims to see initial knowledge and strengthen concepts. At the same time, the highest indicator of the control class is in the first indicator, which mentions the general meaning and characteristics of protists. Because the C1 level question was easier to understand than the C2 and C4 levels, the control class's indicator 1 was high.

The indicator with the lowest average value is the second indicator, identifying protists based on the general characteristics has an average value of 82 for the experimental class and 56 for the control class. The low experimental and control scores on the second indicator were caused by the lack of ability in identifying protist structures, especially with scientific names. Students were challenged when it came to unfamiliar terms such as the protist's scientific name. According to Hartantio & Buditjahjanto, (2014) the most significant difficulty of students in understanding the material is understanding concepts, remembering, and scientific names. Student worksheets also became the one of the obstacles that resulted in lowers student scores than other indicators. As the student worksheets that have been made did not emphasize the classification of protists. Therefore, it is considered that student worksheets are essential for understanding the material and are a learning component.

In the fourth indicator, the experimental and control class's achievement per indicator obtained an average value of 84 for the experimental class and 61 for the control class. The indicator of achievement in creating three-dimensional media designs based on the animal-like protist phylum of the experimental class has a higher average value than the control. Students were assigned to fill out worksheets, one of the tasks was to create a framework for creating

media using a description and pictures. Meanwhile, the experimental worksheet based on the Wimba model has a design in the form of an image; thus, the experimental class is easier to work with than the control class. According to Suprpto et al., (2018) the peculiarity of this visuospatial-Wimba model is in the last stage. Students need to create or construct images from two dimensions into three dimensions. Therefore it will encourage students to develop an understanding of the concept.

The outcomes of students' psychomotor abilities in the experimental class were likewise similar to the results of their cognitive abilities. Figure 3 shows the distribution of students' psychomotor abilities in the control and experimental classes. Again, both the control and experimental groups fall into the range of excellent to good categories and no students in the fair and poor categories in both classes.

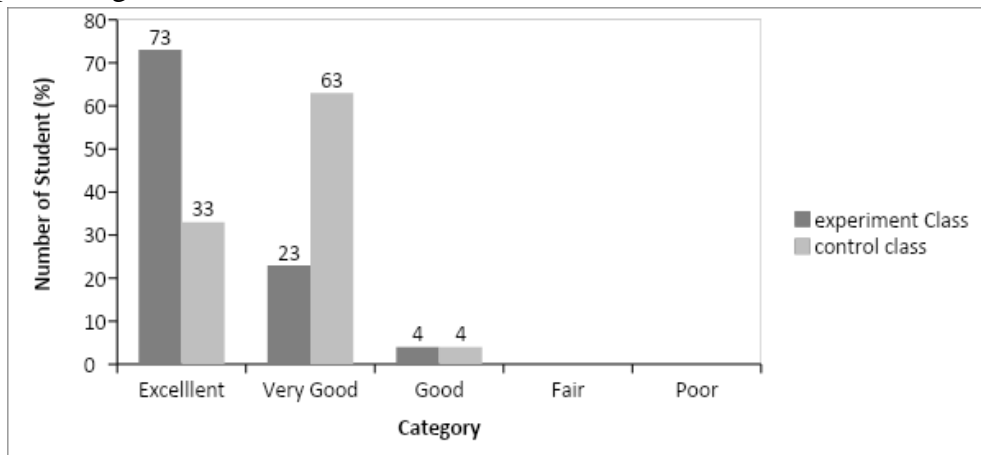


Figure 3 Distribution of students' cognitive abilities by category

Based on these findings, the visuospatial wimba learning paradigm can significantly improve psychomotor abilities. According to Atikah et al Atikah et al., (2018) the Wimba learning model impacts learning outcomes and can increase students' critical thinking abilities when it comes to reproductive system materials. The outcome of the students' three-dimensional media video creation about the structure of the protist phylum may be used to determine the results of the three-dimensional media evaluation of the experimental and control classes. Individually, the experimental and control classes completed creating three-dimensional media.

