1 (1), 2022, 9-15
Pedagogy Review
https://imrecsjournal.com/journals/index.php/pedrev

Implementation of Think Pair Square to Improve Learning Outcomes in Colloidal Systems of Vocational High Schools Students

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Abstract: Implementation of Think Pair Square to Improve Chemistry Learning Outcomes of Vocational High Schools Students. This research aims to determine the effect of cooperative learning model Think Pair Square (TPS) in improving student's learning outcomes on colloidal and polymeric subjects in class XI TP 1 SMKN 4 Palembang. The type of research used in this study is a classroom action research conducted two cycles with each stage of the cycle of planning, action, observation dan reflection. The result of student learning test through the model Think Pair Square (TPS) states improvement of first cycle average equal to 63,8 with mastery learning 42,5% and second cycle is 85,33 mastery learning 87,5%. Similarly, the observation of student also increased for the results of student observations on the first cycle is 57,42% and second cycle is 81,40%. Based on Research Results and Discussion can be concluded that there is improvement of learning outcomes of learners from learning outcomes by using cooperative learning model Think Pair Square (TPS) on chemicals in class XI TP 1 SMKN 4 Palembang

Keywords: think pair square, classical action, results of student's learning

▪ INTRODUCTION

The quality of education that has existed so far needs to be further improved and developed following the developments and progress of the times. The way to improve and develop the quality of education is to improve the learning process experienced by students in school which is still monotonous and teacher-centered (Teacher Learning). Many students think that learning chemistry at school is uninteresting, boring and interest in chemistry is low which results in students being less active and very few students who can be invited to collaborate during the learning process. This results in learning objectives not being achieved (Sunyono, et al., 2009). Learning is the most important activity in the educational process at school. This means that the success or failure of achieving educational goals depends a lot on how the learning process is experienced by students as learners (Slameto, 2003). Colloid is one of the materials taught in chemistry subjects in class XI SMA/SMK. The subject matter of colloids is one of the material in chemistry lessons that is conceptual and rote.

The results of interviews with chemistry teachers in class XI TP 1 at SMK Negeri 4 Palembang showed that students experienced difficulties related to chemistry lessons. The learning outcomes of students in chemistry subjects are low as evidenced by the average repetition of class XI TP 1 students on chemical equilibrium material of 61.45 and the percentage of students who achieve learning mastery is 40%. The minimum completeness criterion for the chemistry subject at the Vocational High School is 75. The approach used in learning is a scientific approach with lecture and discussion methods. The cause of the low average student score is that the learning process still tends to be teacher-centered and the allocation of time for studying chemistry is less so that it is less

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Received: 20 March 2022
Accepted: 17 May 2022
Published: 07 June 2022

effective in triggering student activity and causing boredom in students. In addition, the low student learning outcomes in chemistry subjects were also affected because these students attended vocational schools so they set aside chemistry subjects and prioritized vocational-related subjects.

There are several factors that influence the success of learning at every level of school. These factors are teachers, students, educational facilities and infrastructure. The expected success of learning is influenced by how precisely the teacher uses strategies, models and learning methods (Sulistyo, 2011). The activeness of students in class can improve learning outcomes. It is not easy to maintain students' active learning. The conditions of each student can change. Then a suitable and appropriate strategy is needed to overcome this problem (Barlian, 2016). Corrective actions that can be taken against a boring or teacher-centered learning atmosphere and low student learning outcomes in class XI TP 1 is to use the Think Pair Square (TPS) cooperative learning model, because learning with the TPS cooperative learning model can make students involved actively and enthusiastically during the learning process in the classroom.

Relevant research or using the same model was carried out by Ariska et al. (2014) on chemistry subjects in Class XI IPA 2 SMA Negeri 11 Palembang which informed that the TPS learning model can make students active during the learning process, resulting in learning outcomes students also increased where the average score of the first cycle test was 53.48%, the average test score in the second cycle was 72.09, and the average test score in the third cycle was 86.04%. The same research was also conducted by Kristiyanti et al. (2014) on chemistry subjects using the TPS learning model in class X at Rambah Rokan Hulu 1 Public High School which provided information that this TPS learning model could improve student achievement.

The formulation of the problem in this paper is "how can the application of the Cooperative Think Pair Square (TPS) learning model improve chemistry learning outcomes for class XI TP1 students at SMK Negeri 4 Palembang?". The purpose of this study is to improve students' chemistry learning outcomes through the application of the Think Pair Square (TPS) cooperative learning model in class XI TP1 SMK Negeri 4 Palembang. Based on the description that has been stated, the researcher is interested in conducting classroom action research with the title: "Implementation of the Think Pair Square (TPS) Cooperative Learning Model to Improve Student Chemistry Learning Outcomes in Vocational High Schools"

▪ METHOD

Types of research

The type of research conducted is Classroom Action Research (CAR). Classroom Action Research (CAR) which has been implemented consists of two cycles. Each cycle has four stages, namely action planning, observation, and reflection.

