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The Effect of Group Investigation Learning Model Assisted by Digital Mind Map (GI-DMM) on Student Learning Oucomes in the Cognitive Domain

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Abstract

The progress of a nation depends on the quality of education, One way to improve the quality of education is to carry out an effective learning process so as to improve student learning outcomes. learning process the teacher uses a scientific approach, but in learning the scientific approach is implemented not optimally so learning does not involve students actively and learning outcomes are low. Teachers are required to design an innovative learning model that leads to an increase in learning outcomes achieved by students. This research aims to determine the effect of the Group Investigation learning model assisted by Digital Mind Map (GI-DMM) on student learning outcomes in the cognitive domain. This type of research is an experiment with this research design, namely in the experimental class using the application of the Group Investigation learning model assisted by the Digital Mind Map while in the control class it is carried out using a scientific approach, then a final test is carried out on both sample classes. The determination of the sample was carried out using the Total Sampling technique. The cognitive domain instrument is a test sheet in the form of multiple choice of 39 questions. Data analysis techniques using t-test. The results of this research are based on the t test, the average value of the experimental class is greater than the control class. Thus it can be concluded that through the application of the Group Investigation model it influences learning outcomes in the cognitive domain.

Keywords: cognitive realm; digital mind map; learning model; learning outcomes

INTRODUCTION

The progress of a nation depends on the quality of education, education is the most important means to realize the progress of the nation and state, with quality education will create quality human resources (Alifah, 2021; Fitri, 2021; Evendi *et al.*, 2022). One way to improve the quality of education is to carry out an effective learning process so as to improve student learning outcomes. Learning outcomes are patterns of behavior, values, notions, attitudes, appreciation and skills (Rahman, 2021; Yulianto, 2021; Husna *et al.*, 2023). Learning outcomes can be grouped into three aspects, namely the cognitive, affective and psychomotor domains. Explicitly, these three domains are separated from one another and whatever the type of subject, it always contains these three aspects but has a different emphasis (Siregar, 2019; Wicaksono & Iswan, 2019; Putri *et al.*, 2022). In line with the opinion of Learning outcomes are results given to students in the form of assessments after participating in the

learning process by assessing knowledge, attitudes, skills in students with changes in behavior (Nurrita, 2018; Rahman, 2021; Yulianto, 2021). What is expected from student learning outcomes is abilities that are in the cognitive domain area, so that student learning outcomes show that students have carried out actions that already include the knowledge and attitudes expected to be achieved by students (Yusuf, 2017; Hasanah, 2021; Tumulo, 2022).

The cognitive domain is a domain that includes mental (brain) activities, namely abilities possessed by a student which include memorizing (C1), understanding (C2), applying (C3), analyzing (C4), evaluating (C5) and making (C6). The cognitive domain can be measured using tests developed from material that has been obtained at school (Hasanah, 2021; Magdalena *et al.*, 2021; Yulianto, 2021). Cognitive is a term that comes from the verb "cognition", which refers to individual activities in recognizing and interpreting the surrounding environment. This includes various activities, such as acquiring knowledge or trying to recognize something through personal experience. Cognitive also refers to the process of understanding and knowledge that is built by one's mind (Kurniawan *et al.*, 2017; Ma'rifah, 2018; Fauhah & Rosy, 2020).Based on Bloom's Taxonomy theory the cognitive domain with regard to intellectual learning outcomes consists of 6 aspects, namely knowledge, understanding, application, analysis, synthesis and assessment (Ahmadiyanto, 2016; Netriwati, 2018; Nafiati, 2021).

The results of interviews that were conducted with Biology teacher at a high school in West Sumatera, said that in the learning process the teacher uses a scientific approach, but in learning the scientific approach is implemented not optimally so learning does not involve students actively. In addition, the teacher stated that students have problems in understanding the material, one of which is the reproductive system, and the number of students has low learning outcomes. The low student learning outcomes can be seen from the average daily assessment of reproductive system material that has not reached the minimum completeness criteria set by the school, which is 75, where the average is 73. Minimum Completeness Criteria is the lowest criterion for declaring students to achieve mastery (Hadi *et al.*, 2015; Muammar, 2018; Hidayat *et al.*, 2020). Teachers are required to design an innovative learning model that leads to an increase in learning outcomes achieved by students. Group Investigation learning model is a form of cooperative learning that makes students active in finding material (information) on their own through literature or learning resources and requires students to have good ability to communicate and group processing skills so as to improve learning outcomes student (Aryana, 2019; Devi *et al.*, 2021; Anik, 2022).The group investigation model has the advantage that students can be more enthusiastic, active and creative and increase students' self-confidence in solving a problem (Sagita *et al.*, 2018; Rahmawati *et al.*, 2020; Widyaningsih & Puspasari, 2021).