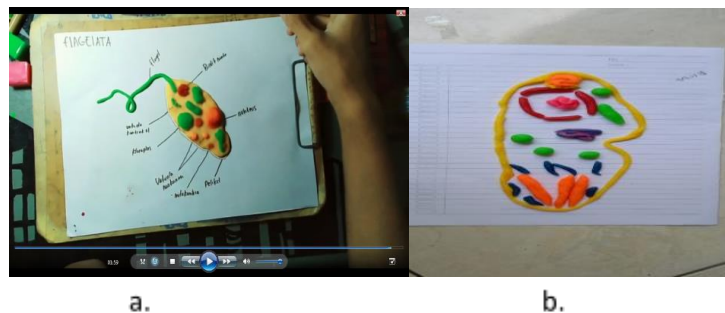
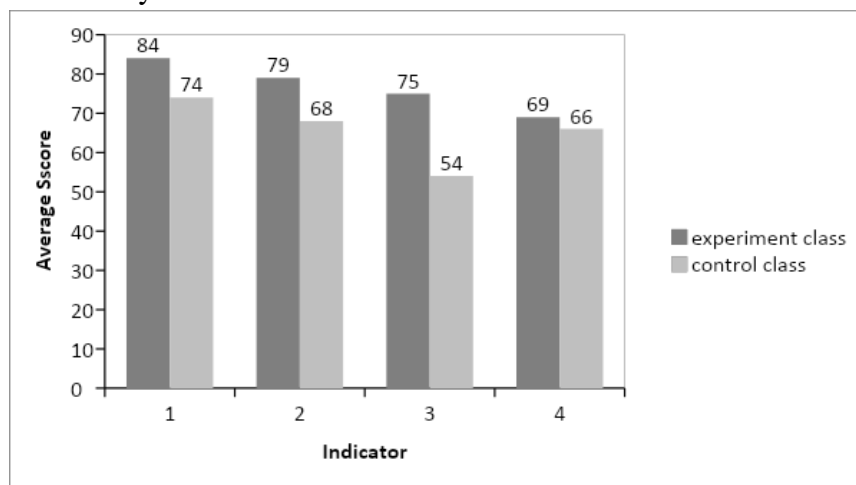


Figure 4 Three dimensional media products. a. experimental class and control class b.

Students in the experimental class can depict pictures in two-dimensional form. In contrast, students in the control class can envision the shape of the structure of the protist phylum through a summary given over student worksheets. It is generally present in the experimental class and is connected to tidiness and completeness. Because the experimental class already understands the notion before creating 3D material influenced the results. The notion is found in the fourth step of the visuospatial-wimba learning paradigm, which involves envisioning a picture comprising the structure of the protist phylum and then expressing it in two dimensions. However, the control class imagines it in summary form and not visually. Therefore the experimental class's psychomotor value is greater than the control class.

Figure 5 showed that the average psychomotor score in the experimental class for all indicators was higher than the control class. For all indicators, the first indicator showed the highest score, very good criteria with 84 and 74 in experimental and control class respectively. The high percentage value in the first indication is because students are highly passionate and enthusiastic in solving difficulties. Students construct protist organelle patterns with playdough using various colors such as red, yellow, green, blue, and other colors. Students who have a high level of excitement will take all learning activities seriously, whereas students who have a low level of enthusiasm will become sluggish while studying. Therefore, even though the first indicator is relatively high, the experimental class has a more excellent value than the control class. In the experimental class's media creation activities, students are focusing on the phases of the visuospatial Wimba learning model included in the student worksheets. Figure 5 showed the result of the achievement of psychomotor indicators, based on the psychomotor level of Bloom's revised taxonomy combined with aspects of student product creativity.



Indicator description:

1. Preparing appropriate tools and materials for problem-solving of 3D media assignments (P2)
2. Creating a Protista structure using 3D media to show the authenticity of the product (P3)
3. Assembling the description of the picture as a form of product details (P4)
4. Integrating the content of the protozoan material with the 3D media creation (P4)

Figure 5. Psychomotor indicator achievement value

The last indicator with the lowest average value is the indicator of protozoan material content on 3D media (P4). The detailed content includes the placement of organelle structures and the structure and function of the protozoan organelles. The low value in the indicator was because students are more focused on making media than paying attention to the content in the media, as for other things such as the time being provided is too fast. Hence, students are in a hurry to place the organelles of the protist structure. In addition, the activity of constructing 3D images using playdough requires habituation. Therefore students' visuospatial abilities can be stimulated. The fourth indicator has the lowest score because students construct 3D images for the first time using playdough.

CONCLUSION

It can be concluded that the visuospatial wimba learning model influences the learning outcomes of class X students on the concept of protists for cognitive and psychomotor aspects. Statistical analysis showed on the cognitive significance value was 0.00, the psychomotor significance value was 0.03 with a significant level of 0.05 therefore the H1 was accepted.

For the following study, three-dimensional media assessment sheets focusing on students' visuospatial abilities in the learning process should be explored more deeply. In addition, the assessment criteria for making 3D media should be more detailed on each other. Furthermore, the visuospatial wimba learning model should also be applied to other materials and the protists concept. Finally, the fifth stage of the visuospatial wimba model should be appropriately conducted to create the optimal product.

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