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Research Article

The Effect of Numbered Head Together (NHT) in a Flipped Classroom Environment on Students' Self-Efficacy and Achievement on Colloid Topics

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Abstract
This study aim to determine the effect of the implementation of flipped classroom model integrated Numbered Head Together (NHT) on self efficacy and learning achievement on colloid topics. This method used is quasi experiment with non-equivalent control group design. The sampling technique used is convenient sampling where class XI MIPA 1 is the experimental group and class XI MIPA 3 is the control group. The experimental group was carried out by applying the flipped classroom model integrated Numbered Head Together (NHT) while the control group applied traditional learning. Student self-efficacy was measured using a self-efficacy questionnaire while student learning achievement was measured using a learning achievement test. Hypothesis test of learning achievement test and self-efficacy questionnaire using t-test. The results of the independent t-test on the posttest value showed that the average posttest value of the experimental group was higher than the control group. Hypothesis testing of the self-efficacy questionnaire with independent t-test on the post-questionnaire showed the level of self-efficacy in the experimental group after being given treatment, higher than the control group. The conclusion of this study is that the application of the flipped classroom model integrated Numbered Head Together (NHT) can improve self-efficacy and student learning achievement on colloid topics.

Keywords: Achievement, flipped classroom, Numbered Head Together (NHT), self efficacy

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1. INTRODUCTION

Colloids are one of the chemistry topics taught in class XI high school. The characteristics of colloidal materials include conceptual material that requires an understanding of concepts and contextual material that studies the phenomena of changes in chemical materials that occur in everyday life (Fiyani et al., 2021). According to research by Taher et al. (2018), colloids tend to be given as assignments, not studied further or connected between the concept of colloids and problems related to colloids in everyday life. This causes students to be unsure in answering questions, convey opinions and provide solutions in solving problems and their ability to analyze and evaluate problem solving questions tends to be low (Taher et al., 2018). This shows that students tend to have low self-efficacy. Self-efficacy is an

individual's self-confidence in their ability to complete a task or achieve certain goals (Zheng et al., 2020).

The implementation of the 2013 curriculum emphasizes implementing active learning that is centered on students (student centered learning) and can integrate with developments in Information and Communication Technology (ICT) in the learning process so that students can develop critical thinking, communication, creativity and collaboration skills (Rahmawati et al., 2020). However, in practice, it is not uncommon for some teachers to deliver learning in one direction, not involving students in the learning process and not studying further or connecting the material studied with everyday life. Based on the results of observations made during Teaching Skills Practice (PKM) in class

One effort that can be made is by implementing the integrated Numbered Head Together (NHT) flipped classroom learning model. The concept of the flipped classroom is to reverse conventional learning where the delivery of material that is usually done in class is changed to the delivery of material through learning videos given before class activities, while activities in class are carried out with active learning centered on students (student centered learning) (Li et al., 2017). To support maximizing classroom activities in the flipped classroom learning model, it can be integrated with Numbered Head Together (NHT), which is a cooperative learning model that applies group discussions equipped with different head numbering between group members (Al-Tabany, 2014).

Based on the description that has been explained, the researcher decided to study further the flipped classroom learning model integrated with Numbered Head Together (NHT) on students' self-efficacy and learning achievement on the topic of colloids. This research was carried out by reversing the traditional classroom where the delivery of colloid material was carried out with learning videos given two days before starting class activities and in-class activities were carried out by discussion using Numbered Head Together (NHT). This research aims to determine the effect of implementing the integrated Numbered Head Together (NHT) flipped classroom learning model on students' self-efficacy and learning achievement on the topic of colloids.

2. METHODS

2.1 Study Design

This research was carried out at SMAN 44 Jakarta during April – May 2022 in the even semester 2022/2023. The research method used is a quasi experiment with a non-equivalent control group design, using an experimental group and a control group. The sample for this research was students in classes XI MIPA 1 and XI MIPA 3 who were determined using a convenience sampling technique where class control with conventional learning.

2.2 Instruments

The instruments used were self-efficacy questionnaires and learning achievement tests (pretest and posttest). The self-efficacy questionnaire was adapted from research by Dalgety et al. (2003) consists of 17 items regarding students' self-efficacy which are arranged based on a Likert scale and consist of a scale of very no self-confidence, no self-confidence, little self-confidence, no self-confidence and very no self-confidence. The learning achievement test (pretest and posttest) consists of 20 multiple choice questions related to colloid material. Pretest and posttest scoring means that each question has a weight of 5 points so that the maximum score is 100 and the minimum score is 0.