The learning model, if assisted by learning media, will create an effective learning situation. Learning media that can be used in the Group Investigation learning model is the Digital Mind Map (DMM). A digital mind map is a mind map that is packaged in digital form which displays brief lesson notes in the form of an application-assisted mind map (Asyafah, 2019; Oktavia *et al.*, 2021; Saepul *et al.*, 2023). GI-DMM learning model is a model used in the learning process where one of the syntax stages is implemented, namely evaluation assisted by digital technology in the form of DMM (Astutik *et al.*, 2017; Devi *et al*., 2021; Rosba, 2021). This research aims to determine the effect of the Group Investigation learning model assisted by Digital Mind Map (GI-DMM) on student learning outcomes in the cognitive domain.

METHOD

This research was conducted in April-July at SMAN 1 Hiliran Gumanti. This research is an experimental research which uses two sample classes, namely the experimental class and the control class. The design of this study used the Randomized Control Group Posttest Only Design, namely in the experimental class using the application of the Group Investigation learning model assisted by Digital Mind Map while in the control class it was carried out using a scientific approach, then a final test was carried out on both sample classes. The population in this study were all students of class XI MIPA SMAN 1 Hiliran Gumanti of 2 classes with a total of 41 students. Determination of the sample was

carried out using the Total Sampling technique, where all members of the population were used as samples (Sugiyono, 2005).

How to determine the sample class using a lot system, the first lot comes out as an experimental class with a total of 21 people and the second lot as a control class. In this study there are two variables, namely the independent variable is the application of the Group Investigation learning model assisted by the Digital Mind Map, the dependent variable is student learning outcomes in the cognitive domain. While the type of data taken from research subjects through tests is the primary data in this study. Meanwhile, the data obtained from the biology teacher was considered as secondary data in this study. The source of the data in this study was students of class XI MIPA at SMAN 1 Hiliran Gumanti who were sampled. The research procedure consists of the preparation stage, the implementation stage and the completion stage. The instrument used in this study was the cognitive domain. The measuring instrument used to obtain data in this study was in the form of a set of tests used to measure student learning outcomes in the cognitive domain, in the form of an objective test with 39 items in the form of multiple choice questions with 5 alternative choices.

To get good quality questions, do the following steps: Make a grid of test questions; Arrange questions according to the grid, namely in the form of multiple choice questions; The questions were then tested on class XII MIPA SMAN 1 Hiliran Gumanti; and The questions that have been tried out are then reviewed to determine test validity, reliability, index of difficulty and discriminatory power. The data analysis technique was carried out using the t-test, before carrying out the t-test, the normality test and homogeneity test were carried out first. The normality test is used to find out whether the data comes from all normally distributed samples. Normality test used is the lilliefors test. Whereas in the homogeneity test it is useful to see that the two sample classes have the same or different versions, to determine the homogeneity test of the data, the F test is carried out. After carrying out the normality test and homogeneity test, a hypothesis test is then carried out to find out whether there is an influence on the two sample classes using the t-test (Sugiyono, 2005).

RESULTS AND DISCUSSION

The cognitive domain assessment was obtained from the final exam on the reproductive system material. The final test given to students totaled 39 items in objective form. The number of students who took the final test in the experimental class were 21 students and 20 students in the control class.The results of research on the application of the Group Investigation learning assited by digital mind map (GI-DMM) to learning outcomes in the cognitive domain are presented in the following figure 1.

