



The Effect of the Two Stay Two Stray Learning Model Based on a Scientific Approach to Student Competence in Biology Learning

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Abstract: This study aims to determine the effect of the two stay two stray learning model based on a scientific approach to the competence of class XI students at SMAN 3 Pariaman. This type of research is a quasi-experimental research with a randomized control-group posttest only design. The research population was all class XI MIPA students at SMAN 3 Pariaman in the 2022/2023 academic year. Sampling used a purposive sampling technique, so that class XI MIPA 1 (experimental class) and class XI MIPA 3 (control class) were selected. Data analysis techniques using normality test, homogeneity test and hypothesis testing. Testing the hypothesis in the domain of knowledge uses the t test while testing the hypothesis in the domain of attitudes and skills using the Mann Whitney test. The results of the study found that the two stay two stray learning model based on a scientific approach had an effect on the competence in the realm of knowledge, attitudes and skills of class XI students at SMAN 3 Pariaman.

Keywords: Scientific approach; Student Competence; Two Stay Two Stray Model

Introduction

The implementation of education in Indonesia is currently faced with several problems. One of them is the low quality of education. Solving the problem of low quality education must be focused on the quality of learning, because learning is the essence of educational activity. Components that can contribute to the quality of learning and improve learning outcomes are students, teachers, materials, methods, learning resources, facilities and infrastructure and costs (Karwono & Mularsih, 2017).

Efforts to improve the quality of teacher learning are required to educate and teach by using learning models and approaches needed in the learning process in accordance with the demands of the curriculum. Learning using the 2013 curriculum has improved the mindset of learning from teacher-centered to student-centered, from passive to active, and from independent learning to group learning (Widyastono, 2014). In the

implementation of the 2013 curriculum in learning, sometimes teachers still tend to apply the direct learning model because it is considered more practical and easier to achieve learning objectives. (Suharno, 2014).

Based on observations made at SMAN 3 Pariaman by distributing questionnaires to 1 biology teacher teaching in class XI MIPA, information was obtained that the learning model often used by teachers was the direct learning model. Learning is more focused on the transfer of knowledge conveyed by the teacher to students using learning media, namely infocus. This makes the teacher talk more and students only receive explanations from the teacher so that learning is teacher centered. According to (Asri et al., 2022) the disadvantage of applying the direct learning model is that students become less trained to be independent in obtaining information, because students assume that the material will be conveyed by the teacher as a whole in front of the class.

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The learning model applied by the teacher is also less varied so that students do not play an active role in learning. Students are not trained to express opinions, ask questions, and give answers. This is certainly not in accordance with the learning demands of the 2013 curriculum which should be student-centered learning. Based on this, the teacher must create opportunities for various learning experiences that can be passed by students so that students do not passively receive lessons from the teacher (Lufri et al., 2020).

Based on the distribution of questionnaires conducted to class XI MIPA students, the same information was obtained where students rarely asked questions, expressed opinions, and gave answers and sometimes even felt bored, sleepy, and carried out other activities while participating in biology lessons in class. So that it affects the learning outcomes of students. It is known that from 5 different classes the average student completeness is 22.6%. This shows that the direct learning model applied by biology teachers who teach in class XI at SMAN 3 Pariaman has not implemented the 2013 curriculum so that student learning outcomes are low. In addition, the competence in the realm of attitudes and skills of students has not been noticed, this is also known from the results of distributing questionnaires to teachers.

Based on observations of students from the material aspect, it is known that some essential material is difficult to understand. The percentage of students who had difficulty with the circulation system material was 17% and the digestive system was 15%. Seeing the problems faced by teachers and students of class XI SMAN 3 Pariaman, a solution is needed in implementing a learning model that is in accordance with the demands of the 2013 curriculum. The learning model that is applied must be related to a learning model that accommodates the involvement of the active role of all students in the learning process and can assess all domains of student competency and can be applied to learning materials. One strategy that can be applied in this case is to apply cooperative learning.

Cooperative learning encourages students to be active in carrying out a series of learning activities with peers by forming study groups. In practice, in study groups sometimes students who have low academic abilities are less involved in group activities and conversely students with better academic abilities will dominate the course of group activities. Therefore, the type of cooperative learning that is applied must be able to activate all students in groups with a clear division of learning roles. The cooperative learning model that is able to accommodate the role involvement of all students in study groups is the two stay two stray type of learning model.