2.3 Data Analysis

Before testing the hypothesis, prerequisite tests are carried out, namely the normality test and homogeneity test. This research hypothesis test uses paired sample t-test and independent sample t-test with a significance level of 5% which is analyzed using SPSS version 25.0 for windows.

3. FINDINGS AND DISCUSSION

Research data consists of the results of self-efficacy questionnaires and the results of learning achievement tests (pretest and posttest) obtained from the experimental group and the control group.

Based on research data, the number of participants in the experimental group (class XI MIPA 1) was 35 students and the number of participants in the control group was 39 students (class XI MIPA 3). The average score of the learning achievement test (pretest) in the control group was 35.51 with the lowest score being 10 and the highest score being 50, while the average pretest score in the experimental group was 36.00 with the smallest score being 10 and the largest score namely 55 . Based on the kkm score for chemistry lessons, namely 70, the percentage of scores in the experimental group and control group was 100% below the kkm. Therefore, it can be concluded that before learning colloid material, the control group and experimental group were said to be in an equivalent condition.

Based on the results of the learning achievement test (posttest), the control group obtained an average score of 65.26 with the lowest score being 30 and the highest score being 90. And the average score for the experimental group was 75.43 with the lowest score being 55 and the the highest was 95. These results show that there is a significant difference in the posttest scores between the control group and the experimental group where 60% of students in the experimental group got a score above the kkm while in the control group only 41% of students got a score above the kkm after learning. .

Based on data from the results of the self-efficacy questionnaire, the average pre-questionnaire self-efficacy score in the control group was 49.46 with the lowest score being 35 and the highest score being 63. Meanwhile, the results of the self-efficacy pre-questionnaire in the experimental group obtained the lowest score, namely 32, the highest score is 70 with an average pre-questionnaire self-efficacy score of 50.46. These results show that the self-efficacy of students in the control group and the experimental group has a fairly low level of self-efficacy and tends to be equal between the control group and the experimental group.

After learning, the post-questionnaire self-efficacy data obtained in the control group had the lowest value, namely 37, the highest value, namely 66, and an average (mean) of 54.85, while in the experimental group the average value was 60.49. with the lowest score being 49 and the highest score being 81. This shows that after learning with different treatments in the experimental group and the control group, different levels of self-efficacy were obtained, where the level of self-efficacy in the experimental group was higher than the level of self-efficacy in the control group.

Before testing the hypothesis, it is necessary to carry out prerequisite tests, namely the normality test and homogeneity test. The normality test uses the Liliefors test, while the homogeneity test uses the Levene test with a significance level of 0.05. Based on the requirements test, the data obtained were normally distributed and the experimental group and control group were homogeneous so that hypothesis testing could be carried out using the t-test. The t test used is paired samples t-test and independent t-test.

Based on the results of the paired samples t-test, the significance value of the experimental group's learning achievement test and the significance value of the control group's learning achievement test were smaller than 0.05, so it was concluded that there was a significant difference between the pretest and posttest in the experimental group and between the pretest and posttest in the group. control. Where the experimental group experienced an increase in the average value from 36 to 75.4, while the control group experienced an increase in the average value from 34.2 to 65.3 as shown in Figure 1.

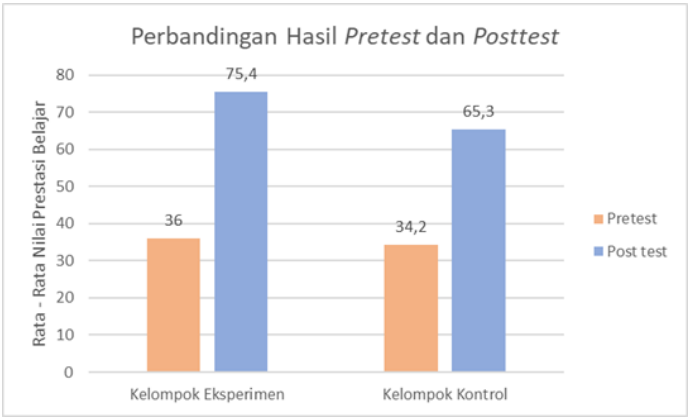

Figure 1. Pretest and Posttest in the Experimental and Control Groups

Based on the results of the independent t-test, the pretest value was greater than 0.05, so it was concluded that there was no significant difference between the control group and the experimental group before the learning was carried out. This shows that the learning achievements of the two groups can be said to be equivalent. Meanwhile, the results of the independent t-test on the posttest value obtained a significance value smaller than 0.05, so it was concluded that the average learning achievement in the experimental group after being given treatment was greater than the control group as shown in Figure 2.

