

LEARNING USING THE JIGSAW TYPE I COOPERATIVE MODEL TO IMPROVE STUDENTS' ABILITY IN DETERMINING THE FUNCTIONS COMPOSITIONS IN CLASS X SMA NEGERI 1 BARUSJAHE 2018/2019 ACADEMIC YEAR

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ABSTRACT

This research is descriptive research. This study aimed to determine whether learning by using the Jigsaw Type I Cooperative Model can improve students' ability to determine the function compositions in class X SMA Negeri 1 Barusjahe in the 2018/2019 academic year. The subjects in this study were students in class X SMA Negeri 1 Barusjahe in the 2018/2019 academic year with a total of 35 people. The object of this research was the students' mathematics learning mastery during the implementation of the Jigsaw Type I Cooperative Model to Improve Students' Ability to Determine Functional Compositions in Class X SMA Negeri 1 Barusjahe 2018/2019 Academic Year". The instrument used was a test consisting of 6 questions. In the pre-test, the classical mastery was 7.1%. After action I, the test results obtained classically the level of problem-solving ability with 75.2%. This shows that students' mathematical problem-solving abilities have increased to the medium category. The test results in cycle II classically obtained the level of classical student learning mastery with 93.8%. This shows that students' mathematical problem-solving abilities have increased to a very high category. From the actions in cycle I and cycle II, it was concluded that the application of learning strategies using the Jigsaw Type I Cooperative Model improves students' ability in determining functional compositions in class X SMA Negeri 1 Barusjahe 2018/2019 Academic Year.

Keywords:

Jigsaw Type I Cooperative Model, Learning Mastery

1. INTRODUCTION

Education is a conscious effort to prepare students through guidance, teaching, or training activities for their future roles. Dewey in Ihat Hatimah (2007: 1.16), suggests "education is a social process for immature people to become an active and participatory part of society".

National Education is a system whose function is to develop capabilities and improve the quality of life and human dignity of Indonesia in the context of efforts to realize national goals. This is in accordance with Law Number 20 of 2003 concerning the National Education System which states that national education functions to develop capabilities and shape the character and civilization of a dignified nation in the context of the intellectual life of the nation.

Mathematics is one of the branches of science that is considered to be able to make a



positive contribution to spurring science and technology (IPTEK), so it is very important in efforts to improve the quality of education. Mathematics education in Indonesia is currently undergoing a paradigm shift. There is a strong awareness, especially among policymakers to renew mathematics education. This is in accordance with the opinion of Sutarto Hadi (2008) that the aim is to make mathematics learning more meaningful for students and can provide adequate competence for both further studies and for entering the world of work.

Based on the pre-test conducted by the researcher, from 35 students of class XI SMA N 1 Tiganderket there was only 1 person who completed it individually. This data shows that only 2.86% of students completed classically, this number is very low when compared to classical mastery. Students are said to be proficient if 85% of the students complete individually. Based on this, it can be concluded that the material for determining the function composition is a difficult material for class XI students of SMA N 1 Tiganderket.

Based on the observations of the researchers, there are several factors that cause students' difficulties with the material, such as (1) the use of the discussion method by the teacher is less than optimal in learning the composition of functions, this can be seen from the division of groups based on the order of absent names only. Hamdani (2011:83) stated "The accuracy (effectiveness) of using learning methods depends on the suitability of learning methods with several factors, such as learning objectives, learning materials, teacher abilities, student conditions, sources or facilities, conditions and time." This statement is in line with what was stated by Slameto (2010:65) that: "in order to make students can learn well, the teaching method must be sought as precise, efficient and effective as possible. Progressive teachers dare to try new methods, which can help to improve teaching and learning activities and increase students' motivation to learn. (2) not using student worksheets (LKS) in learning, even though LKS can be used as a support for good learning. LKS in teaching and learning activities can be used at the concept cultivation stage (delivering new concepts) or at the concept understanding stage (advanced stage of concept cultivation) because LKS is designed to guide students in learning topics (Hamdani, 2011: 75). In line with Hamdani, Lestari in Hamdani (2011: 75) stated "At the concept understanding stage, student worksheets are used to learn knowledge about the topics that have been studied, which is concept cultivation" (3) student motivation is still low, seen by students being less motivated to repeat lessons at home, this can be seen from assignments or homework (PR) that are rarely completed by students. Whereas Slameto (2010:135) stated that: "The presence or absence of motivation for achievement in students is sufficient to affect the intellectual abilities of students to function optimally" (4) student interest is still low, it can be seen from the lack of student attention when the teacher explains. Hamdani (20011:141) stated, "interest has a great influence on learning. If you like a subject, students will learn happily without feeling burdened."

