

The Influence of Group Investigation Learning Models Through Hands on Activity and E Learning on Biology Learning in terms of Student Learning Styles on Student Learning Outcomes at Public Senior High School Poso

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Abstract

This study aims to improve biology learning outcomes by developing an active Group Investigation learning model supported by hands-on activities and e-learning while considering students' learning styles. This experimental study employed a completely randomized design with a factorial arrangement. The population included students from three senior high schools in Poso, while the sample comprised 257 students from nine classes, including six experimental and three control classes. Treatments combined two factors: learning models and learning styles (auditory, visual, and kinesthetic). Learning styles were identified before the intervention, whereas learning outcomes were assessed afterward using achievement tests. Learning style data were collected through questionnaires. Data were analyzed using two-way ANOVA. Results indicated significant differences in learning outcomes among the combinations of learning models and learning styles ($p < 0.05$). The most effective combination was the Group Investigation model through hands-on activities with students who had visual learning styles, producing the highest mean learning outcome score of 86.72. These findings suggest that aligning instructional strategies with students' preferred learning styles can enhance biology achievement more effectively than conventional approaches. Therefore, teachers are encouraged to integrate collaborative investigations, practical activities, and appropriate learning style considerations into biology instruction to optimize student academic performance.

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Introduction

As an educational institution, Poso State High School has the same roles, hopes and goals in advancing and developing the nation today. However, the current condition, schools in Poso are still unable to meet these goals and expectations because one of them is the low learning outcomes of biology in the last two years. Data obtained from student learning outcomes in biology subjects obtained results of <80%, this percentage is still far from the target of achieving learning outcomes targeted by the curriculum in Poso State High School. Based on the initial survey, it shows that the value of biology learning outcomes in animalia tends to be lower than other materials. This can be due to the model used with conventional learning models which are sometimes interspersed with practical activities.

Use conventional learning model that is with one-way lectures. Model in I do not help students in learning. Learning becomes passive because students are used as objects who are continuously given information without being able to find the information (material) themselves that must be

mastered. This resulted in the dependence of students who were too high on the teacher and also resulted in the lack of development of independent learning skills.

Based on the initial observations made, it is known that there is still a lack of student learning activities such as recording teacher explanations, asking questions and doing assignments given by the teacher. This passive learning activity is influenced by the low interest of students in learning biology. Therefore, it is necessary to develop and implement a model that can foster the interest, creativity and activeness of students in learning.

Other problems in Poso State High School which is related to the pattern of using learning styles applied by students. The learning styles that are often used are audio, visual, and kinesthetic learning styles. However, until now it is not known which learning style has a significant influence on the process and learning outcomes of students. Therefore, it is necessary to conduct research related to the influence of student learning styles on the accuracy of the process of receiving student material so that teachers know for sure a good learning model to use in learning. Learning style is

the most preferred method used by students to be able to process and receive information or subject matter easily (Gunawan, 2003). Everyone's learning style is not the same, and is related to the ability to absorb, organize and process information (Suyono, 2018).

Learning carried out at High School Poso still seems rigid by centered on one source of learning, namely books. This causes students to have difficulty in receiving learning information. With the learning style applied in the learning at High School Poso, this of course also limits the space for movement and thinking space of students.

Based on these facts, one solution to improve biology learning outcomes is to develop a learning model that will actively involve students by paying attention to their learning styles. So that the learning objectives achieve the goals well as stated in the curriculum, by seeking the use of appropriate learning models. In the process of learning biology, students are expected not only to memorize the subject matter but students are able to understand the concept of biology through learning group investigation learning model through hands on activity and e learning. At High School Poso, it has not implemented group investigation learning model through hands on activity and e learning.

One model that is well developed and applied in learning is the group investigation model. In this cooperative learning, students are more active in finding information about the lessons to be studied and with friends in groups to determine the topic of investigation used, so that it will have an impact on cooperative abilities and learning outcomes. According to Taher., et al (2018) "The use of the investigative group-type cooperative model can spur activities. Students are required to be active in learning by helping their groups to do learning. With the use of this model, students' interest in a learning process will increase because students actively participate in searching and investigating to obtain information from various sources as according to Ilhamdi and Mertha (2020) that students who have an interest in learning will feel happy about learning. Therefore, students can understand the subject matter well, interest can arise by itself, which is marked by a sense of liking for the lesson.