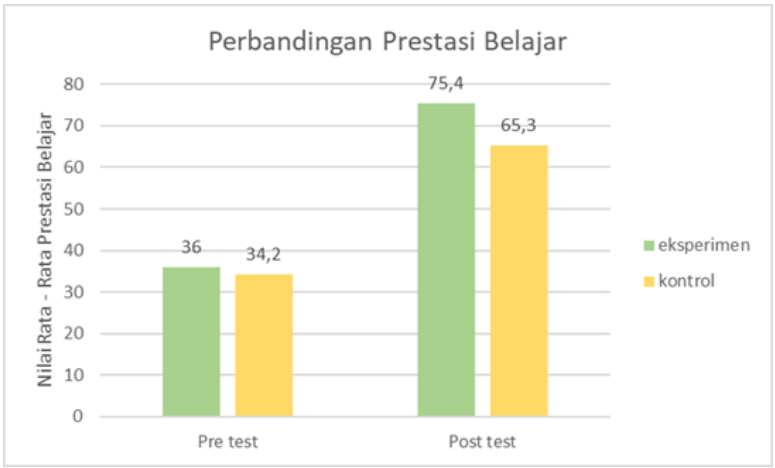

Figure 2. Achievement in the Experimental and the Control Groups

Based on the hypothesis test on the learning achievement test, it can be concluded that the results of the paired samples t-test in the control group and

experimental group experienced an increase in pretest scores to posttest scores after learning colloid material. This shows that regardless of the learning model or treatment applied, students in the experimental group and control group experienced an increase in learning achievement. However, based on the results of the independent t-test, it shows that the average posttest score for the experimental group is higher than the control group, so it can be concluded that even though both groups experienced an increase in learning achievement, the implementation of the integrated Numbered Head Together (NHT) flipped classroom learning model in the experimental group was more effective. compared to conventional learning.

Based on the results of the paired samples t-test on the self-efficacy questionnaire of the experimental group and the control group, it shows a significance value of less than 0.05, so it can be concluded that there is a significant difference between the level of self-efficacy in the pre-self-efficacy questionnaire and the experimental group's post-self-efficacy questionnaire. as well as the level of self-efficacy in the pre-self-efficacy questionnaire and post-self-efficacy questionnaire in the control group. This shows that the level of self-efficacy in the experimental group and control group before learning increased after learning the colloid material.

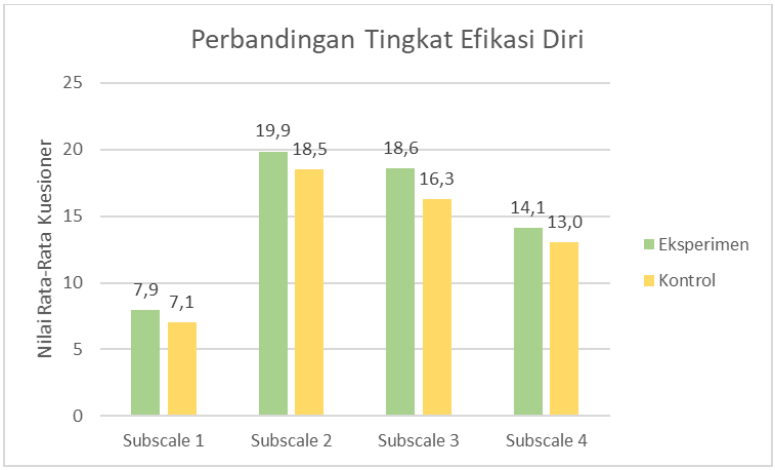

Figure 3. Self-Efficacy Levels in the Experimental and Control Groups

Based on the independent t-test results shown in Figure 3, the pre-questionnaire obtained a significance value greater than 0.05. This shows that there is no significant difference in the level of self-efficacy of students between the control group and the experimental group before learning is carried out, so it can be concluded that the initial condition of the level of self-efficacy of the two groups tends to be equal. Meanwhile, the results of the independent t-test on the post-questionnaire obtained a significance value smaller than 0.05, which shows that the level of self-efficacy in the experimental group after being given treatment was greater than that of the control group. Based on these results, it can be concluded that although the level of self-efficacy in the experimental group and control group before learning and after learning has increased, the level of self-efficacy in the experimental group after being given treatment is higher than the control group. This shows that the application of the integrated flipped classroom learning model Numbered Head Together (NHT) is more effective in increasing students' self-efficacy levels compared to conventional learning.

4. CONCLUSION

The results of this research indicate that the application of the integrated flipped classroom learning model Numbered Head Together (NHT) can increase students' self-efficacy and learning achievement on the topic of colloids.

Conflict of Interest

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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