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Comparison of Cooperative Learning Models of Reciprocal Teaching Type and Cooperative Jigsaw Type on Students' Learning Outcomes in Animalia Material Class X MIPA SMA Negeri 1 Tapalang

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Abstract: This research aims to compare student learning achievements on the topic Animalia class X MIPA at SMA Negeri 1 Tapalang using two cooperative learning approaches, namely Reciprocal Teaching and Jigsaw. The research method used is quantitative descriptive with a Nonequivalent Control Group research design. The sample was taken using a nonprobability sampling technique with purposive sampling, involving two classes, namely X MIPA 1 as a Jigsaw class and X MIPA 3 as a Reciprocal Teaching class. The research was conducted at SMA Negeri 1 Tapalang, Tapalang District, Mamuju Regency, West Sulawesi Province. Data collection was carried out through pretest and posttest, then analyzed using SPSS version 24 statistical software. The results of the study showed that there was a significant difference between the Reciprocal Teaching and Jigsaw cooperative learning models on student learning achievement, as seen from the results of the posttest score which was significant (p = 0.000). The null hypothesis (Ho) can be rejected and the alternative hypothesis (H1) can be accepted. Therefore, it can be concluded that there is a significant difference in student learning outcomes between the Reciprocal Teaching and Jigsaw cooperative learning models in Animalia class X MIPA material at SMA Negeri 1 Tapalang. Based on the achievement of student learning achievements in the two classes, namely the Jigsaw and Reciprocal Teaching classes, it can be concluded that the Reciprocal Teaching type cooperative learning model is considered more effective than the Jigsaw type cooperative learning model.

Keywords: Jigsaw; Learning model; Learning outcomes; Reciprocal Teaching; SMAN 1 Tapalang

Introduction

In the current era of globalization, it can create dynamics that cannot be ignored, becoming a challenge that involves every country in the world in an effort to improve the quality of education (Moshtari & Safarpour, 2024). Education is a basic need in everyone's life. Its relevance is increasingly prominent in today's era (Abo-Khalil, 2024). Dost et al. (2023), explained that education is not just a routine process but a solid foundation for humans. This foundation includes a series of steps that ensure the development of the skills, knowledge, and work ethics needed to create competent and competitive individuals. This process involves investing time and

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resources to provide comprehensive education, training, and coaching. Education is not only limited to the transfer of knowledge, but also becomes an important foundation in the formation of individual character and personality. During the learning journey, students not only accumulate knowledge from the study materials they study, but they also develop a deep understanding and skills that underlie their learning success, but also develop skills and values that are essential for everyday life (Karlen & Hertel, 2024; Darling-Hammond et al., 2020). Thus, education becomes a structured and sustainable effort to encourage everyone to achieve their potential so that they can grow into strong, characterful individuals who can contribute positively to society (Kioupi & Voulvoulis, 2019).

After conducting observations at SMA Negeri 1 Tapalang, it was found that the learning approach in biology subjects is still centered on the role of the teacher (teacher-centered). Students tend to only follow the teacher's instructions and record the information provided without being actively involved. When the question and answer session is conducted by the teacher at the end of the lesson, students tend to have difficulty in providing answers and tend to remain silent. An interview with a biology teacher revealed that biology lessons involve a teaching and learning process that still tends to focus on the teacher. A teacher in the learning process only explains the material and students listen and record the material that has been delivered (Martin-Alguacil et al., 2024). A teacher also only distributes textbooks to students, after which students study each material given by themselves (Almulla, 2020). Reinforcement is provided by conducting a question and answer process with students, but some students are less confident in answering the questions that have been given. The impact of the problems mentioned above is a decrease in the level of student participation in the classroom environment, which in turn leads to a decrease in the quality of their learning outcomes (Akpen et al., 2024; A. I. Wang & Tahir, 2020).

