



## EFFECTIVENESS OF COOPERATIVE LEARNING MODEL TYPE LEARNING TOGETHER (LT) ON LEARNING OUTCOMES AND CREATIVITY OF STUDENTS ON ACID-BASE MATERIAL

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*Received: July, 14<sup>th</sup> 2023*

*Revised: August, 30<sup>th</sup> 2023*

*Accepted: October, 21<sup>th</sup> 2023*

### ABSTRACT

This study aims to determine the effectiveness of Cooperative Learning Model Type Learning Together (LT) on learning outcomes and creativity of students on acid-base material in class XI MIPA SMA Muhammadiyah 3 Yogyakarta. The population of this study were all students of class XI MIPA SMA Muhammadiyah 3 Yogyakarta which amounted to 93 students and divided into 3 classes, namely class XI MIPA 1, XI MIPA 2, and XI MIPA 3. The samples of this study were class XI MIPA 2 as the control class and class XI MIPA 3 as the experimental class, each class consisting of 31 students. This research method is a quasi-experiment. The design used is nonequivalent control group design. Data collection techniques using test and filling out questionnaire sheets of students' creativity. Data analysis techniques used are normality test, homogeneity test, and hypothesis testing (Mann Whitney test and independent sample t-test). Based on the results of the Mann Whitney test analysis, the Sig (2-tailed) value of  $0.000 < 0.05$  was obtained, so  $H_0$  rejected and  $H_1$  was accepted, meaning that the cooperative learning model type learning together (LT) was effective on learning outcomes on acid-base material. Based on the results of the independent sample t-test analysis, the Sig.  $0.005 < 0.05$ , so that  $H_0$  rejected and  $H_1$  was accepted, meaning that the Cooperative Learning Model Type Learning Together (LT) is effective on students' creativity in acid-base material.

**Keywords:** Cooperative Learning Model, Creativity, Learning Outcome, Learning Together.

## INTRODUCTION

The 2013 curriculum is implemented to improve intelligence, attitudes, communication skills, and develop skills (Pahrudin, 2019). Curriculum 2013 encourages students to play an active role during the learning process, known as Student-Centered Learning. However, until now not all learning is this way, there are still those who apply the Teacher-Centered Learning model which places the teacher as the center of the information provider.

Chemistry material is considered difficult material to understand. This is influenced by the way teachers applies a boring learning model that is boring (Muderawan dkk., 2019). Learning

difficulties affect students' learning outcomes to be low (Sudiana dkk., 2019). This is reinforced by the result of teacher interviews high school teacher in Yogyakarta revealed that may students face obstacles in understanding chemistry material, reluctant to pay attention to the teacher when teaching chemistry, and low learning outcomes which is indicated by learning that not exceeding the KKM (less than 75). Based on observations during implementation of the Professional Training Program, it was also seen that students had difficulties in learning and understanding chemistry material. Students are easily bored when teacher explains and tends to chat with their friends. There are because

the conditions are not conducive and choose to ask a friend or teacher.

Acid-base is considered difficult material understood because it requires the ability numeracy and concept understanding (Izza, 2021). Students find it difficult to determine strong acid bases and weak acid bases and weak bases, as well as calculating the degree of acidity (Silviana dkk., 2023). An effective solution is needed to overcome the difficulties of students in understanding chemistry lessons, namely by applying the chemistry lessons, namely by applying the model cooperative learning type Learning Together (LT) cooperative learning model.

Cooperative learning model is a group learning model with different abilities (Daryanto, 2012). Learning Together (LT) is a cooperative learning model that focuses on small group collaboration to solve common tasks and problems (Slavin, 2011). This model can foster students' courage to express their opinions in solving problems (Ilham dkk., 2018). The syntax of the Cooperative Learning Model Type Learning Together (LT) includes: (1) the teacher presents the lesson information, (2) the division of small groups with 4-6 learners who have differences in abilities and characteristics, (3) discussion to complete the tasks given by the teacher, (4) learners present the results of the discussion, (5) giving awards (Mediatati, 2012).