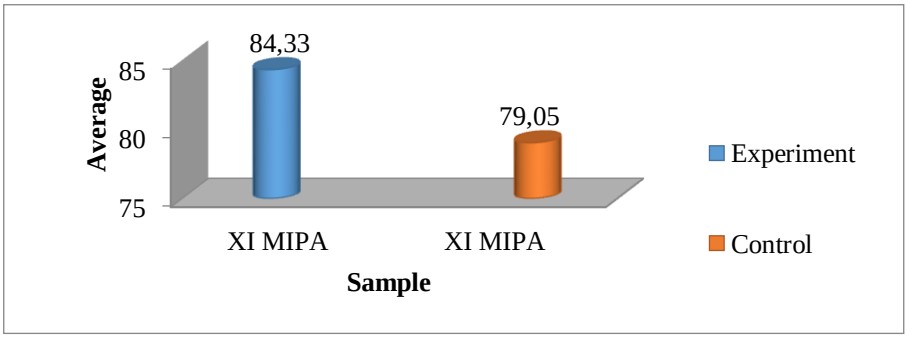

Figure 1. The average cognitive domain of the two sample classes

Figure 1 shows the average cognitive domain of the experimental class is higher than that of the control class. Where the average value of the experimental class is 84.33 while the control class is 79.05. Cognitive domain normality test for the experimental class LO < Ltable, namely 0.1123 <0.190 then the data is normally distributed while the control class LO < Ltable which is 0.1073<0.190 then the

data is normally distributed. To test the homogeneity of the two classes namelyFcount = 0.47<Ftable = 2.15, the data belonging to both classes is homogeneous, because the data is normally distributed and homogeneous, the hypothesis test is carried out usingtcount = 1.95 > ttable = 1.68, it can be concluded that HI is accepted. Assessment of the cognitive domain is the process of gathering information about students' thinking skills, which is integrated with their mastery of knowledge which aims to assess the achievement of graduate competency standards for all subjects by considering the results of student assessments by educators (Hidayat *et al*., 2020; Hasanah, 2021; Putri *et al.*, 2022). Based on the results of the t-test, it is known that the Group Investigation learning model assisted by Digital Mind Map (GI-DMM) has an effect on student learning outcomes in the cognitive domain.

The average value of the experimental class was higher than that of the control class, which was seen from the completeness of the experimental class from a total of 21 students, 20 students were declared complete and 1 student was declared incomplete, as much as 95% was declared complete and 5% was declared incomplete. In the control class, out of a total of 20 students, 17 students were declared complete and 3 students were declared incomplete, 85% were declared complete and 15% were declared incomplete. Learning process is said to be successful if classically it reaches 75% (Hadi *et al*., 2015; Muammar, 2018; Hidayat *et al.*, 2020). In the experimental class the high student learning outcomes were due to the application of the digital mind map-assisted group investigation learning model requiring students to be active and participate during the learning process, namely being actively involved from the stage of choosing a topic to the evaluation stage, so that students are trained in solving a problem and learning to communicate with friends and teachers. Advantages of the Group Investigation model can encourage students to take initiative, be creative, self-confidence can be further increased, be able to handle a problem, develop enthusiasm and increase learning to work together and learn communicate (Astutik *et al*., 2017; Ulfa & Sugianto, 2015; Pratami *et al.*, 2019).

In addition, the high learning outcomes of the experimental class are due to the Group Investigation learning model assisted by the Digital Mind Map, students choose the desired learning topics themselves, so that students investigate the topics themselves with enthusiasm and great curiosity, this causes students to understand and remember studied material. Experimental class in laboratory (Pertiwi & Saputri, 2020; Saputri & Pertiwi, 2021) and study field (Triacha *et al.*, 2021; Fatonah *et al.*, 2023; Mufida *et al.*, 2023) gave memmorable experience and good outcome. In addition, by using theDigital Mind Map at the evaluation stage students can also understand and remember the material that has been studied, because at the evaluation stage each student makes the conclusions obtained inthe form of a Digital Mind Map with their creativity. In the control class in the learning process using a scientific approach, the low learning outcomes of students in the control class compared to the experimental class because at every meeting in the control class not all students are actively involved in the learning process, mostly onlystudents who have a high interest in learning who want to be actively involved in the learning process, so that there is no high cooperative attitude in the group. Then in the learning process there are students who are not present in the learning process. Student learning activeness is one of the basic elements that is important for the success of the learning process, student activeness in learning is all activities that are physical or non-physical in the learning processso as to create good learning outcomes (Wibowo, 2016; Yulita *et al.*, 2021; Cahyaningtyas *et al.*, 2023).

CONCLUSION

Based on the results of the research conducted, it can be concluded that the application of the Group Investigation learning model assisted by Digital Mind Map (GI-DMM) has an effect on student learning outcomes in the cognitive domain. average score in the experimental class is 84,33 and the control class is 79,5. The advantages of the Group Investigation model can encourage students to take initiative, be creative, self-confidence can be further increased, be able to handle a problem, develop enthusiasm and increase learning to work together and learn communicate. These findings are useful for the nation especially teachers, because This research can be used as an alternative to vary the learning

model in a broader scope, in order to improve other abilities.

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