

**LEARNING MODEL EXPERIMENTATION OF STUDENT TEAM
ACHIEVEMENT DIVISION (STAD) AND THINK PAIR SHARE (TPS) OF
ASSESSMENT FOR LEARNING (AFL) BASED**

Muhammad Noor Kholid, Yoga Muh. Muklis, Ummi Khasanah

Mathematic Education – Muhammadiyah University of Surakarta - Indonesia

Muhammad.Kholid@ums.ac.id

Abstract

The purposes of this research were to know difference of influences of each learning model category towards mathematics learning achievement of the students. The research was a quasi experimental research. Population of the research was all students of VII grade of SMP Negeri 1 Colomadu of even semester of academic year 2013/2014. The samples were taken by cluster random sampling technique. The samples in the research were totaled 116 students. The instruments used for data collection were initial ability test and mathematics learning achievement test. The instrumental test covered content validity, difficulty level, discrimination capacity, and reliability. The prerequisite test covered normality test used Lilliefors method and homogeneity variance test used Bartlett method. Balance test and hypothesis test used one way variance analysis with different cell. Based on the hypothesis test, derived conclusion that the cooperative learning model type STAD of AFL based provided better mathematics learning achievement than the cooperative learning model type TPS of AFL based and conventional learning model of AFL based, as well as the cooperative learning model type TPS of AFL based provided better mathematics learning achievement than the conventional learning model of AFL based.

Keywords: STAD, TPS, AFL, Mathematics Learning Achievement.

INTRODUCTION

Education is a process of self-development to improve self quality. One of the development processes is learning process because by learning one is able to improve the self quality; it is a proof of an increase in human resources. Thus education is classed as an absolute requirement needs to be owned by every human being, so that they are able to be up to date to periods that are always directly proportional to the development of human resources.

One of the sciences in the process of learning is mastery inexact science concepts, namely mathematics, because mathematics assessed an important role in the development of science. So giving mathematical concepts is necessary as a means of promoting the role of human resources in advancing science in the world. It becomes one of the basic purposes of studying mathematics, which trains students to have the ability to reason and think to study a problem logically and systematically. By having a logical and systematic mindset, students will be skilled in solving everyday problems.

One international study to evaluate special education for learning outcomes at the level of junior high school (SMP), followed by Indonesia is the Trends in International Mathematics and Science Study (TIMSS). TIMSS as ongoing studies conducted every four years and is a long series of studies conducted by the International Association for the Evaluation of Educational Achievement (IEA), an international association for assessing achievement in education. Average math ability of Indonesian students in TIMSS 2011 International Benchmarks in

general were at a low level (Low International Benchmark) with the title below the international median. It shows the average of Indonesian learners are able to understand the basic integers and decimals, perform basic calculations, matching tables and bar charts to pictograph, and read a simple line diagram. The average of Indonesian participants in TIMSS 2011 was 386 which was decreased from the average achievement in TIMSS 2007 at 397, where the framework of TIMSS 2011 was not different from the TIMSS 2007 framework.

As one of the real evidences of what happened in Indonesia is the low learning achievement experienced by students of SMP Negeri 2 Colomadu. It can be seen from the data of student achievement of VII grade in academic year 2012/2013 which was based on the score of the final semester there were 21% of students who had not completed. Based on these data, the learning achievement of students of SMP Negeri 1 Colomadu was low. Therefore, it required an effort to improve the quality of students' learning achievements of mathematics in SMP Negeri 1 Colomadu. The efforts are expected to improve the learning achievement of students of SMP Negeri 1 Colomadu.

Information from mathematics teachers that as a general class of mathematical learning situation at VII grade in SMP Negeri 1 Colomadu that students just listen what teachers teach, there is not courage students to ask questions, students tend to be fearful and reluctant to answer questions given by the teachers, lacks of feedback on questions done students in daily tests, Mid-Semester Exam and Final Exam Semester, and students tend not to communicate the difficulty experienced by other students (rarely happens a cooperative problem solving). This adversely affects the learning achievement of students.