The learning model has a role in delivering learning material, so that it can be well received by students. The combination of learning models with activities designed to make these learning activities more meaningful to students so that it will strengthen the learning information received by each student, one of which is through hands on activities. Hands on activity according to Haury & Rillero (1994) is an activity designed to involve students in digging up information and asking questions, doing activities and finding, collecting

data and analyzing and making their own conclusions through direct physical activity. Physical activity in the laboratory can be in the form of conducting experiments. During the experiment, students do not only do physical activities (hands on activity), but students also do psychological activities (mind on activity). Avisya, et al., (2019) stated that students' science process skills can improve student achievement after the application of the hands on activity-based cooperative learning model. Nasrah & Amaliah, (2021) show that there is an effect of cooperative learning model type student team achievement division with hands on activity on student learning outcomes in the experimental class. Avisyah, et al., (2019) which shows that the cooperative learning model can improve learning outcomes. The increase in student learning outcomes in each research cycle was caused by the hands on activity-based learning activities.

Pratimi., et al (2019) shows that this type of group investigation cooperative learning has advantages in improving learning outcomes compared to conventional learning. Group-type investigative cooperative learning can also increase the activity of students' cooperative abilities. Group investigation learning which divides students into several small groups is suitable to be combined with hand on activity which emphasizes physical activity to understand a material concept, by dividing students into several small groups and doing a series of physical activities will be more effective for students to understand a material.

Learning that combines models and learning activities that aim to improve student learning outcomes will make learning more meaningful because there are physical activities through experiments in learning and students seek learning information from various references (internet). This is what will be done in this study, namely by combining group investigation model learning through hands on activity and e-Learning. E-learning learning is learning using internet media. Through e-learning students can do distance learning (distance learning), discuss with other people or experts in certain fields, provide input, get material, send assignments easily, know the development of education besides that students can learn from anywhere not limited by space and time. Materials from the internet are more complete and interesting and there are many other benefits. These two activities will make students understand the concept of biology and be more interested and inspired to learn biology. With a combination of group investigation and e-learning, students who are divided into several small groups can conduct an assessment of a material through e-learning media so that in these groups students are trained in teamwork and express their opinions or exchange ideas in the study of a material. These two activities

will make students understand the concept of biology and be more interested and inspired to learn biology. With a combination of group investigation and e-learning, students who are divided into several small groups can conduct an assessment of a material through e-learning media so that in these groups students are trained in teamwork and express their opinions or exchange ideas in the study of a material. These two activities will make students understand the concept of biology and be more interested and inspired to learn biology. With a combination of group investigation and e-learning, students who are divided into several small groups can conduct an assessment of a material through e-learning media so that in these groups students are trained in teamwork and express their opinions or exchange ideas in the study of a material.

According to Erdawati & Sartika (2022), e-learning is an asynchronous learning activity through computer electronic devices connected to the internet, where learning participants seek to obtain learning materials that suit their needs. Learning activities through e-learning or different from learning activities carried out classically in the classroom.

To clarify the material and make students interested in the subject matter to be delivered, the teacher can use computer media and 3-dimensional media. So that students' learning styles must also be considered in the learning process. Every human being has a unique learning style. Teachers should pay attention to whether students learn most effectively by seeing (visual), hearing (auditorial) or moving and touching (kinesthetic). For this reason, an appropriate learning model is needed in the teaching and learning process. By using group investigation learning through hands on activities and e-learning, it is expected to provide an interesting and fun learning atmosphere for students.

The purpose of this research to improve biology learning outcomes by developing a learning model that will actively involve students through a hands-on activity-based group investigation model and e-learning by paying attention to their learning styles.

Materials and Method

This research is an experimental research. Experimental research aims to examine the possibility of causality by applying one or more treatment conditions to one or more experimental groups and comparing the results with one or more untreated control groups. The experimental design used is a factorial design. At the end of the experiment both groups were tested with the same measuring instrument and became experimental data. This data is then processed by statistical analysis of two-way variance.

The population in this study were all high school students 2, 3 and 4 Poso. The sample in this study was class X students at the three High School in Poso for the academic year 2020/2021 as many as 3 classes in each school. So that the total class used is 9 classes with six classes as experimental classes and three other classes as control classes with a sample of 257 students with a ratio of 159 female students and 98 male students. Samples were taken by purposive sampling technique. The questionnaire instrument for student learning styles is 39 numbers with 5 alternative answers, namely never, almost never, sometimes, often and always, and using a test instrument for learning outcomes as many as 20 numbers with 5 alternative answers, which have been tested for validity. content and construct by experts and tested on 15 students, learning style data is taken before the treatment is given and learning outcomes are taken after the treatment is given, then the data is tested for normality and homogeneity and followed by a 2-way ANOVA test using assistance SPSS 21.