Active involvement of students in the learning process plays a crucial role in shaping their ability to overcome challenges that arise in understanding the subject matter introduced by the teacher during the teaching and learning process. It should be emphasized that the lack of variation in the use of learning models during the learning process is an additional fact that can be identified. The impact is the lack of student involvement in the classroom, which is reflected in the dynamics of the learning process. Participation in sharing between teachers and students becomes crucial, especially in situations of uncertainty or difficulty felt by students in responding to questions during question and answer sessions with the teacher. Therefore, for an educator, it is very important to carefully choose the learning model that will be implemented in the classroom environment, with the aim of improving student learning achievement effectively. In addition, steps to overcome obstacles that arise during the learning process also need to be emphasized. The solution that can be used for this problem is the cooperative approach, as suggested by Haleem et al. (2022). This approach is expected to lead to learning conditions that can motivate, overcome doubts, and reduce difficulties in responding to questions.

Cooperative learning refers to a learning approach that emphasizes organizing groups, where collaboration between them in the learning process aims to achieve optimal learning outcomes. This concept emphasizes the value of cooperation and support between students in completing various learning tasks and creating an interactive learning environment that supports students' cognitive and social development. In this context, each group plays an active role in exploring understanding, sharing ideas, and overcoming learning challenges together. Students in cooperative learning are encouraged to learn together in teams, where cooperation and collaboration are the main keys to achieving learning success. The importance of group work in cooperative learning instills in students the understanding that individual success does not only depend on personal abilities but is also influenced by positive contributions in group cooperation. Therefore, students are taught to build good relationships with their group members, adapt to differences, and contribute actively. One of the leading forms of collaborative learning, as expressed by Liu et al. (2025) and Mebert et al. (2020), emphasizes the importance of interaction and exchange of roles between students in groups, which supports an effective learning process. In this model, students teach each other by playing the role of temporary teachers for certain topics or concepts, thereby activating deeper engagement and understanding.

Thus, reciprocal teaching also develops their skills in communicating, collaborating, and leading in a cooperative learning context. This confirms that cooperative learning, especially through models such as reciprocal teaching, is not only about transferring knowledge, but also about building social and cognitive skills that are important for students' future success. A learning approach designed to facilitate students' understanding of the material. In its implementation, this model encourages a group learning process, where each student is expected to be able to actively participate with speaking skills in front of the class as one of the aspects emphasized. According to research by Mafarja et al. (2023), reciprocal teaching as part of this model applies 4 essential strategies, including summarizing (samri), question generating (questions), clarifying

(explaining), predicting (prediction). The main advantage of the reciprocal teaching type of cooperative learning model lies in the role of students who are equal to a teacher (Pada et al., 2022). They are not only asked to understand the material in depth but are also required to convey explanations to classmates openly. This approach is expected to improve grades, strengthen individual understanding of the material, form communication and leadership skills through the role of students as explainers in front of the class (Zamiri & Esmaeili, 2024).

Another type of learning is jigsaw which has been known to be very effective in the cooperative learning approach (Cochon Drouet et al., 2023). This is because this model encourages active participation and mutual support among students, with the aim of facilitating optimal mastery of the subject matter and promoting the achievement of maximum learning outcomes through collaboration between group members. Learning begins with the teacher dividing students into groups (Chen et al., 2023; Yang, 2023). Each group is assigned to complete a task together. There are two types of groups involved, namely the original group and the expert group. They discuss, share information, and convey the content that has been learned. In this model, the group learning process allows each member to actively participate and develop their abilities and skills in order to improve learning outcomes together, as stated by (Le et al., 2018).

Based on the context of these various problems, the researcher aims to raise in the form of a study entitled "Comparison of the reciprocal teaching type cooperative learning model and the jigsaw type cooperative on the learning outcomes of students in animalia material for class X MIPA SMA Negeri 1 Tapalang". In order to overcome these challenges, a learning approach is needed that can be implemented effectively. The learning model chosen must be varied and interesting, with the main goal of creating a learning environment that can stimulate active student involvement during the learning process. The hope is that it can produce significant improvements in student achievement.