The low learning achievement of students of SMP Negeri 1 Colomadu certainly is influenced by many factors. One of the factors that may affect the low learning achievement is learning model implemented by the teacher. The good learning model is a learning model which encourages students to be active in learning so that the learning objectives achieved optimally. In learning activities, students should be given the opportunity to develop their ability actively.

During this time, many learning models applied by the mathematics teacher of SMP Negeri 1 Colomadu are conventional learning models with expository method are always dominated by the teacher. Teachers deliver the material and give examples of questions while the students just listen, mimic the patterns given by the teacher, and model how to solve problems that lead students to act passively. Most mathematics teachers spend learning hours to discuss the tasks, explain a new subject matter, and gives a new task. During the learning activities, teachers tend to be more active explaining mathematical formulas and students only receive all the explanations of the teacher. Teachers do not do evaluations for emphasis of key points of assigned material, thus becomes one of the causes of the lack of students' understanding of the material provided. Thus, the learning of mathematics makes students less able to explore the information obtained during the learning process to gain an optimal understanding.

Based on these problems, it takes innovation in teaching mathematics so that students actively engaged during learning activities. The application of innovative learning is expected to provide a positive influence on learning achievement. One alternative solution is the model of learning offered is Student Team Achievement Division (STAD) and Think Pair Share (TPS) based Assessment For Learning (AfL).

Currently in the world of assessment, has been developed one type of assessment is called assessment for learning (hereinafter abbreviated AfL). The AfL is basically a formative assessment. It is named the AfL with the aim to emphasize that the assessment is carried out for improvement of learning assessment, not an assessment to see how much knowledge has been mastered by the student.

AfL can be developed on the premise that students' ability to optimally increase, if they understand the purpose of learning, know their position in relation to the learning objectives, and understand how to achieve the learning objectives.

According Budiyo (2010), AfL is the process of seeking and interpreting evidence used by students and teachers in determining the position of the student, then what must be done, and how best to achieve the learning objectives. There are 10 principles of AfL as follows.

1. AfL is part of the planning for effective learning.
2. AfL should focus on how students learn.
3. AfL is the center of learning practices in the classroom.
4. AfL is a key professional skill of teachers.
5. AfL should be sensitive and constructive because any assessor always has an emotional impact on students.
6. AfL should pay attention to the importance of student motivation.
7. AfL should focus on commitment to the goal of learning and understanding of the criteria that must be assessed.
8. In the AfL, the students must obtain a constructive hint how students should improve.
9. AfL should be able to develop the capacity of students to assess themselves.
10. AfL must consider the range of student abilities.

There are four key characteristics which must be understood by teachers in implementing the AfL, namely:

1. The use of effective questioning techniques
2. The use of strategies to provide feedback
3. The existence of shared understanding about the purpose of learning
4. The conduct of peer assessment and self-assessment

On the other hand, Clarke (2005: 1-2) says that the implementation of the AfL (which by Clarke called formative assessment) should follow the following strategy.

1. Clearly stating learning objectives and success criteria for the learning plan as the basic framework for the AfL.
2. Sharing learning objectives and success criteria with the students.
3. Using appropriate questioning techniques and effective to develop learning, not to measure the ability of students.
4. Focusing on providing feedback, both orally and in writing.
5. Reforming the target such that the achievement of students' abilities based on the ability of the previous
6. Involves individual assessment and assessment of inter-friend.
7. Provides an understanding that every student can learn and thrive.

Based on the opinion of Clarke, the AfL will work well in practice in the classroom, if a teacher has the ability and skills to plan, formulate learning goals and success criteria before learning takes place. Later, during the learning process teachers need to have a strategy and assessment methods that can foster self-confidence, motivation, and a sense of responsibility of the student.

Cooperative learning models of STAD is one of cooperative learning that is applied to cope with heterogeneous capabilities of students. This model is viewed as a model of the most simple and direct of cooperative learning approach. STAD model developed by Robert Slavin at Johns Hopkins University, USA, is one model that is widely used in cooperative learning.