Based on the problems above, the solution is to improve the implementation of the discussion method carried out by the teacher. In accordance with the opinion of Slavin (2011:85), "Seventy-eight percent of the discussion methods found a significant effect". Through this statement, the use of the discussion method has a significant influence on learning so that the discussion method will be developed into a cooperative learning model. This is in accordance with the opinion of Newman and Thompson in Miftahul Huda (2011:305) "of 37 comparisons made, 25 of them (68%) found that cooperative learning had a significant effect on student achievement (with a minimum level of significance of 0.5)". Through the use of cooperative learning models, it is hoped that students' abilities will be

better than before.

From the description above, the researcher carried out learning improvements with the title **"Learning Using the Jigsaw Type I Cooperative Model To Improve Students' Ability in Determining Functional Compositions in Class XI SMA Negeri 1 Tiganderket 2018/2019 Academic Year"**.

DISCUSSION

A. Definition of Studying

Wina Sanjaya (2008:107) stated, "Studying is a thinking process, learning to think emphasizes the process of seeking and finding knowledge through interactions between individuals and the environment." According to Slameto (2010: 2), "Studying is a process carried out by a person to obtain a new behavior change as a whole as a result of his own experience in interaction with the environment."

Anthony Robbins in Trianto (2010:15), defined: "Studying is the process of creating a relationship between something (knowledge) that is already understood and something new". Slavin in Trianto (2010:16), defined "Studying is generally defined as individual change through experience, and not because of the growth or development of his body or characteristics of a person since birth. Humans learn a lot from birth. Learning and development are closely related."

From these opinions, it can be concluded that studying is a process of changing a person's behavior as a result of his interaction with the environment.

B. Definition of Teaching

Wina Sanjaya (2010: 96) stated, "Descriptively, teaching is defined as the process of delivering information or knowledge from teachers to students. The delivery process is often considered a process of transferring knowledge."

Syaiful Sagala (2009:61) stated, "Teaching is organizing student activities in a broad sense. The role of the teacher is not merely to provide information, but also to direct and provide learning facilities so that the learning process is more sufficient."

Based on the opinion of experts, it can be concluded that teaching is a series of interactions that take place between students and teachers to achieve the objectives of learning.

C. Definition of Learning

According to Benny A. Pribadi (2009:10) "Learning is a process that is intentionally designed to create learning activities within the individual." Meanwhile, according to Dimiyati and Mudjiono in Syaiful Sagala (2009:62) "Learning is a teacher activity programmed in instructional design, to make students learn actively, which emphasizes the provision of learning resources".

Knirk and Gustafon in Syaiful Sagala (2009:64) state "Learning is a systematic process through the stages of design, implementation, and evaluation. Learning does not happen instantly, but has gone through the stages of learning design."

Based on the opinion of experts, it can be concluded that learning is a process of interaction between teachers and students which aims to improve learning abilities and change students' behavior for the better.

D. Learning Math

Learning mathematics is learning about mathematical concepts and structures contained in the material being studied and looking for relationships between mathematical



concepts and structures (Bruner in Hudojo, 2010).

Nurhadi (2011) states "Learning mathematics means learning exact sciences, learning exact sciences means learning to reason. So learning mathematics means dealing with reasoning."

From these opinions, it can be concluded that learning mathematics is a process for students whose results are in the form of changes in knowledge, attitudes, skills, and to apply of concepts, structures, and patterns in mathematics so as to make students think logically, creatively, systematically in everyday life.

E. The Definition of Ability

According to Robbins in Pak Guru Ian (2010) that "ability can be an innate ability from birth, or is the result of training or practice." Meanwhile, according to H. Sunarto (2008: 120) "ability is the power to perform an action as a result of innate and training. " Based on the opinion of experts, it can be concluded that ability is a skill in performing an act physically or mentally which is obtained from birth, from teaching and learning process and experience.