Method

The study used a quasi-experimental design consisting of an unequal control group to maintain some control over variables that could potentially affect the course of the experiment. Although the control group participated in the experiment, they were unable to fully control all factors that could potentially affect the overall implementation of the experiment. The research method adopted in this work is based on the quantitative descriptive approach developed by Sugiyono. Sugiyono is one of the research experts in this field and has developed various tested and reliable research methods. The groups were selected randomly to ensure balanced representation in the study. Thus, the diversity and variability in the population can be better reflected in the research results. This study was conducted in the even semester of the 2022/2023 academic year, with the aim of achieving an optimal level of accuracy and validity in data collection. The data collection process began in March 2023 and continued until an adequate sample was achieved for analysis. The selection of the research location was carried out with careful consideration to ensure proper representation of the population studied. SMA Negeri 1 Tapalang was chosen because it has a wide coverage and represents the variations that exist in the target population.

The population that is the subject of this study refers to all students registered. In the context of sample collection for this study, the approach taken is to apply the purposive sampling method. This use was chosen because this decision involves special considerations such as reviewing the results of students' semester grades in the odd semester and conducting discussions between teachers and researchers. Therefore, within the framework of this investigation, the examples chosen to be samples are divided into two different class categories, namely class X MIPA 1 as the Jigsaw class and MIPA 3 which is used as a reciprocal teaching class. Thus, the study can capture various perspectives and experiences from the two classes in implementing different learning methods, thus allowing for a more in-depth analysis of the effectiveness of each approach.

Result and Discussion

After evaluating the descriptive data on student learning achievement in both classes, it seems that there is a significant difference. The analysis shows that there was a marked increase in the minimum score of the reciprocal teaching class, which increased by 36 points. Meanwhile, the increase in the jigsaw class was not that big, although there was still an increase in the minimum and maximum scores. However, this difference is not too striking when compared to the increase experienced by the reciprocal teaching class. Furthermore, attention is also drawn to the average posttest score of the reciprocal teaching class of 76.03, and the jigsaw only reached 51.94. This confirms that the reciprocal teaching teaching method has a more significant impact than the jigsaw method. These results show the importance of considering the right teaching method in the context of learning to achieve the desired results. The distribution data for the reciprocal teaching class can be seen in table 1.

Table 1. Data on the Results of the Distribution of Frequency and Percentage Assessment of Student Learning Outcomes from the Pretest and Posttest in the Reciprocal Teaching and Jigsaw Classes

Frequency					Percentage (%)				
Range	Pretest		Posttest		Pretest			Posttest	Category
90 – 100	0	0	2	0	0	0	6.06	0	Very High
80 – 89	0	0	17	0	0	0	51.51	0	High
75 – 79	0	0	1	0	0	0	3.03	0	Currently
56 – 74	11	0	13	17	33.33	0	39.40	51.51	Low
0 – 55	22	33	0	16	66.67	1	0	48.49	Very Low
Amount	33	33	33	33	100			100	

The data will undergo prerequisite tests before undergoing statistical tests as follows: In this study, a normality test was conducted with the aim of evaluating the distribution of the obtained data and determining whether the pattern is followed by the data. The determination is made through observation of the significant values produced during the normality test process as in Table 2.

Normality Test

The normality test showed interesting results related to the reciprocal teaching class and the jigsaw class. In the pretest test of the reciprocal teaching class, sig. 0.200 was obtained, and in the posttest, the sig value reached 0.070. The jigsaw class showed normality test results with a sig value of 0.650 in the pretest and 0.058 in the posttest. Further analysis of the significance value showed that in both classes, both reciprocal teaching and jigsaw, the sig value was more than the significance limit of 0.05. This implies that the data obtained from the two classes can be considered to have a normal distribution, so that the assumption of normality in the pretest and posttest data of the reciprocal teaching and jigsaw classes. In this context, it can be concluded that based on the sig value obtained from the normality test, the reciprocal teaching class and the jigsaw class can be considered to have a normal data distribution. This finding has important implications in continuing further data analysis or considering the results of the two classes in a statistical study or evaluation. Homogeneity test to determine the variance of the uniformity of the data collected. The results of the homogeneity test can be found in Table 3.