Slavin (1995) explains that the STAD cooperative learning model, students are placed in study groups of four or five students who have the academic ability of different, so that within each group there are students who are high achievers, medium, and low or variation type gender, racial and ethnic groups, or other social groups. The teacher presents a lesson, and then students work in their teams to ensure that all team members have mastered the lesson. Then, all students are given the test relating to the material individually. According to Slavin (2008:12),

the main idea of the model STAD cooperative learning is to motivate students to support each other and help each other in mastering competencies.

Slavin (2008: 143-160) describes that the components in the STAD cooperative learning model are as follows.

1. The first component is a class presentation. This component is in the form of direct teaching as is often done or discussion led by the teacher, or teaching with audiovisual presentations. Thus, students will realize that they have to actually pay full attention during the presentation as this will greatly assist them in doing quizzes and quiz scores determine the team score.
2. The next component is the presence of the team. A team consists of four or five students are heterogeneous. The primary function of the team is to ensure that all team members are actually learning so that each member of the team will be ready to do quiz well. After the teacher delivering the material, the team assembled to study the activity sheet in the form of discussion of problems, comparing answers, and correcting errors of understanding among the team members.
3. The third component is a quiz. This last component is done after one or two periods of delivery of material. Students are not allowed to help each other in the quiz.

Table 1 Criteria for Determining the Improving Score of Learning Outcomes

Criteria	Increased Value
Quiz grades dropped more than 10 points below the initial score	5
Quiz grades dropped 1 to 10 points below the initial score	10
Value equal to the score of the initial quiz up to 10 above the initial score	20
Quiz grades more than 10 above the initial score	30

4. The fourth component is the progress of individual scores. In the scoring system for each student can contribute to the group's maximum points, therefore each member of the group should strive to obtain the maximum score of the quiz scores. Furthermore, students will accumulate points for their group based on the level of increase in quiz scores compared to their baseline scores.
5. The last component is a team award. The purpose of scoring is to reward each group. The group with the highest average score awarded "super team", a group with an average score awarded intermediate "great team", and the group with the lowest average scores as a group of "good team".

In STAD cooperative learning model, the teacher rewards based acquisition group increased scores for individual students. In this study, the group award in each of the meetings is given at the next meeting. This is because an increase in the individual scores computed by the teacher after knowing each student quiz scores.

STAD cooperative learning model also has advantages and disadvantages. Roestiyah (2001: 17) argues that the STAD cooperative learning model has many advantages such as:

1. Students are given a great opportunity to use the skills to ask and discuss a problem.
2. Students are given the opportunity to conduct a more intensive investigation of a problem.
3. Students can develop the talent of leadership and teaching skills of discussion.
4. Teachers pay more attention to students as individuals.

5. The students are more actively join in their lessons and they are more active in the discussion.
6. Students are given the opportunity to develop a sense of score and respect other people's opinions.

These advantages can occur when there is individual responsibility of group members, which is the group's success is determined by learning outcomes of all the individual members of the group. Besides these advantages STAD cooperative learning also has shortcomings, according to Dess (1991:411) including the following.

1. STAD cooperative learning requires a longer time in the learning process that makes it difficult to achieve curriculum target.
2. STAD cooperative learning teachers require special skills that not all teachers can do cooperative learning.
3. STAD cooperative learning requires certain characteristics of students, such as the cooperater nature.

The shortcomings can be mitigated by the use of student worksheets so that discussions that occur in a group are more focused. Additionally, it takes the role of a teacher who always motivates weak students in order to play the active roles, increasing the student's responsibility to learn together and help students who are experiencing difficulties. The existence of the appointment of the students in turn by the teacher during a class discussion can create liability for the present members of the group discussions.

TPS learning model was developed by Frank Lyman et al from the University of Maryland, USA in 1985. TPS learning model is one of the simplest models of cooperative learning. This technique gives the opportunity to students to work alone as well as in collaboration with others. Advantage of this technique is the optimization of student participation (Lie: **2004**). Learning model is able to train students how to express their opinions and the students also learn to respect other people's opinions with reference to the material or the learning objectives.