This research is not the first time this has been done, previously there have been previous studies related to this topic, based on previous studies conducted by R.D. Lestari et al. (2019) showed that the application of the Cooperative Learning Model Type Learning Together (LT) equipped with guided LKS can improve social interaction and learning achievement of students in the stoichiometry material of class X MIPA 5 SMA Negeri 7 Surakarta in the 2017//2018 academic year is indicated by an increase in the percentage of completeness in each aspect in cycle I and cycle II. The study conducted by Arahap & Arahap &

Makhromi (2021) shows that the use of the Learning Together (LT) learning method in PAI learning in class VII at Al Mahrusiyah Ngampel Junior High School, Kediri City is effective as evidenced by the increase in students' cognitive outcomes in PAI subjects.

## RESEARCH METHODS

This study used a quasi-experimental research method. Quasi-experiment is a research design that divides experimental and control groups where group selection is carried out randomly (nonrandom assignment) (Hastjarjo, 2019). The research design used in this study was nonequivalent control group design. The sampling technique used in this study was probability sampling with a simple group random sampling approach. As a result, the control class was XI MIPA 2 and the experimental class was XI MIPA 3.

The type of data uses quantitative research in the form of student learning outcomes and student creativity. The instruments for collecting data in this study were in the form of test questions and a questionnaire for students' creativity. The data collection techniques in this study used exams in the form of pretests and posttests and filling out student creativity questionnaires.

In the instrument validation, validity test, reliability test, differentiating power analysis, and difficulty level analysis were conducted. The instrument was tested for content and construct validity by discussing it with the supervisor and expert lecturers in the field. There are three categories of validity instrument, including valid; valid with revision; and invalid. Reliability test on this study was assisted by SPSS 24. The instrument is said to be reliable if the Cronbach's Alpha value is between 0,70 – 0,90 (Yusup, 2018). Differentiating power analysis distinguishing power analysis is the ability of test items to separate the test items to separate abilities of ability of student clearly (Fitriani, 2021). Analysis the level of difficulty is how easy and

difficult the question tested (Hanifah, 2014). Analysis of distinguishing power and difficulty level are assisted by ANATES V4 software.

Data analysis techniques in the form of descriptive statistical results analysis, prerequisite test analysis, and hypothesis testing. Prerequisite test analysis in the form of normality test and homogeneity test. Normality test to determine whether the data is normally distributed or not. The normality test uses the Kolmogorov-Smirnov test assisted by SPSS 24 software. Data is normally distributed if the significant value  $> (\alpha) 0,05$  (Pratama & Permatasari, 2021). Homogeneity testing is carried out to evaluate the level of data uniformity. In this study, the homogeneity test used was the Levenue Statistic test assisted by SPSS 24 software 24. Data is said to be homogeneous if the significance value is greater than 0,05 (Pujianto dkk., 2020).

Bagian ini mendeskripsikan secara singkat dan padat tentang metode penelitian yang digunakan termasuk spesifikasi bahan dan alat, pengambilan contoh (kualifikasi dan cacah), cara pengukuran, desain penelitian, tahapan cara kerja, parameter, dan analisis data. Metode disajikan dalam bentuk paragraf dan dapat dilengkapi dengan tabel, gambar, atau bagan alur.

## RESULTS AND DISCUSSION

This study aims to determine the effectiveness of the Cooperative Learning Model Type Learning Together (LT) on the learning outcomes and creativity of students on acid-base class material XI SMA/MA. The samples used were XI MIPA 2 class totaling 31 students as a control class that applied the direct instruction learning model and XI MIPA 3 class totaling 31 students as an experimental class that applied the Learning Together (LT) learning model.