Table 2. Normality Test Results

Variable	Sig		Information
	Jigsaw	Reciprocal teaching	
Pretest	0.650	0.200	Normally Distributed
Posttest	0.058	0.070	Normally Distributed

Homogeneity Test

The results of the homogeneity test conducted on the reciprocal teaching class with a significance value of 0.105. Meanwhile, the jigsaw class has also been tested for homogeneity and obtained a sig value of 0.070. This indicates that the variance data is homogeneous. In this context, the variability between the groups is not statistically significant, allowing for a more accurate comparison. The purpose of Normalized Gain or N-Gain is to see the differences in learning outcomes in cooperative animalia material of the reciprocal teaching type and the jigsaw type cooperative. The results of the N-Gain test related to learning outcomes can be found in Table 4.

Table 3. Results of the Homogeneity Test

Variable	Sig		Information
	Jigsaw	Reciprocal Teaching	
Student Learning Outcomes	0.070	0.105	Homogeneous variance

N-Gain of Learning Outcomes

Table 4 displays interesting data related to the reciprocal teaching class and the jigsaw class. In its analysis, it was found that the N-Gain for reciprocal teaching was 0.47, indicating an increase after participating in the learning process. A similar thing happened in the jigsaw class, where the N-Gain value reached 0.31, indicating a significant increase in understanding the material. Although both are categorized as moderate score increases because their N-Gain values are below 0.7, significant differences emerged when comparing the two classes. First, although both classes had comparable increases in final scores, there was a striking difference in the magnitude of the increase. The reciprocal teaching class was higher than the jigsaw class, highlighting the effectiveness of the teaching method in improving student understanding. This difference becomes even more apparent when looking at the gap between the two. Second, the differences suggest that the method may be more suitable or more efficient in teaching the material given. Although both produced significant improvements, the approach used in reciprocal teaching appears to provide additional benefits that can optimize student learning outcomes. Thus, although both fall into the same category in terms of score improvement, the differences in the magnitude of improvement and the

relative effectiveness of each approach should be considered in the development of future curriculum and learning strategies.

Table 4. N-Gain Test of Learning Outcomes

Class	Pretest Average	Posttest Average	N – Gain	Category
	Jigsaw	Reciprocal Teaching		
Reciprocal Teaching	49.94	76.03	0.47	Currently
Jigsaw	29.76	51.94	0.31	Currently

Independent Sample t-test

Hypothesis testing identifies the potential influence between test results before receiving a treatment (pretest) and test results after receiving the treatment (posttest) in two different sample groups. In the context of this study, it is important to note that the confidence level used to test the hypothesis is set at 5%, which is usually symbolized by $\alpha = 0.05$. If the sig value exceeds α, then the null hypothesis (H0) will be rejected; while if the sig value is less than α, then the alternative hypothesis (H1) will be accepted. This decision-making step is essential because it provides direction for interpreting the results of the hypothesis test.

Based on the explanation above, the test method applied in this study is the Independent Sample T-Test to compare the average values of two independent sample groups. The results of the test can be detailed in Table 5 attached below:

Table 5. Independent Sample T-Test

Variable	Class	Df	Sig
Student Learning Outcomes	Reciprocal Teaching and Jigsaw	64	0.000

The results of the analysis with a significance value of 0.000 indicate that the null hypothesis (H0) is rejected, and (H1) is accepted. This indicates a significant difference between the use of learning approaches to student learning outcomes. This conclusion provides an indication that the effectiveness of cooperative learning can have a positive effect on students' understanding of the subject matter. As viewed by Urhahne et al. (2023), learning motivation is identified as a process that stimulates, guides, and maintains student behavior. This motivation plays a central role for students and teachers. This encourages researchers to provide additional motivation to students, provide encouragement and enthusiasm to increase student engagement. Strategies and environments that support knowledge exploration are needed to stimulate student interest and motivation. Approaches that allow active participation from students, such as group discussions, collaborative projects, or the use of educational technology, more than that, these approaches are also expected to strengthen the connection with students' daily lives.