The two stay two stray learning model is a learning model in group discussions, where each group consists of four people. Two people act as hosts to convey information to their masters and two people as guests in other groups to seek information and convey information discussed from other groups to their respective groups (Firman et al., 2020). The advantages of this model are that it can make students active and directly involved in the learning process and can be applied to all subjects for all age levels of students (Huda, 2014).

The learning approach that is in line with the two stay two stray learning model, and is also suitable to be applied in the 2013 curriculum based on Permendikbud No. 65 of 2013 concerning process standards is a scientific approach. Teachers can combine a scientific approach with the two stay two stray learning model, because two stay two stray learning and scientific learning are both student-centered. The scientific approach can encourage students to be active in the learning process (Astawan, 2021).

The implementation of a scientific approach in learning has principles including: student-centered; form student self-concept; reduce verbalism (the teacher is more dominant in speaking); provide opportunities for students to assimilate and accommodate concepts, principles, or laws; encourage the improvement of students' thinking skills; increase students' learning motivation; provide opportunities for students to practice communicating as well as a process of validating concepts that have been constructed by students in their cognitive structure (Hosnan, 2014). Based on the description above, a study was conducted on "The Influence of the Two Stay Two Stray Learning Model Based on a Scientific Approach to the Competence of Students at SMAN 3 Pariaman".

Method

This research was conducted at SMAN 3 Pariaman from 20 October to 30 November 2022 in semester II of the 2022/2023 academic year. The population in this study were all class XI MIPA students at SMAN 3 Pariaman who were registered in the 2022/2023 academic year, totaling 168 people from 5 classes.

The research sample technique used was a purposive sampling technique. The criteria used by researchers for the research sample are classes taught by the same teacher and having the same variant value. In this study, samples were obtained for the experimental class, namely class XI MIPA 1 and the control class, namely XI MIPA 3. The experimental class applied the two stay two stray learning model based on a scientific approach while the control class applied the direct learning model. This type of research is a quasi-

experimental research with a randomized control-group posttest only design. In summary, it can be seen in Table 1.

Table 1. Research Design Randomized Control Group Posttest Only Design

Class	Pretest	Treatment	Posttest
Experiment	-	X	T2
Control	-	-	T2

Result and Discussion

Competence of Learners in the Domain of Knowledge

Based on research that has been done on the competence of KD 3.6 circulatory system and KD 3.7 knowledge domain students in the digestive system, research data is obtained to test the hypothesis. Before testing the hypothesis, a requirements test is carried out, namely the normality test and homogeneity test. The normality test of the data uses the Columogorov-Smirnov test while the data homogeneity test uses the Levene test with the help of the SPSS application so that a significance value is obtained. The results of the normality test for competence in the realm of knowledge in the research sample class can be seen in Table 2.

Table 2. Results of the Normality Test on Competency in the Knowledge Domain

Research Class	Significance	Information
Eksperimen	0.181	Normal
Kontrol	0.200	Normal

Based on Table 2 it is known that the significance value of the normality test for the experimental class is 0.181 and that for the control class is 0.200. The significance value of the normality test for the two samples shows > 0.05 , meaning the data is normally distributed. After the normality test, then the data homogeneity test was carried out. The results of the research sample class data homogeneity test can be seen in Table 3.

Table 3. Results of Knowledge Domain Competency Homogeneity Test

Research Class	Significance	Information
Experiment	0.067	Homogen
Control		

Based on Table 3, it is known that the significance value of the homogeneity test for the experimental class and the control class is 0.067. The significance value of the homogeneity test of the two samples shows > 0.05 , meaning that the data has a homogeneous variant. After carrying out the requirements test and it is known that the competency data in the knowledge domain are

normally distributed and homogeneous, then a t test is then carried out in the knowledge domain between the experimental class and the control class. The results of the knowledge domain hypothesis test can be seen in Table 4.

Table 4. Results of the Knowledge Domain Hypothesis Test

Research Class	Average	Significance	Conclusion
Experiment	81.40	0.045	H_0 rejected
Control	77.95		

Based on Table 4, it shows that there is a significant difference between the experimental class and the control class. Therefore, the results prove that the two stay two stray learning model based on a scientific approach influences the competence of the knowledge domain of students in biology learning in class XI SMAN 3 Pariaman. With the average value of the experimental class higher than the control class.

The results show that the two stay two stray learning model based on a scientific approach can improve student learning outcomes. Students with the two stay two stray learning model have a better understanding of concepts in KD 3.6 circulation system material and KD 3.7 digestive system than students who take part in learning in the control class. This is because the two stay two stray learning model provides opportunities for students to develop their reasoning and conceptual understanding of a material (Yusuf et al., 2020). The process carried out in the two stay two stray learning model also directs students to discuss, look for answers, explain and also listen to material explained by their friends so that students can improve their thinking skills and improve their learning outcomes (Sulistiyanti et al., 2019).