### 1. Experimental Classroom Learning

Chemistry learning in the experimental class was conducted for 5 meetings. The first meeting was

conducted pretest, the second meeting discussed acid-base theory, the third meeting discussed acid and base pH material, the fourth meeting explained acid-base indicator material bases and practicum of acid-base indicator practicum and filling out the questionnaire sheet creativity of students, the fifth meeting posttest was conducted. The steps research with the Learning model cooperative learning model type learning together (LT), the preliminary steps include greetings, praying, asking for news and attendance, making apperceptions, conveying learning objectives. Core steps learning iiiis carried out according to the syntax of the cooperative learning model type Learning Together (LT), which begins with the heterogeneously into 5 group of 6 students each. Next the stage of conveying information. At this stage the teacher explains the subject matter being studied and students are given the opportunity to study the material. The third stage is group discussions related to learning material, learners also work on practice questions on LKPD with their group members. Each member of the group members are expected to be active in giving opinions or asking practice questions given.



Image 1. Learning in the Experimental Class  
(Source: Personal Documents, 2023)

The next stage is presenting the results of the answers and practicum that has been done. At the presentation stage, other groups listened and teacher clarifies the answers and draws conclusions.



Image 2. Presentation of Practicum Results (Source: Personal Documents, 2023)

The Learning Together (LT) stages ends with rewards for groups that are active in learning.



Image 3. Experimental Class Rewards (Source: Personal Documents, 2023)

The implementation of the Cooperative Learning Model Type Learning Together (LT) in the experimental class ran smoothly, although there were few obstacles such as the existence of some passive learners who tended to leave group work to their friends. Problems like this become a note for the teacher to keep paying attention to the group during the discussion process and emphasize the students to participate actively in the discussion.

## 2. Learning in the Control Class

Learning in the control class was conducted using the direct instruction learning model for 5 meetings like the experimental class. The learning steps in the control class began with demonstrating knowledge and skills. In this context, the teacher provides an explanation of the material using the blackboard and power point. Students pay attention to the teacher's explanation, and the teacher invites students to ask for explanation that are not understood.



Image 4. Explanation of Material in Control Class (Source: Personal Documents, 2023)

The next step is guiding training, at this stage the teacher illustrates example problems and provides practice problems contained in the LKPD (Learner Worksheet).



Image 5. Learning in the Control Class (Source: Personal Documents, 2023)

After learners have a good understanding of the material that has been taught and can solve the problems given, then evaluate understanding and provide feedback. At this stage, the teacher provides additional explanation to the learners' responses (feedback). The next step is to provide opportunities for further practice and application, the teacher gives homework to students on LKPD. Learning ends with a closing. The closing activities carried out are reflection, making conclusions from the lessons learned, and the teacher informs students to prepare material for the next meeting and reminds the deadline for collecting homework, and closes with prayer and greetings.

## 3. Learner Learning Outcomes

Learning outcomes are the impact of interactions in learning activities (as explained by Dimiyati and Mudjiono in 2008). Outcomes include improvements in students' grades, their ability to express ideas through language, as well as skills in presentation and problem solving (Suprijono, 2009). Learning outcomes are very important for teachers because they

are used as a basis for evaluating the next learning process (Sari & Dewi, 2018).

Data on student learning outcomes based on pretest and posttest results. The test question instrument was validated by an expert lecturer, Mrs. Retno Aliyatul Fikroh, M. Sc. The test question instrument was also tested on 28 students of class XII MIPA 1 SMA Muhammadiyah 3 Yogyakarta who had received acid-base material. After conducting the test, the next step is to test the validity, reliability, distinguishing power, and difficulty level of the questions. The validity test results showed that of the 30 questions tested, 26 questions proved to be valid, while the rest were valid, 4 questions were invalid. Of the 26 questions that met the validity criteria, 25 questions were taken to be used as pretest and posttest questions.