Efforts to increase student engagement are not only aimed at creating space for understanding concepts, but also to stimulate their curiosity and desire to continue learning (J. Liu et al., 2024; Scott-Barrett et al., 2023). Researchers also expose information about the activities of implementing the approach. This context actively listens to the researcher's explanation of the learning model used and provides a very positive and enthusiastic response. Hwang et al. (2023), and Oo et al. (2021), emphasized that students' communication skills can be formed positively through the application of the reciprocal teaching learning method. In the learning process, the skills that are improved and the activities carried out by students have a significant positive impact, as seen in the interaction of students who actively ask questions and provide comments on their friends' answers during the learning process. Researchers have taken steps to strengthen student learning by organizing them into cooperative groups consisting of 5 to 6 individuals.

This approach, as stated by (Izadpanah & Rezaei, 2022), is believed to be able to increase student enthusiasm and help overcome their fear of asking questions. In these groups, researchers act as mentors who guide students in learning and working together. Each member of the group is given a specific role to be accounted for. For example, one student is expected to summarize the material that has been given, while the others are responsible for generating questions that are relevant to the material, an action known as "Questioning Generating." In addition, the researcher provides guidance to students to explain parts of the material that they may not fully understand in the context of their group, a step known as "Clarifying." However, that's not all. In addition to these roles, there is also another role known as "Predicting," which is predicting the next material. Thus, collaboration among group members also helps them prepare for the upcoming learning. In essence, this strategy promotes deep interaction between students, allowing them to support each other and enrich their understanding through discussion, explanation, and joint prediction. Thus, learning occurs not only through direct instruction, but also through interactions between students that are carefully guided by the researcher, creating a cooperative and learning-oriented environment.

Al-Said (2023), argues that student motivation can develop rapidly when the material taught attracts their attention, is relevant to their personal needs, satisfies their curiosity, and positively strengthens self-confidence and also connects the learning process to

their individual needs (Zhou & Zhang, 2025). They are involved in interactions that include activities such as summarizing material, developing skills to identify main ideas in reading materials, and efforts directed at improving the quality of learning. Zohar et al. (2003) is in accordance with the findings that the application of the reciprocal teaching method has succeeded in bringing significant improvements in student learning achievement that was initially at a low level. This confirms that learning strategies that consider motivational factors, active student involvement, and the relevance of the material to individual needs can be the key to success in improving academic achievement. This study involved researchers who assessed the learning process using an evaluation method that involved the participation of each group in a presentation in front of the class, where they were asked to present the results of the discussion that had been carried out. During the presentation, students are expected to be able to deliver the material with a higher level of confidence and enthusiasm.

In this context, Fischer et al. (2024), stated that evaluation is not only a process that occurs after teaching ends, but can also be started before learning is carried out. According to him Schildkamp et al. (2020), the purpose of this evaluation process is to obtain various answers related to how to improve learning. Evaluation is defined as a step taken to collect information related to learning, as well as to determine the level of learning progress for future improvements. Hayashi et al. (2025), highlighted that the cooperative learning model, especially the reciprocal teaching type, is the choice of this system because it stands out because of its high level of flexibility and its ability to easily adapt to various classroom conditions and different subject matters. Based on the concept that knowledge and understanding are the results of a creative socialization process involving negotiation between students and teachers, it is proven that the benefits of this learning model are to increase student enthusiasm in learning. They are expected to actively participate in discussions and explain the results of their work effectively, so that they can improve students' overall thinking skills.