Ibrahim, et al. (2000: 26) explains that the TPS cooperative learning model type has steps which are defined explicitly to give students more time to think, respond, and help each other. The stages in cooperative learning model TPS is thinking, pairing, and sharing. These stages can be described as follows.

1. The first stage is thinking. The teacher asks a question or issue related to the lesson. After that, the students are asked to think about the question or the issue independently within a predetermined time.
2. Next stages namely pairing. Teacher asks the students to pair up with other students to discuss what has been thought in the thinking stage. Interaction at this stage is expected to share the answer if it has been asked a question or share ideas with a partner.
3. The final stage is sharing Teacher asks each pair to share with the whole class about what is discussed.

In TPS cooperative learning model, teachers' group rewards based on individual student gains an increase in scores. In this study, the group awards are given at the next meeting. This is due to the increase in the individual scores computed by the teacher after knowing each student quiz scores.

TPS cooperative learning model also has advantages and disadvantages. Based on the opinion of Ibrahim (2000: 6), TPS cooperative learning model has the following advantages.

1. Increasing the allocation of time on task.
2. Repairing of presence.
3. Reducing apathy.
4. Understanding of the material by students greater.

5. Improving learning outcomes.

6. Improving attitude.

While the weakness as expressed by Lie (2002: 46), among others:

1. Less idea that emerges during the discussion.

2. The difficulty of finding a solution.

These advantages can occur if each individual in the group running responsibilities, it means success or failure of the group is determined by the results of individual learning of all group members. In addition, the needed recognition to the group so that group members understand that working together to help each other in a group of friends is very important. Weaknesses can be minimized with the role of the teacher is always weak in order to motivate students to play an active role, increasing the student's responsibility to learn together, and help students who are having difficulty.

RESEARCH METHOD

This research was conducted at SMP Negeri 1 Colomadu. The subjects were students of VII grade of SMP Negeri 1 Colomadu of second semester of academic year 2013/2014. In this study, data collections used were test method and documentation method. The test method was used to obtain data on learning achievement. Meanwhile the documentation method was used to obtain data on students' prior knowledge in the form of final semester grades that had been owned by the teacher. The data were used to test the average balance of the experimental class I, experimental class II and control class. The data obtained through the learning achievement of learning mathematics achievement test on the subject matter of equation of line and angle. Test questions were used in the form of multiple choices and compiled by researchers. Each item had four alternative answers questions. The correct answer was given a score of 1 and an incorrect answer given score 0.

RESULT AND DISCUSSION

The instrument was first tested the ability of the initial test, the test was based on odd Final Semester Exam (UAS) that was managed by a team of District MGMPs. Final Semester Exam has been found to comply with the terms of the validity of the instrument, those were, the level of difficulty of the instrument was medium, the instrument included good distinguishing, and ofcourse that the instrument was reliable.

Before testing the balance, firstly done the prerequisites tests which were the normality test and homogeneity of variance test. Test for normality was used Lilliefors method. Meanwhile the homogeneity of variance was used Bartlett method. From the test results concluded that both samples come from populations that were normally distributed and had homogeneous variance.

Because the prerequisites were met then the test can be performed the balance test of the initial capability data using one way analysis of variance of different cell with a significance level of 0.05.

Here's a summary of the results of tests of balance to the initial capability data.

Source	JK	dk	RK	F _{obs}	F _α	p
Learning Materials (A)	63.1253	2	31.5626	1.3615	3.07	<0.05
Error (G)	2619.6592	113	23.1828	-	-	-
Total	2682.7845	115	-	-	-	-

Based on the above table, F_{obs} obtained with $t = 0.05, 2, 113 = 3.07$. Since F_{obs} are not located in areas of criticism, and then H₀ is accepted. It means that the groups of STAD, TPS, and Conventional have the same initial capabilities.