The reliability test in this study was assisted by SPSS 24 software. The instrument is said to be reliable if the Cronbach's Alpha value is between 0,70 – 0,90 (Yusup, 2018). Based on the result of SPSS 24 software the reliability result of the test question instrument is 0,830, which means the test question is reliable. The results of the reliability test can be seen in the Table 1.

Table 1. Result Reliability Test

Reliability Statistics		
Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Item
,829	,830	30

Test the level of difficulty and distinguishing power of the test questions in this research was conducted with the help of ANATES V4 software. The level of difficulty is how easy and difficult the question being tested is (Hanifah, 2014). Based on the result of the level of difficulty test, it can be concluded that of the 30 questions that were tested, there was 1 question in the difficult category, 10 questions in the medium category, 16 questions in the easy category, and 3 questions in the very easy category.

Differentiating power is needed to determine the intensity of the difficulty of the questions (Fatimah & Alfath, 2019). Distinguishing power can measure the feasibility of questions based on the ability of ability of students. Based on the results of the differentiating power test concluded from 30 questions that were tested there was 1 question that had classification of distinguishing power, 15 questions have a classification of distinguishing power enough, and 1 questions has poor differentiating power.

The result of the pretest and posttest then tested descriptive statistics obtained the average value of the experimental class pretest of 57,29 and the average value of the posttest of 95,23. Meanwhile, the control class obtained an average pretest value of 52,13 and an average posttest value of 74,06. After the descriptive statistical test carried out, a normality test is carried out to determine whether the test result of the experimental class and control class are normal or not. Based on the result of the analysis of the pretest and posttest values of the experimental class and control class, it can be concluded that the data is not normally distributed. The result of the normality test of the test question can be seen in Table 2.

Table 2. Normality Test Result of Test Question

Test of Normality				
Class		Kolmogorov-Smirnov <sup>a</sup>		
		Statistic	Df	Sig.
Student Learning Outcomes	Pre-Test	,119	31	,200*
	Experiment (LT)			
	Post-Test	,374	31	,000
	Experiment (LT)			
	Pre-Test Control	,184	31	,009
	Post-TestControl	,244	31	,000

\*. This is a lower bound of the true significance

a. Lilliefors Significance Correction

The homogeneity test was carried out determine whether the variants of the experimental class and control class data were the same or not (Usmadi, 2020). The homogeneity test was carried out with the Levenue Statistic with the help of SPSS 24 software. Based on the result of the homogeneity test of the test question, a significance value of 0,031 was obtained,

indicating that the experimental class and control class had inhomogeneous data variations. This result of the homogeneity test of the question can be seen in Table 3.

Table 3. Homogeneity Test Result of Test Question  
Test of Homogeneity of Variance

Student Learning Outcomes			
Levenue Statistic	df1	df2	df3
4,881	1	60	,031

Then, hypothesis testing using the Mann Whitney test shows the result of the Asymp. Sig (2-tailed) of 0,000, which is also less than 0,05. This means that the null hypothesis ( $H_0$ ) is rejected and alternative hypothesis ( $H_1$ ) is accepted. In conclusion the Learning Together (LT) cooperative learning model is more effective than the learning model in improving students' learning outcome. The result of the Mann Whitney test analysis can be seen in Table 4.

Table 4. Mann Whitney Analysis Test Results  
Test Question

Test Statistics <sup>a</sup>	
Student Learning Outcomes	
Mann-Whitney U	83,000
Asymp. Sig. (2-tailed)	,000

a. Grouping Variable: Class

#### 4. Creativity

Creativity is a special intellectual and thinking ability. Someone who has the ability to think creatively to find solutions to problems from a new perspective and with different methods (Sugihartono, 2013). Creativity is a person's ability to create something that has not existed before (Yuliani, et al, 2020). According to Benedicta (2019), creativity does not depend on time or age factors; anyone who has the ability to create something new is capable of doing so ability to develop themselves and create new things can be considered a creative individual.