Researchers give awards or appreciation to each group that manages to deliver their presentation smoothly in front of the entire class, such as praise for students' success in working together in groups. According to Thiele et al. (2025), appreciation in learning is very much needed by students to support efforts and encourage learning. According to Valtonen et al. (2021), the importance of developing appreciation in the context of the learning process is a crucial aspect and requires serious attention. Therefore, it is necessary to find an effective method to intensify appreciation of the achievements made. The results of the study in the jigsaw class revealed that in the initial pretest, students' learning abilities were not fully adequate, even not reaching the KKM value because their mastery of the previous material was lacking. However, the learning model applied can change the learning situation so that there is a significant increase in the posttest. Although there has been an increase, it has not reached the KKM target so it is suspected that there are still weaknesses that need to be addressed.

The reason for the inability to achieve the KKM target can be explained by the fact that the jigsaw approach still shows weaknesses in students' understanding of the material. Each student has unique characteristics that affect their participation and learning. There are students who are more shy and awkward, so they are reluctant to express their opinions in the learning process. Meanwhile, there are also students who are more active and confident, who actively ask questions and are involved in the discussion and question and answer process. For example, Ho et al. (2023) stated that in their study, there were students who tended to be shy and awkward so they were reluctant to actively participate in the learning process. However, there were also other students who were more open and active, who were confidently involved in class interactions. This shows that differences in individual characteristics can affect the dynamics of learning in the classroom. Therefore, there needs to be a more focused strategy to help students with different characteristics in achieving better understanding in learning. In this context, a learning differentiation approach can be an effective solution.

By understanding the unique characteristics of each student, teachers can adjust learning strategies to meet their individual needs. For example, for shyer students, teachers can create supportive learning conditions and provide extra opportunities for participation, while for more active students, teachers can provide additional challenges or facilitate deeper discussions. Thus, through a focused and inclusive approach, the potential of each student can be optimized in the learning process. According to Wang et al. (2024), each student has a different level of intelligence, and this variation has an impact on how they absorb learning materials, which in turn affects the student's ability to understand the content being taught. Differences in these abilities also have the potential to affect students' cognitive learning outcomes. It is important to remember that the inability to achieve a level of success in learning should not be misinterpreted as stupidity, because each student has a unique learning rhythm, so the time required to achieve optimal understanding can vary between individuals.

The student's attention factor is often easily distracted by the surrounding environment, which can lead to a lack of focus when studying. In addition,

certain situations may make the subject matter difficult to understand, even though students have tried hard. Some students may have difficulty maintaining concentration during the learning process, while others tend to feel bored or sleepy when involved in learning activities, as expressed by (Borgonovi et al., 2023). All of these factors are important elements that must be considered in creating a learning environment that supports and can accommodate the various needs of students (Rusticus et al., 2023). An approach can create an interesting dynamic. Students who are actively involved in answering questions asked by researchers. On the other hand, students who are less active in learning tend to choose to remain silent, limiting themselves to listening. Ironically, this results in a lack of initiative from more passive students to ask questions or provide responses to content that has been presented by classmates. In turn, this phenomenon is triggered by the awkwardness and embarrassment felt by these students, perhaps due to lack of self-confidence or concerns about classmates' responses (Stephens et al., 2024)

Muhammadiah et al. (2022), in his analysis, highlighted the importance of a teacher's role in the overall success of the learning process. It is known that the success of the teaching and learning process is highly dependent on a teacher's ability to continuously develop a learning model that is consistent with student activity. This means that teachers must have extensive skills in facilitating discussions, motivating students. Teachers can help overcome obstacles such as awkwardness and embarrassment that students may experience, and encourage a more active exchange of ideas and responses between them. The jigsaw cooperative learning model offers great potential to increase student engagement and broaden their understanding through collaboration, its implementation is not without challenges. It is important for educators to have a deep understanding of interpersonal dynamics in the classroom and to continuously improve their learning strategies to ensure that each student feels supported. The observation sheet for the reciprocal teaching approach to interactions between teachers and students in the classroom can be seen in Table 6.

