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Comparison of Students' Physics Concept Understanding Using STAD and Jigsaw Type Cooperative Learning Models in Grade XI Phase F at SMAN 1 Padang Ganting

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Abstrak

Salah satu aspek penting dalam pendidikan yang tidak dapat dipisahkan adalah proses pembelajaran. Dalam proses tersebut, penting bagi guru untuk memperhatikan metode pembelajaran yang digunakan agar dapat menarik perhatian siswa. Agar siswa dapat belajar fisika dengan lebih efektif, guru perlu memahami cara memilih metode pembelajaran yang melibatkan siswa secara aktif dalam proses pembelajaran. Sayangnya, masih banyak sekolah yang menerapkan metode tradisional, yaitu guru mendominasi pembicaraan sementara siswa hanya mendengarkan. Salah satu cara agar pembelajaran menjadi lebih menarik dan menyenangkan adalah dengan menerapkan metode pembelajaran khusus, seperti STAD dan Jigsaw. Penelitian ini difokuskan pada topik usaha dan energi pada Kelas XI Fase F di SMAN 1 Padang Ganting. Penelitian ini menggunakan pendekatan kuantitatif dengan desain Non-equivalent control group design. Populasi penelitian adalah siswa Kelas XI Fase F, dan sampel dipilih secara purposive sampling. Kelas XI F1 ditetapkan sebagai Kelas Eksperimen 1, sedangkan Kelas XI F2 ditetapkan sebagai Kelas Eksperimen 2. Fokus utama penelitian adalah pada penilaian pengetahuan siswa, dengan data dikumpulkan melalui tes. Metode analisis data meliputi analisis deskriptif, uji normalitas, uji homogenitas, dan uji hipotesis pada taraf signifikansi 0,05. Hasil penelitian menunjukkan bahwa nilai rata-rata kelas yang menggunakan model pembelajaran STAD adalah 73%, lebih tinggi dibandingkan dengan nilai rata-rata kelas yang menggunakan model pembelajaran Jigsaw sebesar 71%. Pengujian hipotesis menunjukkan nilai t hitung sebesar 24,42, lebih besar dari nilai t tabel sebesar 1,99. Karena nilai t hitung lebih besar dari nilai t tabel (24,42 > 1,99), maka H0 ditolak dan H1 diterima. Hasil ini menunjukkan adanya perbedaan yang signifikan dalam peningkatan pemahaman konseptual siswa antara model pembelajaran STAD dan Jigsaw.

Kata kunci: *Pemahaman Konseptual, STAD, Jigsaw*

Abstract

An important aspect in education that cannot be separated is the learning process. In this process, it is important for teachers to pay attention to the teaching methods used in order to attract students' attention. In order for students to learn physics more effectively, teachers need to understand how to choose teaching methods that actively involve students in the learning process. Unfortunately, many schools still apply traditional methods, where teachers dominate the conversation while students only listen. One way to make learning more interesting and enjoyable is to apply special teaching methods, such as STAD and Jigsaw. This study focused on the topic of work and energy in Class XI Phase F at SMAN 1 Padang Ganting. This study used a quantitative approach with a Non-equivalent control group design. The study population consisted of Class XI Phase F students, and the sample was selected by purposive sampling. Class XI F1 was designated as Experimental Class 1, while Class XI F2 was designated as Experimental Class 2. The main focus of the study was on assessing students' knowledge, with data collected through testing. Data analysis methods included descriptive analysis, normality test, homogeneity test, and hypothesis test at a significance level of 0.05. The study results indicated that the average score for the class utilizing the STAD learning model was 73%, which was higher than the 71% average in the class using the Jigsaw model. Hypothesis testing revealed a calculated t-value of 24.42, surpassing the t-table value of 1.99. Since the calculated t-value is greater than the t-table value

(24.42 > 1.99), H0 is rejected, and H1 is accepted. This outcome demonstrates a significant difference in the improvement of students' conceptual understanding between the STAD and Jigsaw learning models.