The creativity of students is obtained from a questionnaire sheet instrument distributed to students. The questionnaire sheet was validated by an expert lecturer, namely Mrs. Laili Nailul Muna, M.Sc. After the instrument is declared valid, then

the creativity questionnaire is given to students to obtain the results. The results obtained are then analyzed. The first data analysis is descriptive statistical analysis of the students' creativity questionnaire sheet and the average score of the experimental class is 93,48 with the highest score of 118 and the lowest score of 68 while in the control class the average score is 82,58 with the highest score of 111 and the lowest score of 49.

After the descriptive statistical test is carried out, then the analysis prerequisite test is carried out which consists of normality test and homogeneity test. The normality test is used to determine whether the results of the experimental class and control class test questions are normally distributed or not (Sugiyono, 2015). Data is said to be normally distributed if it has a significance value  $> 0,05$  (Pratama & Permatasari, 2021). Based on the normality test, the significance value of the student creativity questionnaire data is 0,200, which means that the data is normally distributed. The result of the normality test of the questionnaire sheet can be seen in Table 5.

Table 5. Normality Test Result of Creativity  
Questionnaire Sheet

Test of Normality			
		Kolmogorov-Smirnov <sup>a</sup>	
Class		Statistic	Df   Sig.
Student Creativity	Experiment Class	,127	31   .200*
	Control Class	,109	31   200*

\*. This is a lower bound of the true significance  
a. Lilliefors Significance Correction

The homogeneity test is carried out to determine whether the data variants of the experimental class and control class are the same or not (Usmadi, 2020). Data is said to be homogeneous if it has a significance value  $> 0,05$  (Pujianto dkk., 2020). Based on the homogeneity test, the significance value of the student creativity questionnaire sheet data is 0,690. From this data it can be concluded that the data on the questionnaire sheet for the creativity of experimental and control class students are homogeneous or the same.



Table 6. Homogeneity Test Result of Creativity Questionnaire Sheet

Test of Homogeneity of Variance			
Student Creativity			
Levenue Statistic	df1	df2	df3
,160	1	60	,690

The next step after conducting the pre-analysis test is to test the hypothesis. In this study, the hypothesis test used an independent sample t-test assisted by SPSS 24 software. The decision-making rules in the hypothesis test if the significance value (2-tailed)  $< 0,05$  then  $H_0$  is rejected (Muwakhidah & Pravesti, 2017). The hypothesis test conducted shows a significance value (2- tailed) of 0,005. Can be drawn conclusion that the cooperative learning model type learning together (LT) is more effective than the direct instructuin learning model on students' creativity.

Table 7. Independent Sample T-Test Result

Independent Sample Test			
		Levene's Test for Equality of Variances	t-test for Equality of Means
		Sig.	Sig (2-tailed)
Student Creativity	Equal variances assumed	,690	,005
	Equal variances not assumed		,005

There is no previous research that discusses the creativity of students with the cooperative learning model type learning together (LT), but there are parallel studies using cooperative learning models but with different types. Research conducted by (W.T. Lestari et al., 2014) stated that learning using the Numbered Head Together (NHT) type cooperative learning model can increase students' creativity in chemistry.



Filling out the Creativity Questionnaire (Source: Personal Document, 2023)

## CONCLUSIONS

Based on the Mann Whitney test output, the Asymp. Sig (2-tailed) of 0.000  $< 0.05$ , so  $H_0$  is rejected and  $H_1$  is accepted, meaning that the cooperative learning model type learning together (LT) is effective on student learning outcomes on acid-base material.

Based on the independent sample t-test, Sig. 0.005  $< 0.05$ , so  $H_0$  is rejected and  $H_1$  is accepted, meaning that the cooperative learning model type learning together (LT) is effective on students' creativity on acid-base material.

## ACKNOWLEDGMENTS

Thank you to SMA Muhammadiyah 3 Yogyakarta for helping with the research.

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