F. Mathematics Learning

According to Nickson in Jajang (2005:5), mathematics learning is the provision of assistance to students to build mathematical concepts and principles with their own abilities through an internalization process (guidance) so that the concept or principle is built. According to the MKPBM Team (2009: 8-9), the definition of mathematics learning is divided into two types:

"(1) The definition of mathematics learning in a narrow sense is the learning process within the scope of schooling so that there is a process of socializing individual students with the school environment, such as teachers, sources or facilities, and fellow students, (2) The definition of mathematics learning broadly is efforts to the arrangement of the environment that gives the nuances for the mathematics learning program to grow and develop optimally."

From these opinions, it can be concluded that mathematics learning is a series of teacher activities in teaching students to build mathematical concepts and principles with their own abilities.

G. Mastery of Individual and Classical Learning

According to Hamdani (2011: 60) "Mastery learning is a minimum mastery criterion (KKM) which implies that students completely master all competency standards and basic competencies of certain subjects."

"Mastery learning is one of the contents of the Education Unit Level Curriculum (KTSP). The standard of student learning mastery is determined from the results of the percentage of student mastery in Basic Competencies in a certain material. The criteria for learning mastery for each Basic Competency range from 0-100%. According to the Ministry of National Education, ideally for each indicator to reach 75%. Schools can set their own criteria for learning mastery according to their respective situations and conditions. Thus, it can be concluded that schools need to determine the criteria for mastery learning and improve the criteria for mastery learning in a sustainable manner to approach the ideal" (<http://ktiplt.blogspot.com/archive/2009/01/24/ketuntasan-belajar.html>)

In <http://www.scribd.com/doc/4359536/KTSP-SD>

"Learning mastery for each indicator developed as an achievement of learning outcomes from a basic competency ranges from 0-100%. The ideal criteria for mastery of



each indicator are 75%. Schools must determine the minimum mastery criteria as a competency achievement target (TPK) by considering the average level of ability of students and the ability to support resources in the implementation of learning. The school gradually and continuously always be."

Each student is said to master the learning (individual mastery) if the proportion of students' correct answers is 65%, and a class is said to reach learning mastery (classical mastery) if in the class there are 85% of students who have completed learning (Depdikbud in Trianto, 2010: 241).

From these opinions, it can be concluded that students are said to reach individual mastery if students reach a value of 65 and are complete classical mastery if 85% of students have completed their studies.

H. The Learning Model

The learning model is a conceptual framework that describes a systematic procedure for organizing learning experiences to achieve certain learning objectives and serves as a guide for learning designers and teachers in planning teaching and learning activities. (Trianto, 2009:22). Benny A. Pribadi (2009: 86) stated that: "A model is something that describes a pattern of thinking. A model usually describes a whole concept that is interrelated. The model can also be seen as an attempt to concretize a theory. The learning model is a plan or pattern that is used as a guide in planning classroom learning or learning in tutorials and to determine learning tools including books, films, computers, curriculum, and others (Joyce, 1992 in Trianto, 2011: 22).

From this description, it can be concluded that the learning model is a plan or a pattern that is used as a guide in planning learning in the classroom that is equipped with all the learning tools needed.

There are several learning models that are often used in schools, in this discussion the researcher specifically discusses the Cooperative Learning Model.

I. The Cooperative Learning Model

Sharan in Miftahul Huda (2011: 17) states:

"Cooperative learning is an effective teaching strategy in improving student achievement and socialization as well as contributing to improving their attitudes and perceptions about the importance of learning and working together, including for their understanding of their friends who come from different ethnic backgrounds."

From this opinion, it can be concluded that the cooperative learning model is learning together that is able to encourage the realization of interaction and cooperation to complete tasks in one group. There are six main steps or stages in learning using cooperative learning. Ibrahim in Trianto (2010:66) mentions the steps of cooperative learning which are shown in table 1 below:

Table 1
Cooperative Learning Model Steps

Phases	Teacher Activities
1. Delivering goals and motivating students	Delivering all the learning objectives to be achieved and motivating students
2. Presenting information	Presenting information to students by way of demonstrations or through reading materials.
3. Organizing students into	Explaining to students how to form

cooperative groups	learning groups and helping each group to make the transition efficiently
4. Guiding work and learning group	Guiding learning groups as they work on their assignments
5. Evaluation	Evaluating learning outcomes about the material that has been studied or each group presenting their work
6. Giving Awards	Looking for ways to reward both individual and group effort and learning outcomes.