The application of a scientific approach in learning also emphasizes the learning process which involves more students to experience for themselves what is being learned and involves all student activities so as to get maximum learning results (Mayasari et al., 2019). In addition, according (Daryanto, 2014) a scientific approach can also improve intellectual abilities, especially students' higher order thinking skills.

The application of the two stay two stray learning model requires scientific approach steps that are in accordance with the demands of the 2013 curriculum, namely observing, asking, gathering information, associating, and communicating (Mustafa et al., 2015). In the process of observing activities, the teacher displays pictures or videos of learning observed by each group which has been divided into several heterogeneous groups. Images or videos that are displayed can stimulate students to understand the learning material to the fullest (Rhiantini et al., 2017).

In the learning process of the two stay two stray model, there are visiting activities and activities staying in the group. Visiting activities are intended to seek information from other groups, while staying in a group is intended to share information from the results of group work with guests, so that learning activities can make learning more meaningful. Students also become critical thinkers by looking at the work of other groups and their group's work (Manik & Gafur, 2016). As well as information obtained from each group can also enrich students' knowledge of learning material (Rhiantini et al., 2017). In addition, the groups also presented the results of their discussions. Group presentations are intended to communicate students' understanding and measure and reflect on students' knowledge (Arthaningsih & Diputra, 2018).

Students who take part in learning activities in the control class also get the opportunity to develop conceptual understanding of learning material, it's just that the opportunities given are not as many as students who take part in learning with the two stay two stray model based on a scientific approach. This is because the teacher explains the learning material using the lecture method, then students try to understand the material and record the information provided by the teacher. Learners are not prepared to study independently. In addition, communication tends to be only in one direction, namely from the teacher to the students, so that students tend to only pay attention to the teacher without being offset by other activities. This affects the understanding of the material and has an impact on student learning outcomes (Sujana & Jayanta, 2018).

Learning in the teacher-centered control class also rarely provides opportunities for students to discover concepts or facts from the learning experiences they learn (Marjan et al., 2014). This is the difference in learning outcomes from the realm of student knowledge between learning by applying the two stay two stray learning model based on a scientific approach and students applying the direct learning model.

Competence of Learners in the Realm of Attitudes

Based on the research that has been done on the competence of students in the attitude domain, research data is obtained to test the hypothesis using the Mann Whitney test. The results of the hypothesis test for attitude competency data using the Mann Whitney test can be seen in Table 5.

Table 5. Results of the Attitude Domain Hypothesis Test

Research Class	Average Value	Significance	Conclusion
Experiment	85.45	0.022	H ₀ rejected
Control	80.98		

Based on Table 5, it shows that there is a significant difference between the experimental class and the control class. Therefore, proving that the two stay two stray learning model based on a scientific approach has an effect on the competency of the attitude of students in biology learning in class XI SMAN 3 Pariaman. This is because, the two stay two stray learning model based on a scientific approach involves all students to participate in the learning process. Whereas in the learning model applied to the control class, learning is centered on the teacher, where the teacher has a dominant role in the learning process so that students have less space to play a role in the learning process. This affects each indicator of the assessed attitude domain.

Competency in the attitude domain such as honest indicators has several aspects of assessment that can be seen in the learning process, including cheating in daily tests, copying other people's papers or practicum reports and trustworthy behavior in conveying information in accordance with existing facts. Students in the experimental class had a better understanding of knowledge than the control class so that the lack of cheating was found during daily tests. In contrast, in the control class, observers still saw a lot of cheating during daily tests.

Honest indicators can also be assessed from the work on making circulation system disorder papers and practicum reports on food content tests that are collected to teachers. Some students in the control class were found to be copying other people's work and did not convey information in accordance with the facts, such as copying other people's practicum observations. This is because students are not used to carrying out and producing their own work. On the other hand, in the experimental class, the group papers and reports collected were their own work, because each group produced work based on data and information as it was.

The next attitude competency assessment is an indicator of discipline. Students in the experimental class seemed more enthusiastic about participating in learning as indicated by the behavior of often entering class on time, bringing textbooks or textbooks, doing and submitting assignments on time and bringing learning equipment according to the subject. Whereas in the control class, the discipline aspects that were assessed on students sometimes did not appear in the learning process. This is because students who follow the direct learning model are less interested in participating in the learning process so they feel lazy to participate in learning activities (Yusuf et al., 2020).