Results and

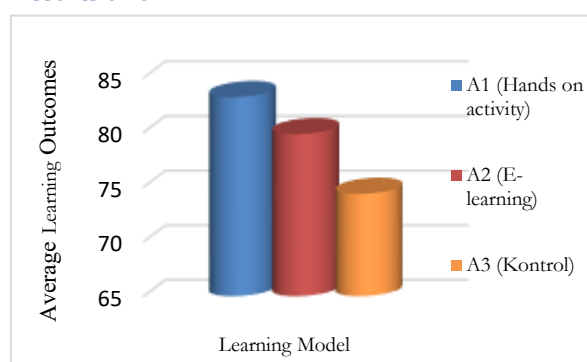


Figure 1. Graph of Average Learning Outcomes based on Learning Model.

From Figure 1 Based on the ANOVA test, the learning model has a significant influence on student learning outcomes (appendix 7). With the highest average learning outcomes in the group investigation through hands on activity (A1), namely 83,211 and the lowest in the control (A3), 74.36.

In addition to the learning model, learning styles also play a role in the average student learning outcomes. The following is a graph of the average learning outcomes based on learning styles.

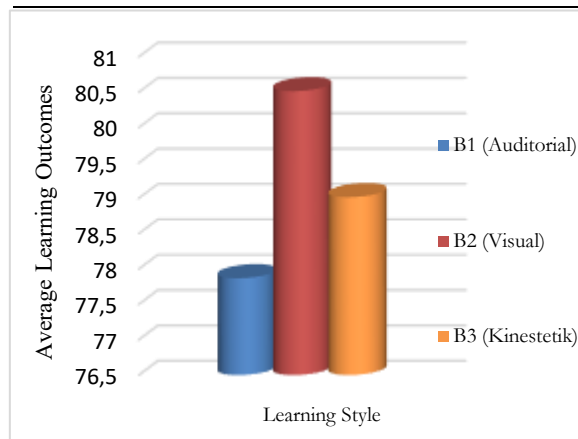


Figure 2. Graph of Average Learning Outcomes by Learning Style.

Based on Figure 2, it shows that students' learning styles have a significant influence on learning outcomes. With the highest learning outcomes on the visual learning style (B2) that is 80,513 and the lowest on the auditory learning style (B1) that is 77,869

The results that show the combination of learning models and learning styles on student learning outcomes are presented in Figure 3.

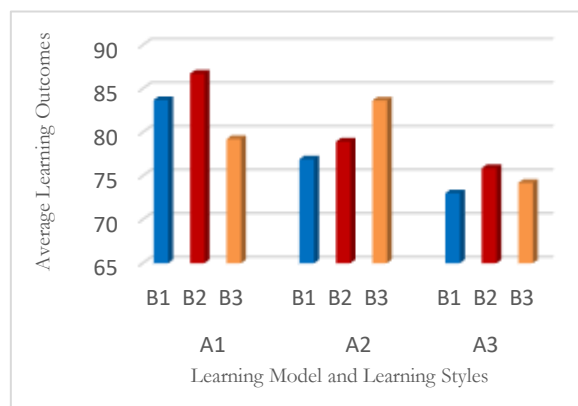


Figure 3. Combination of Learning Models and Learning Styles.

Based on Figure 3 shows that the combination of learning models and learning styles has a significant influence on student learning outcomes. In the combination of learning models and learning styles, it appears that the combination has the highest average learning outcome on A1B2 which is 86.72 and the lowest on A3B1 which is 73.

Discussion

The research conducted shows that the learning model has a significant influence on student learning outcomes, especially by using the hands on activity learning model (Figure 4.1). Judging from the average student learning outcomes with the group investigation learning model through hands on activity (GI+HoA) it shows a significant difference with 83,211 learning outcomes compared to group investigation through e-learning (GI+e-learning) with 79,826 learning outcomes as well as control with 74,361 learning outcomes. This is possible because the hands on activity learning

model not only makes students silent and listens to the material (passively) from the teacher, but also stimulates activity during the learning process so that knowledge is more easily understood and remembered by students (Figure 1). In accordance with the results of research by Kurniawan et al. (2017) that hands on activity have a significant effect of 64.5% on learning outcomes. This is in accordance with the opinion of Holsterman et al (2009) that learning by using the hands on activity model is learning that provides a more realistic and interesting learning experience that can arouse students' interest in learning so that students' cognitive learning outcomes will increase. This opinion is also supported by the opinion of Sadi & Cakiroglu (2011) that the results suggest that hands-on activities enhance cognitive learning, which means that the hands-on activity learning model will improve cognitive learning achievement. With a learning model that prioritizes direct experience, students are expected to be easy to remember and understand the material being taught.