There are four types of cooperative learning models which are Student Teams Achievement Division (STAD), Jigsaw I and Jigsaw II, Teams Games Tournaments (TGT), Think Pair Share (TPS), and Numbered Heads Together (NHT) (Hamdani, 2011: 30).

In the types of cooperative models, the researcher's special discussion is the Jigsaw I cooperative model.

J. Jigsaw Type Cooperative Model I

Jigsaw I has been developed and tested by Ellioet Aroson. Isjoni (2009:77) stated that "Jigsaw I type cooperative learning is one type of cooperative learning that encourages students to be active and help each other in mastering the subject matter to achieve maximum achievement." While Lie in Rusman (2010:218) stated, "Jigsaw I type cooperative learning is cooperative learning in which students learn in small groups consisting of four to six people heterogeneously and students work together in positive interdependence and are responsible independently."

The steps for learning the Jigsaw Type I cooperative model are:

- 1) Students are divided into several groups (each group consists of 5-6 people),
- 2) Subject matter is given to students in the form of text that has been divided into several sub-chapters,
- 3) Each group member reads assigned sub-chapters and is responsible to learn them,
- 4) Members from other groups who have studied the same sub-chapter meet in expert groups to discuss it,
- 5) Each member of the expert group after returning to the group is tasked with teaching his friends,
- 6) At the initial group meeting and discussion, students are billed in the form of individual quizzes.

From this opinion, it can be concluded that the Jigsaw I cooperative learning model is a learning model that focuses on student group work in the form of small groups.

K. Learning Improvement Plan

The steps to improve learning that will be carried out are:

1. Developing a learning improvement plan using the Jigsaw I cooperative learning model with the following steps:

Table 2
Learning Improvement Plan

Phases	Activities
First	The teacher conveys the learning objectives
Second	The teacher divides the group
Third	The teacher distributes student books
Fourth	The teacher gives instructions to form an expert group
Fifth	The teacher gives instructions to return to the initial group
Sixth	Students are instructed to make each members of the expert group teaching the other group members
Seventh	Quiz implementation
Eighth	Evaluation by teacher

2. Designing worksheets
3. Designing student books
4. Arranging test for learning outcome tests
5. Implementing the learning improvements using lesson plans

L. Thinking Framework

Based on the pre-test conducted by researchers in class XI of SMA Negeri 1 Barusjahe, the function composition material is mathematics subject matter that is difficult for students to understand. This can be seen from the score of students which only 1 person is completed individually. This condition shows that students' classical mastery is only 2.86%, while students are said to be classically proficient if their classical mastery is 85% of the total number of students.

Based on the researcher's observations, there are several factors that cause students' difficulties with the material, which may be due to several things, one of which is the implementation of the discussion method used by the teacher is not optimal. This can be seen from the division of groups based on the order of absent names only.

Based on the cause of the problem, the researcher improved the method of a discussion carried out by the teacher. The discussion method was developed in the form of a Jigsaw cooperative learning model I. Thus, it is hoped that after improving learning there would be an increase in students' ability to determine the function compositions.

M. The Operational Definition

- i. Cooperative learning model is learning together that is able to encourage the realization of interaction and cooperation to complete tasks in a group.
- ii. There is two individual mastery, which are:
 - A. Students are said to be proficient individually if students reach a score of 70
 - B. Students are said to be proficient classically if 85% of students have mastered their studies

N. Action Hypothesis

The hypothesis in this study is that there is a significant increase in students' abilities after learning using the Jigsaw I cooperative model in determining the function composition in class XI of SMA Negeri 1 Tiganderket in the 2012/2013 academic year.

2. RESEARCH METHOD

A. Research Procedure

1. Carrying out pre-tests
2. Preparation stage
 - a. Developing steps to use the Jigsaw I cooperative learning model
 - b. Developing a learning improvement plan using the Jigsaw I cooperative model
 - c. Designing worksheets
 - d. Designing student books
 - e. Arranging tests for learning outcomes tests
 - f. Compiling observation sheets
3. Implementation Stage
 - a. Carrying out learning using the steps of the Jigsaw type I cooperative model
 - b. Conducting evaluations i.e. tests

B. Research Instruments

The research instrument used was a test.