Student participation can be seen during learning activities. In the experimental class students play a role and work together in group activities. There is a clear division of tasks between students, namely as a guest and as a guest. With visiting activities, interaction and

communication are formed between students. Visiting activities can make each group responsible for completing the task of visiting and receiving guests properly so that in the learning process positive feedback occurs (Dewi et al., 2018).

The two stay two stray learning model based on a scientific approach also provides opportunities for students to ask more questions, express opinions, and answer questions with their colleagues. This is in line with the attitude domain that is assessed, namely the indicator of self-confidence. Through the activities of asking questions, expressing opinions, and answering questions students will obtain the information needed related to learning materials (Juniantari & Kusmaryatni, 2019). In contrast, in the control class, the teacher only gave theory and learning material directly to students through the lecture method. Meanwhile, students are passive listeners and recipients of information. Students do not have the opportunity to participate in learning, in other words, the teacher dominates the learning activities in the classroom (Dumaini et al., 2019). (Susanto, 2014) argues that the application of learning with lectures, and making assignments can cause students not to participate actively in learning. Low active participation in learning has an impact on student learning outcomes.

Student Competencies in the Skills Domain

Based on research that has been done on the competence of students in the skill domain, research data is obtained to test the hypothesis using the Mann Whitney test. The results of the hypothesis test for skill domain competency data using the Mann Whitney test can be seen in Table 6.

Table 6. Results of the Skills Domain Hypothesis Test

Research Class	Average Value	Significance	Conclusion
Eksperimen	86.84	0.002	H ₀ rejected
Kontrol	81.12		

Based on Table 6, it shows that there is a significant difference between the experimental class and the control class. Therefore, proving that the two stay two stray learning model based on a scientific approach has an effect on the competence of the skill domain of students in biology learning in class XI SMAN 3 Pariaman. With the average value of the experimental class higher than the control class.

The competence of students in the skill domain in the experimental class and control class was observed by observers using observation sheets in the skill domain through practicum and non-practice activities. Practicum is a learning activity that provides opportunities for students to gain real experience in

order to increase students' understanding of theories related to learning material.

KD material 3.6 circulation system for the realm of skills is assessed through non-practical activities. Aspects of skills assessment include the preparation, reporting, and presentation of students in presenting papers about abnormalities in the human circulatory system. Whereas in KD 3.7 material the digestive system for the realm of skills is assessed through practicum activities. The assessment aspects include the preparation, implementation, results, and student reports on the food content test practicum.

Based on the Mann Whitney hypothesis test, it is known that the two stay two stray learning model based on a scientific approach influences the competence of students' skills in biology learning in class XI SMAN 3 Pariaman. In the implementation of practicum and non-practicum, experimental class students were very enthusiastic in the learning process, because the two stay two stray learning model based on a scientific approach provides opportunities for students to make direct observations.

Students are given the opportunity to discuss and verify the results of observations made. Practicum activities based on a scientific approach develop science process skills and provide experience for students to think scientifically and solve problems systematically (Lepiyanto, 2014). Emphasizing science process skills in a science lesson means providing opportunities for students to solve their own problems which are the topic of learning (Hilmi et al., 2017).

Fun learning makes students more interested in following the learning process. Learning that involves students' activities directly in the learning process will make learning more meaningful and students will be enthusiastic about learning, which can be seen from students who contribute ideas in making papers, reporting, presentations, and participating in practicum activities. Increasing attitude competence in the experimental class, namely one aspect of self-confidence, also increases the ability of students to make presentations.

Communication skills will improve if more science activities such as discussing and explaining are often carried out (Ambarsari, 2016). There is a difference between the experimental class and the control class in the realm of students' skills, one of which is influenced by the students' initial knowledge before doing practicum or when learning theory in class. High understanding of a material will motivate students to dig deeper into knowledge, in other words knowledge competence plays a role in increasing student skill competencies. Learning competencies in the realm of knowledge, attitudes, and skills do not actually stand alone, but are interconnected with one another.

The difference in competence possessed by students in the realm of skills for the experimental class and the control class is that the control class is accustomed to being presented with learning material by the teacher, so that when students are asked to contribute ideas in making papers on abnormalities in the circulation system, then present them and carry out food content testing practicum In the material on the digestive system, the students looked less trained and unfamiliar, while in the experimental class it was the opposite.

Conclusion

Based on the research that has been done, it can be concluded that the two stay two stray learning model based on a scientific approach influences the competence in the realm of knowledge, attitudes and skills of class XI students of SMAN 3 Pariaman.

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