Time and Place of Research

The research was carried out for one semester starting from February 2018 to May 2018. Classroom Action Research (CAR) was carried out in class XI TP 1 SMK Negeri 4 Palembang

Research subject

The subjects in this study were students of class XI Mechanical Engineering (TP 1) SMK Negeri 4 Palembang in the 2017/2018 academic year, totaling 40 students, all of whom were male students.

Procedure

Cycle I

Planning Stage

Look for data on the value of student learning outcomes in the material before the action is taken as a T0 value. Determine the learning material, namely the understanding of the colloid system and the properties of colloids. Develop lesson plans on the material studied by applying the TPS learning model. Provide an observation sheet. Make a grid of end-of-cycle test questions and key answers to end-of-cycle test questions.

Action Implementation Stage

The implementation of the action is carried out based on the implementation planlesson plan (RPP) that has been made. The steps are as follows: *Preliminary activities*, The teacher says hello, The teacher checks the attendance of students, The teacher conditions students to learn and motivates students regarding colloid and polymer material. The teacher provides apperception or knowledge that has been previously learned related to the material to be studied, The teacher conveys the learning objectives to be achieved The teacher explains that learning activities will apply the TPS cooperative learning model.

Core activities

The teacher assigns students to better understand the material by providing topical issues in the form of Student Worksheets (LKPD) that have been prepared. Students work on the questions in the LKPD individually, Students try to find the core of learning through LKPD guidance and other reading sources that are relevant to the material being studied, then write down the results of their understanding individually. The teacher assigns students with their partners to discuss and share information about the material being studied. The teacher again directs two pairs to join into 1 group and discuss again the material being studied. The teacher assigns several groups to present the results of group discussions in front of the class. The teacher assigns other groups to provide comments or responses to the presentation results from the presenter group. The teacher explains things that are not yet known by students and corrects wrong concepts.

Closing Activities

Students guided by the teacher make conclusions about the material. Students give the final test of cycle I. The teacher gives assignments to students. The teacher conveys the next lesson plan. The teacher ends the lesson by greeting.

Observation Stage

Researchers together with tutors and colleagues made observations of activities during the learning process. Observations are made to find out how far the actions that have been given can produce the desired changes and to ensure the suitability of the plans that have been made with the actions that are implemented. Observations were also made to collect data regarding the activities carried out by students during the learning process.

Reflection

Reflection is done to correct any deficiencies in the learning process. This reflection is done by looking at all sides, both from the side of the researcher and the condition of the students. For example, researchers lack mastery of learning materials and models, so researchers must be more prepared to prepare for the next meeting in cycle II. Another example is the condition of students who have difficulty concentrating because of the noisy outdoor environment. So for the next meeting the teacher must ensure that the condition of the students is a condition ready to learn.

Cycle II

The actions taken in the second cycle consisted of planning, implementing, observing, and reflecting on the weaknesses or deficiencies that occurred in cycle I. The instruments used in this study are:

Test Instruments

The form of the test used is in the form of multiple choice questions totaling 15 items. Questions are given to students at the end of each learning cycle, namely at the end of the second meeting in each cycle. The tests given will provide information on the extent to which student learning outcomes reach the expected target.

Observation

Observation activities are carried out using an observation sheet where the observation sheet contains all conditions in the form of teacher and student activities. The activities observed were in the form of student activity, teaching performance from the researcher himself, as well as the atmosphere or conditions in the class. Observations were also made by observing videos taken during the research.

The success of the research was carried out by measuring the comparison of the average value of each cycle. If T2 > T1 > T0 is obtained, then this research is said to be successful. Where : T_0 is the result of students' daily test scores from the previous material or before being given action. T_1 is the value of learning outcomes obtained by students after being given action in cycle I. T_2 is the value of student learning outcomes after being given action in cycle II. The percentage of completeness of student learning outcomes is calculated or determined using the following formula:

$$P = \frac{\sum siswa\ yang\ tuntas\ belajar}{\sum siswa} x$$

Information :

P is the percentage of student learning completeness

If the cycle shows that students' classical learning outcomes reach 85% of subject completeness, namely ≥ 75, then the cycle is considered sufficient because the indicator of success has been achieved. However, if the subject has not reached completeness, then the next cycle will continue, and so on.

▪ RESULT AND DISCUSSION

This research consisted of two cycles where each cycle consisted of two meetings. The first cycle studied the topic of understanding the colloid system, the types of colloids and the properties of colloids and their role in everyday life. The learning outcomes test

is carried out at the end of each cycle. Data on student learning outcomes before the action (T0) were taken from students' daily test scores on the subject of chemical equilibrium. The value of student learning outcomes (T1) is taken from the final test scores of cycle I, followed by cycle II where the student learning outcomes (T2) are taken from the final test scores of cycle II. Based on the results of research that has been carried out using the Think Pair Square (TPS) learning model, the following results are obtained:

Average Student Learning Outcomes

From the results of the learning tests in cycle I and cycle II which were tested in the class that was used as the research class, the average student learning outcomes were obtained as shown in table 1 as follows:

Table 1. Average student learning outcomes

Siklus	Rata-rata Hasil Belajar
Siklus I (T_1)	63.8
Siklus II (T_2)	85.33

Student's Classical Completeness Criteria

Based on student learning outcomes in the research that has been carried out, the classical completeness criteria are obtained in cycle I and cycle II as shown in table 2 as follows:

Table 2. Students' classical completeness criteria

Siklus	Kriteria Ketuntasan Klasikal
Siklus I (T_1)	42.5 %
Siklus II (T_2)	87.5 %

From the data above it shows that the students' classical completeness criteria obtained from cycle 1 and cycle 2 experienced an increase of 42.5% to 87.5%.