1. Test

According to Suharsimi Arikunto (2009: 53), "Test is a tool or procedure used to find out or measure something in a certain atmosphere, with ways and rules that have been determined."

The essay test, which is also often known as a subjective test, is a type of learning outcome test that has the following characteristics: First, the test is in the form of a question or command that requires an answer in the form of a description or explanation--- sentences that are generally quite long. Second, the forms of questions or commands require the test to provide explanations, comments, interpretations, compare, differentiate, and so on. Third, the number of questions is generally limited, ranging from five to ten items. Fourth, in general, the items on the description test begin with the words: "Explain ...", "Describe", "Why", "How", or other words that are similar to that (Anas Sudijono, 2011: 99-100).

Table 3.
Test Outline

Basic Competence	Learning Objectives	Cognitive Level	Pre-test	Cycle I	Cycle II	Total
	Determining the function composition	C2	3	3	3	9
Determining the Function Composition of Two Functions	Determining the value of function composition	C2	2	2	2	6
	Solving everyday problems using the concept of function composition	C3	1	1	1	3
Total			6	6	6	18

2. Requirement Test Validation

a. Content Validation

After the test is arranged based on a blueprint, it is then validated by several validators. Validation is carried out to validate the contents of each item that has been prepared, which includes language, the suitability of the items with the learning objectives, systematic writing, the suitability of the answer keys, and the time required to complete the questions. Valid questions by the validator are then carried out to test the requirements for the test items.

C. Data analysis

In accordance with the formulation of the problem in the study, the data analysis was carried out as follows:

a. Mean

Sudjana (2005:67) formulates to calculate the mean as follows

$$\bar{x} = \frac{\sum x_i}{n}$$

Description:

\bar{x} = Average

$$\sum x_i = x_1 + x_2 + \dots + x_n$$

n = total of data

b. Individual and Classical Mastery

- Individual Mastery

To calculate the mastery of individual student learning, Usman (1993:138) formulates as follows:

$$\text{Individual Mastery} = \frac{\text{Number of correct answers}}{\text{Total number of questions}} \times 100\%$$

Description:

$0\% \leq \text{individual mastery} < 65\%$ considered as not proficient

$65\% \leq \text{individual mastery} \leq 100\%$ considered as proficient

- Classical Mastery

To calculate student learning mastery classically, Mulysa (2003:102), formulates as follows:

$$\text{Classical Mastery} = \frac{\text{Number of students who scored} \geq 65}{\text{Number of students participating}} \times 100\%$$

A class is considered to be proficient in learning (classical mastery) if in that class there are 85% of students have been proficient in learning.

3. RESULTS AND DISCUSSION

A. Results

1. The Average Score and Students Learning Mastery in the Pre-test

Before carrying out learning improvements, the researchers first carried out a Pre-Test to find out the average score and student learning mastery. The mean and mastery of the



Pre-Test learning can be seen in table 4.1.

Table 4.1
The Average Score and The Learning Mastery at Pre-test

Number of Questions	The Average Score	Number of Students			
		Proficient	Percentage	Not Proficient	Percentage
1	4	7	20%	28	80%
2	4,2	0	0%	35	100%
3	9,97	3	8.57%	32	91,43%
4	3,86	4	11.4%	31	88,6%
5	4,4	1	2.86%	34	97,14%
6	8,66	0	0%	35	100%
Average	5,85	2,5	7,1%	32,5	92,9%

Based on the Table IV.1, it can be seen that the student learning classical mastery is 7,1%.

2. The Average Score and Students Learning Mastery in Cycle I

At the end of the improvement of learning in Cycle I, a test was carried out to determine student grades and student learning mastery. Cycle I test results can be seen in table IV.2

Table 4.2
Average Grades and Mastery of Student Learning Cycle I

Number of Questions	The Average Score	Number of Students			
		Proficient	Percentage	Not Proficient	Percentage
1.	6,49	25	71,43%	10	28.57%
2.	9,6	27	77,14%	8	22,86%
3.	16,3	28	80,00%	7	20%
4.	6,17	25	71,43%	10	28,57%
5.	9,57	28	80,00%	7	20%
6.	15,37	25	71,43%	10	28,57%
Average	10,58	26	75,2%	9	24,8 %

Based on the table IV.2, it can be seen that students mastery classically in cycle I is 75,2%.