Keywords: *Conceptual Understanding, STAD, Jigsaw*

INTRODUCTION

Physics learning is a learning process that focuses on understanding nature, which involves observing and understanding the interactions between various natural phenomena. Therefore, it is very important to have a good understanding of concepts in the physics learning process. According to Ikbal (2018) The intellectual ability that guides education at various levels, including in schools and universities, is the ability to understand. This understanding is one of the main goals of the learning process that is expected to be achieved. Through understanding, students are able to process the information received and convey it back, either in the form of thoughts or open responses, so that what they learn is deeper and more meaningful. In accordance with Pateda's opinion (2015), physics learning aims to help students understand concepts and their relationships, so that they can solve practical problems in everyday life.

Understanding a concept is not only limited to understanding the definition in physics. True conceptual understanding can be assessed through various aspects, including the ability to change physics symbols into alternative forms, the ability to explain basic physics principles clearly, and the ability to deepen understanding by combining new information obtained from the physics learning process. According to Riwanto (2019), the level of student understanding can also be observed through test results, for example in physics lessons. In learning, students need to hone their thinking skills and not just rely on memorizing material. They must be able to master the concepts presented in order to find solutions to various problems. As is known, physics is a science based on empirical experience. Thus, to solve physics problems effectively, students need to first understand the basic concepts that underlie the material being studied. From the previous explanation, it can be concluded that understanding concepts is crucial in the physics learning process. However, in practice, students often face obstacles in understanding physics material.

The reasons often put forward include the perception that physics is difficult, there are too many formulas, and it is monotonous so that students rely more on memorization than actual understanding. This is contrary to the essence of physics learning which should encourage deep understanding of concepts. Ma'rifa (2016) stated that many students do not achieve optimal results in learning. This is because students do not understand effective and efficient learning methods, and rely more on memorization. In fact, physics should not only be memorized, but also requires logical thinking skills and a deep understanding of concepts. As a result, when facing exams, students often find it difficult to answer questions. Based on the initial test results regarding students' conceptual understanding of vector material at SMAN 1 Padang Ganting, it was found that the conceptual understanding of Class XI Phase F students is listed in Table 1 below.

Table 1. Pre-test Value of Concept Understanding

No	Class	Pre-test Value
1	XI. F1	37,94
2	X1. F2	38,88

These results indicate that students' conceptual understanding is still very limited. Many students still have difficulty drawing conclusions from everyday phenomena and overcoming misunderstandings. In addition, low learning outcomes are related to inadequate mastery of physics concepts and minimal peer interaction, which causes unbalanced discussions where some students become passive and uninvolved. This situation underscores the need for educators to explore alternative solutions to overcome the challenges faced by students in the learning process. There are several types of cooperative learning models, but this study uses the STAD and Jigsaw cooperative learning models. Both models have almost similar characteristics. The main difference between the two lies in the STAD type, where students work together in groups and are

responsible for mastering the group's material as a whole. Meanwhile, in the Jigsaw type, each student holds individual responsibility for mastering certain parts of the material that will be taught again to other group members. Thus, mastery of group material becomes the responsibility of each student in the group.

Based on this background, the author is motivated to conduct a study entitled "Comparing Students' Understanding of Physics Concepts Through the STAD and Jigsaw Cooperative Learning Models in High School Physics Courses".

METHOD

This study uses a quantitative approach with a design that uses a randomized posttest-only control group. The study population includes all grade XI students at SMAN 1 Padang Ganting, with samples collected using an independent sampling technique. The sample for this study was Class XI F.1 which implemented the STAD learning model, and Class XI F.2 which used the Jigsaw model. After the implementation of each learning model, both groups will take a final assessment (posttest) to evaluate the improvement in their conceptual understanding. The data analysis techniques applied include normality tests, homogeneity tests, and hypothesis tests at a significance level of 0.05.

RESULTS AND DISCUSSION

Results

The data presented in this study included students' conceptual understanding, which was measured through a final test and evaluated according to their conceptual understanding in a classroom using the STAD and Jigsaw models. Research data was collected through a written test consisting of objective questions that were carried out at the end of the study. The data can be seen as follows:

The assessment of concept understanding is carried out through two methods. The first method is an observational analysis of the understanding of the concept of vector matter before the research is carried out. After the calculation process was carried out, the students' concept understanding scores from the sample group were obtained, which is shown in Figure 1 below:

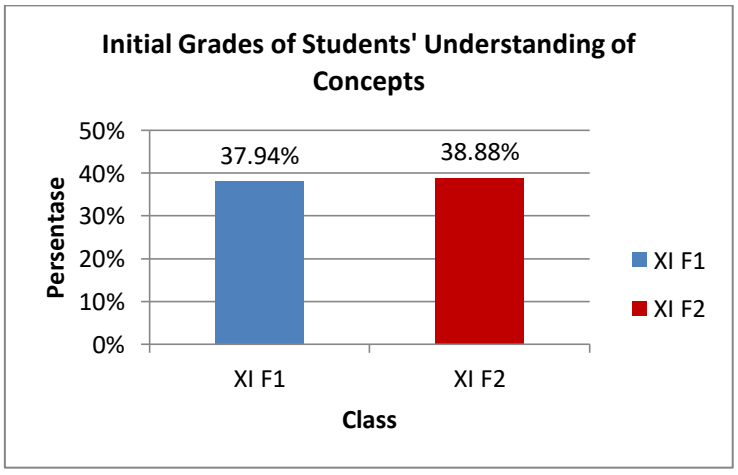

Figure 1. Initial Grades of Students' Understanding of Concepts

From the figure above , it is evident that the percentage of conceptual understanding in the STAD class is 37.94%, indicating that the initial understanding of students in this class falls into the low category. Similarly, the Jigsaw class shows a conceptual understanding percentage of 38.88%, which is also categorized as low. The second evaluation was conducted through a final test given to both sample classes, which included 22 valid multiple-choice questions along with an accompanying question grid. After the calculation process, the data regarding conceptual understanding for both sample classes are illustrated in Figure 2 below:

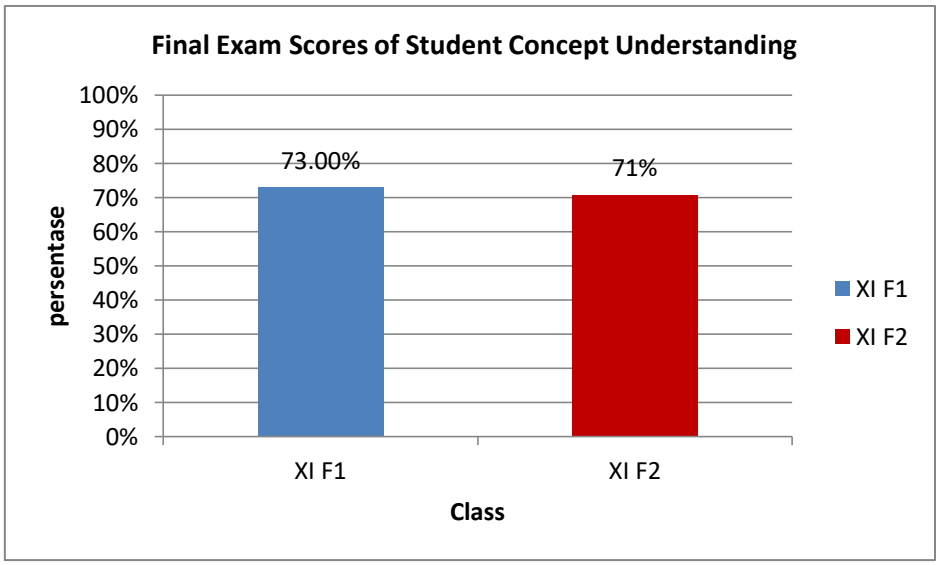

Figure 2. Final Exam Scores of Student Concept Understanding

The figure above provides an explanation regarding students' conceptual understanding scores. The percentage of concept understanding in the STAD Class reached 73% and was included in the good category. On the other hand, the Jigsaw Class also recorded a concept understanding percentage of 71%, which is also considered good. The comparison of students' initial and final grades showed an increase in the average score before and after the study was conducted. Data describing the increase in student grades is presented below:

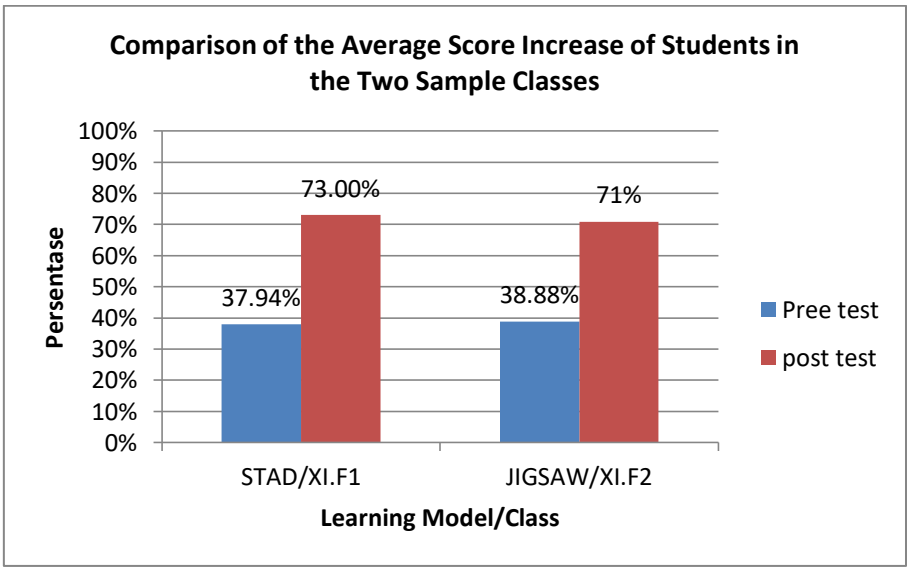

Figure 3. Comparison of the Average Score Increase of Students in the Two Sample Classes

Based on the figure above, it can be seen that there is an increase in students' understanding of concepts before and after the research is carried out. The STAD class has increased from 37.94% to 73.00%, with an increase of 35.06%. On the other hand, the Jigsaw Class increased from 37.42% to 71%, with a percentage increase of 33.58%. From the data, it can be seen that using the STAD learning model has increased concept understanding compared to the Jigsaw learning model.

Discussion

From the data analysis, findings were obtained from the initial and final tests carried out at the end of the study. The focus of this research is only on a conceptual understanding of business materials and energy. Three important points can be drawn from this study:

First, a comparison of students' conceptual understanding from the initial and final tests showed that the understanding in the classroom using the STAD learning model was greater than the improvement seen in the classroom using the Jigsaw learning model on the topic of effort and energy. This difference is due to the more easily implemented STAD learning model, which allows for better organization among students. Meanwhile, the application of the jigsaw learning model is a little more varied and takes a lot of time when applying it. In the STAD learning model, students can focus on discussing learning the same material with the group from the beginning to the end of learning, while in the jigsaw learning model, students must discuss and understand the same material with the expert group, must explain and discuss again with the original group so that students are less focused in learning.

Second, the comparison of the average improvement in classes saw an increase in scores from the initial test to the final test after the application of the STAD and Jigsaw learning models. Theoretical studies show that cooperative learning models are intended to assist students in developing understandings and attitudes that apply to real-life situations. Collaborative group work can improve student motivation, productivity, and academic outcomes (Etin, 2007). This improvement is related to the use of a student-centered learning model, which improves conceptual understanding and final scores in both sample classes. The findings showed that the increase in average initial and final scores for the STAD class on work and energy topics was greater than that of the Jigsaw class. The STAD class increased by 35.06%, increasing from 37.94% to 73%, while the Jigsaw class increased from 37.42% to 71%, resulting in an increase in percentage by 33.58%.

Third, there is a notable difference in the enhancement of students' conceptual understanding following the implementation of the STAD and Jigsaw learning models. on work and energy topics. The analysis of the final average scores of the two sample classes and the results of the hypothesis test showed that the improvement in students' conceptual understanding using the STAD learning model was greater than that achieved with the Jigsaw model. Although both models contribute to improved students' conceptual understanding, the rate of improvement in the classroom using the STAD model surpasses that of the classroom using the Jigsaw model.

CONCLUSION

The findings reveal that implementing both the STAD and Jigsaw learning models improves students' grasp of physics concepts. Notably, the class using the STAD model exhibits a higher degree of understanding than the class employing the Jigsaw model. The average scores of students in the class using the STAD model showed a greater improvement than those in the Jigsaw model class, with the STAD model reflecting an increase of 35.06% in average scores, while the Jigsaw model class experienced a rise of 33.77%. Furthermore, the results from the hypothesis test indicated a significant difference in the improvement of students' conceptual understanding between the STAD and Jigsaw learning models, particularly regarding the topics of work and energy in Class XI Phase F at SMAN 1 Padang Ganting.

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