Observation Results

Based on the research that has been carried out, the value of student activity in cycle I and cycle II is obtained as shown in table 3 as follows:

Tabel 3. Rekapitulasi Keaktifan Siswa Tiap Siklus (T_1) dan (T_2)

Siklus	Jumlah Peserta Didik	Keaktifan Peserta Didik	Kategori
Siklus I (T_1)	40	57.42 %	C
Siklus II (T_2)	40	81.40 %	A

Classroom action research has been carried out by applying the Think Pair Square (TPS) cooperative learning model in class XI TP 1 SMK Negeri 4 Palembang. Based on research data there is an increase in student learning outcomes and student learning activeness. An increase in student learning outcomes occurs in each research cycle

followed by an increase in student learning activeness in each cycle as shown in Table 1 and Table 3.

In cycle I, there was an increase in learning outcomes seen from the average student learning outcomes before taking action (T0) of 61.45 with 40% mastery learning on chemical equilibrium material, experiencing an increase in average learning outcomes after being given action in cycle I (T1) to 63.80 with 42.5% learning completeness on the subject of understanding colloids and types of colloids and the role of colloids in everyday life with 57.42% active learning. There is an increase in student learning outcomes in this cycle because student learning activity has begun to increase. As stated by Dimyati and Mudjiono (2009), namely the existence of increased student activity indicates that there is an increase in direct involvement in the learning process.

This increase occurred because learning had implemented the Think Pair Square (TPS) learning model in class XI TP 1 SMK Negeri 4 Palembang. According to Spencer Kagan (in Isjoni, 2011) think pair square cooperative learning is a technique that provides opportunities for students to work alone and collaborate with others. The advantage of this technique is optimizing student participation, namely providing more opportunities for students to be recognized and show their participation to others. This can be observed when students solve problems that exist in LKPD regarding the material understanding colloids and types of colloids and their role in everyday life, students who actively express opinions during discussions at the first meeting are 25 students and at the second meeting there are 27 students.

After the implementation of learning cycle I (T1), even though there was an increase in learning outcomes, it was still not optimal because there were still some weaknesses that occurred during the implementation of learning, such as students still feeling unfamiliar with the learning model that was applied because it was the first time, there were still many students who only copied the results of their friends' LKPD answers and not taking the time to discuss it was seen that 14 people did not ask either the teacher or their friends, so that the evaluation test in cycle I was still not as desired. This is also because students are still not used to sharing information with friends in a group formed by the teacher. During the presentation the students also looked less enthusiastic, only 4 students asked questions and 6 students expressed opinions to the group presenting. This is because only one group presented the results of their discussion, resulting in no opportunity for other groups to convey the results of their discussions in front of the class due to time constraints where time was not optimal because students were still unfamiliar with the applied learning.

Based on the weaknesses and the lack of achievement of the expected student learning completeness in cycle I, then the action is corrected in cycle II, namely before entering learning, the teacher provides motivation and encouragement to students to be more enthusiastic in discussing, students are guided again to read first first the LKPD instructions in order to help students better understand the learning steps applied. At the time of presentation, the teacher calls group members to present in front of the class at least 2 groups per meeting. Then the teacher gives rewards in the form of additional cognitive value so that students are more active in giving opinions or objections during questions and answers and presentations.

In cycle II, after repairing the weaknesses that occurred in cycle I, there was an increase in the average student learning outcomes of 63.80 with 42.5% completeness in cycle I (T1) increasing to the average student learning outcomes students 85.33 with a complete learning of 87.5% with the subject of colloids and polymers.

The results of the study show an increase in the learning process, which can be seen from the increase in the average learning outcomes and the activeness of the students. This is because students have more opportunities to share information and work together with their peers (pair stage) and other friends in the same group (square stage).

▪ CONCLUSION

Based on the results of the study it was concluded that students' cognitive chemistry learning outcomes increased through the application of the Think Pair Square (TPS) learning model. The increase in students' cognitive chemistry learning outcomes can be seen from the increase in the completeness of student learning outcomes and the average student learning outcomes. The average cognitive learning outcomes of students in cycle 1 (T1) is 63.80 with learning completeness of 42.5%, the average cognitive learning outcomes of students in cycle 2 (T2) is 85.3 with learning completeness of 87,5.

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