3. The Average Score and Students Learning Mastery in Cycle II

Classical student learning mastery in the first cycle test is 62.86%, which does not meet the criteria for classical student learning mastery. Therefore, the improvement of learning cycle II was carried out. At the end of the improvement of learning in Cycle II, a test was carried out to determine student grades and student learning completeness. Cycle II test results can be seen in table IV.3

Table 4.3

The Average Score and Mastery of Student Learning Cycle II

Number of Questions	The Average Score	Number of Students			
		Proficient	Percentage	Not Proficient	Percentage
1.	7,69	32	91%	3	9%
2.	11,7	35	100%	0	0%
3.	18,96	32	91%	3	9%
4.	7,46	32	91%	3	9%
5.	11,8	34	97%	1	3%
6.	19,17	32	91%	3	9%
Average	12,8	32,83	93,8%	2,17	6,2%

From table IV.3 it can be seen that the average score of the first cycle test in each test item is 12.8 and the second cycle of learning mastery in each test item is 32.83 (the calculations can be seen in the appendix). The classical mastery of students in the first cycle test is 93.8% so the classical student mastery criteria have been achieved.

4. Implementation of Teacher Learning Cycle I

Activity	Observer I	Observer II	Average	Criteria
Teacher				

5. Implementation of Teacher Learning and Students Cycle II

Activity	Observer I	Observer II	Average	Criteria
Teacher				

6. The Analysis of Research Result

a. The Average Results of the Pre-Test Students, Cycle I, Cycle II.

Number of Questions	The Average Score of Students		
	Pre-test	Cycle I	Cycle II
1.	4	6,49	7,69
2.	4,2	9,6	11,7
3.	99, 7	16,3	18,96
4.	3,86	6,17	7,46
5.	4,4	9,57	11,8
6.	8,66	15,37	19,17
Average	5,85	10,58	12,8

b. The Result of Student Mastery Pre-test, Cycle I, Cycle II.

Number of Questions	Pre-test of Student Mastery				Student Mastery Cycle I				Student Mastery Cycle II			
	Proficient	%	Not Proficient	%	Proficient	%	Not Proficient	%	Proficient	%	Not Proficient	%
1.	7	20	28	80	25	71,43	10	28,57	32	91	3	9
2.	0	0	35	100	27	77,1	8	22,8	35	100	0	0



						4		6					
3.	3	8,57	32	91,4	28	80,0	7	20	32	91	3	9	
						0							
4.	4	11,4	31	88,6	25	71,4	10	28,5	32	91	3	9	
						3		7					
5.	1	2,86	34	97,1	28	80,0	7	20	34	97	1	3	
				4		0							
6.	0	0	35	100	25	71,4	10	28,5	32	91	3	9	
						3		7					
Ave rage	2,5	7,1	32,5	92,9	26	75,2	9	24,8	32,8	93,8	2,17	6,2	
									3				

B. Discussion

In the pre-test conducted by the researcher, the following things were found: 1. The average student learning classical mastery was very low, which was 7.1%

After improving learning by using the Jigsaw Type I Cooperative Model, the following were found:

i. In the first cycle, it was found an increase in the average score of students individually and classically. Classically, there was a fairly high increase with 75.2%, which means that students' ability to determine the function composition improved classically

ii. After improvements were made in cycle II, it was found that there was an increase in the average score of students individually and classically. Classically, it has increased quite well with 93.8%, which means that the ability of students to determine the composition of functions is very good classically.

4. CONCLUSIONS

Based on the results of the research in Chapter IV above, the application of the learning model Using the Jigsaw Type I Cooperative Model can Improve Students' Ability to Determine Functional Compositions in Class X SMA Negeri 1 Barusjahe 2018/2019 Academic Year. The results found are students' abilities increased therefore classical mastery students experienced an increase of 93.8% which is classified into the very good category.

Based on the findings of this study, it can be concluded that the Jigsaw Type I Cooperative Model can Improve Students' Ability to Determine Functional Compositions in Class X SMA Negeri 1 Barusjahe 2018/2019 Academic Year

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