While in e-learning learning which provides the widest access to students to get information, but the limitation of e-learning learning is the lack of students' ability to surf the internet in terms of finding reliable sources so that it is not uncommon to have many misconceptions that cause student learning outcomes. not better than using hands on activity as well as conventional learning models that result in students being inactive in the learning process, to overcome this a learning model is needed that makes students the center of learning.

The research also shows that visual learning styles have a significant effect compared to audio and kinesthetic learning styles, with the average learning outcomes respectively 77,869, 80,513 and 79,015.

Visual learning styles have a higher average learning rate compared to other learning styles because students with this learning style tend to learn from what they see, by learning to use visual displays such as videos, diagrams and practice, with these displays helping students to focus their attention on the object or material being studied so that they can remember and understand the material.

This result is supported by Kartono's opinion in Dedih., et al (2019) that attention is a response made by a person and awareness that causes increased activity, concentration power and helps students focus attention or awareness on a particular object.

Students with visual learning styles have the advantage of ease of learning the material displayed visually so that it will have an impact on increasing achievement or learning outcomes. In accordance with Mintarti (2016) that someone who is a visual type will quickly learn materials that are presented in writing, charts, graphs or pictures in other words it

is easier to learn lesson materials that can be seen that are presented in writing, charts, graphs or pictures with In other words, it is easier to learn lesson material that can be seen. This is in accordance with the results of research by Rambe and Yarni (2019) that learning styles have a significant influence on learning outcomes with the percentage of the influence of visual learning styles being greater than other learning styles, namely 27.4%.

While Audiotoral learning style prioritizes the ear (hearing instrument), students with this learning style can learn faster by using verbal discussions and listening to what the teacher says. Kinesthetic learning styles tend to learn through moving, touching and doing. Students like this cannot stand for long sitting listening to learning, but even though students with a kinesthetic learning style understand practice, if they don't understand theory, students tend to just experiment.

Based on the description above, learning styles make learning more effective so it is very important for students to know and take advantage of their learning styles, although basically the three types of learning styles are owned by students, however, students must have a tendency to one learning style (Permana., et al, 2019).

This study also shows that there is an interaction between the learning model and the learning styles on learning outcomes. Partially it appears that each learning model has the most suitable learning style to improve learning outcomes, the group investigation learning model through hands on activity with the visual learning style has higher learning outcomes than the treatment of other learning styles, the group investigation learning model through e-learning has higher average learning outcomes for students with kinesthetic learning styles compared to other learning styles. The conventional learning model has higher average learning outcomes for students with visual learning styles compared to other learning styles. However, Overall, the group investigation learning model through hands on activity with visual learning style was better than all other treatments. This is because the visual learning style demands visual things with the characteristics that students will be more likely to remember what is seen from what is read, prefer to read rather than be read, and prefer to do demonstrations rather than speech. This is in accordance with the hands on activity learning model that prioritizes real action and experience through the presentation of material as concrete as possible so that students are actively involved in the learning process and it is easier to construct their knowledge.

While the learning model *group investigation*

through e-learning has conformity with kinesthetic learning styles, this is presumably because students have good internet browsing abilities so that they are able to access various sources that provide materials that are in accordance with students' learning styles so that in fact this e-learning learning style has good potential. and the same for the three types of learning styles depending on the student's ability to find learning resources through e-learning media. This is in accordance with the research of Dharmayanti, et al (2018) that e-learning has the advantage that it can be adapted to the needs or characteristics of students in this case according to their learning style. The advantages of adaptive e-learning based on learning styles can adapt to student learning styles and needs so that it is effective in improving learning outcomes (Surjono, 2015).

The description above shows that the importance of conformity between the learning models applied by the teacher in the classroom by taking into account the conditions student learning styles so that the acceptance of information by students becomes more effective, in accordance with the opinion (Slavin, 2000).

That the suitability between external factors (learning models) and internal factors (learning styles, and characteristics) are able to make it easier for all information to be received and processed by the brain.

Conclusion

There is an influence of learning models on learning outcomes with the group investigation learning model with hands on activity can improve learning outcomes higher than the e-learning and conventional learning models, besides that there is also the influence of learning styles on learning outcomes with visual learning styles can improve learning outcomes higher than the audio and kinesthetic learning styles as well as the interaction of learning models and learning styles on learning outcomes showing a significant effect with the interaction of the hands on activity learning model and visual learning styles can improve learning outcomes higher than the interaction of other learning models and learning styles.

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