Table 6. Observation Results of the Implementation of the Learning Model in Class Teacher Activities Reciprocal Teaching

No	Meeting 1		Meeting 11		Meeting 111	
Respondents	Student	Researcher	Student	Researcher	Student	Researcher
Total Score	63	64	65	65	76	79
Presentation	75%	76%	76%	77%	90%	90%
Category	Quite Implemented	Implemented	Implemented	Implemented	Quite Implemented	Quite Implemented

Table 6 explains the implementation well from the first to the third meeting. Analysis of the first meeting, the implementation category of the syntax of the reciprocal teaching cooperative learning model reached 75% for the category of quite implemented. However, from the first meeting to the third meeting, there was a clear increase where the implemented category rose to 77%, and the very implemented category reached 90%.

Not only that, the results of the observation presentation conducted by the researcher himself also illustrated a similar increasing trend. Initially, at the first meeting, the presentation showed that 76% of the categories had been implemented well. However, in the same time span, from the first to the third meeting, the percentage of implementation increased to 77%, and even reached 90% in the very implemented category. Thus, the data collected consistently shows that from both the perspective of students and researchers, there has been an increase. Observations of the implementation of the learning model in the activities of Jigsaw class students are shown in Table 7.

Table 7. Results of Observations of the Implementation of the Learning Model in the Activities of Jigsaw Class Students

No	Meeting 1		Meeting 11		Meeting 111	
Respondents	Student	Researcher	Student	Researcher	Student	Researcher
Total Score	41	51	46	53	57	56
Presentation	60%	75%	67%	77%	83%	82%
Category	Quite Implemented	Quite Implemented	Quite Implemented	Implemented	Implemented	Implemented

Based on the analysis in table 7, there was a significant increase in each meeting. From a review of the activities carried out by researchers and students during the period, there was consistent development. For example, in terms of student presentations, there was a striking increase from the first meeting to the third meeting. The percentage of achievement in the categories of quite implemented, quite implemented,

and implemented were 60%, 67%, and 83%, respectively. Meanwhile, in terms of presentations carried out by researchers, there was also a significant increase from the first to the third meeting. The percentage of achievement in the categories of quite implemented, implemented, and implemented were 75%, 77%, and 82%, respectively. This shows that the implementation of the jigsaw cooperative learning model has a positive impact on the quality of presentations and the involvement of students and researchers in the learning process.

Conclusion

The conclusion that can be drawn from the previous explanation is that there is a significant difference in the effectiveness of the reciprocal teaching type and the jigsaw type on the achievement of student learning outcomes. The analysis was carried out through a hypothesis test which showed a significance value of 0.000 <0.05 which can be interpreted as H0 being rejected and H1 being accepted. This finding confirms that there is a difference in the effectiveness of the two approaches used. Observations of the achievement of student learning outcomes in both classes show that the reciprocal teaching type of cooperative learning model is more effective. This confirms that the use of learning methods that involve interaction between students cooperatively, such as reciprocal teaching, can provide a more significant impact on improving students' understanding of animalia material. However, it is important to note that these results may be influenced by various factors, including student characteristics, teacher readiness, and the learning environment. The implementation of the approach in learning should be based on the needs and characteristics of students and the learning objectives to be achieved. Although reciprocal teaching has been shown to be more effective in the context of this study, this does not always apply in other learning situations or contexts. Therefore, a holistic and contextual approach in developing learning strategies.

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Author Contributions
Conceptualization; J; Methodology; M. D; validation, R; formal analysis; R. M; Investigation, J.; resources; M. D.; data curation: R.; writing—original draft preparation. R. M; writing—review and editing: J.; visualization. M. D:. All authors have read and agreed to the published version of the manuscript.

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The authors declare no conflict of interest.

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