After both groups stated in balance, then performed experimentation for six meetings and testing of learning achievement test instruments. The test was intended to determine whether the

test instrument has compiled fulfill the terms of the instrument is good or not. First the test was done to determine the validity of aspects of language, whether the language used in the tests has been understood by junior high school students and whether the language used in the tests were in accordance with the rules of good and true Indonesian.

After the grammar instrument otherwise good, correct, and appropriate, then the instrument was tested to determine the validity of the content, choose the item with a moderate level of difficulty, choose about good distinguishing, and ensure that the instrument was reliable. Furthermore, to determine the learning model that gives a better effect, hypothesis test to learn mathematics achievement data using one way analysis of variance using different cell with a significance level of 0.05.

Here's a summary of the results of tests of balance toward learning mathematics achievement data.

Source	JK	dk	RK	F _{obs}	F _α	p
Learning Materials (A)	1284.1119	2	642.0559	11.2019	3.07	<0,05
Error (G)	6476.8105	113	57.3169	-	-	-
Total	7760.9224	115	-	-	-	-

Based on the above table, obtained with $F_{0.05, 2, 113} = 3.07$. Since F_{obs} lies in the area of criticism, then H_0 is rejected. This means that the STAD group, TPS, and Conventional have different achievements.

Because H_0 is rejected, it is necessary to test multiple comparisons between cells. Multiple comparison test is only performed on the independent variables that have more than two categories, while the independent variables that only have two categories do not need to do multiple comparison test.

Comparison Test	$F_{i-.j}$	$2F_{0.05;2;113}$	Decision Test
Stad and TPS	6.4023	6.14	H_0 rejected
STAD and Conventional	22.3793	6.14	H_0 rejected
SMT and Conventional	4.7009	6.14	H_0 not rejected

Based on the above table can be concluded as follows

- STAD model is better than TPS learning model
- STAD model is better than conventional learning models
- There is no difference between the conventional learning model and TPS learning model

CONCLUSION AND SUGGESTION

Based on the research results, it can be concluded that STAD learning model-based AfL is more effective than TPS learning model-based AfL and conventional learning model, as well as TPS learning model-based AfL is better than conventional learning model.

REFERENCES

- Budiyono. 2010. Peran Asesmen Dalam Peningkatan Kualitas Pembelajaran. Makalah disajikan dalam Seminar Nasional Pendidikan Matematika, Universitas Sebelas Maret, tanggal 5 Mei 2010.
- Clarke, S. 2005. *Formative assessment in the secondary classroom*. London: Hodder Murray.
- Dees, Robert L. 1991. “*The Role of Cooperative Learning in Increasing Problem Solving Ability in a College Remedial Course*”. Journal for Research in Mathematics Education.
- Erman Suherman, dkk. (2001). Strategi Pembelajaran Matematika Kontemporer. Bandung: JICA.
- Ibrahim, M dkk. 2000. “Pembelajaran Kooperatif”. Surabaya: University Press.
- Lie, Anita. 2002. Mempraktekkan Cooperative Learning di Ruang-ruang Kelas. Jakarta: Grasindo.
- Mas’ud Hasan Abdul Qohar. 1983. Kamus Ilmu Populer. Jakarta: Bintang Pelajar.
- Maasz, J. 2005. A New View of Mathematics Will Help Mathematics Teachers. Adults Learning Mathematics International Journal. Vol. 1 (1). pp. 6–18.
- Purwoto. 2003. Strategi Pembelajaran Mengajar. Surakarta: UNS Press.
- Roestiyah N.K. 2001. Strategi Belajar Mengajar. Jakarta: Rineka Cipta.
- Sagala, Syaiful, 2009, Konsep dan Makna Pembelajaran Untuk Membantu Memecahkan Problematika Belajar dan Mengajar. Bandung: Alfabeta.
- Slameto. 1992. Belajar dan Faktor-faktor yang Mempengaruhinya. Jakarta: Rineka Cipta.
- Slavin. 2008. Cooperative Learning Teori, Riset, dan Praktik. Bandung: Nusa Media.
- Trianto. 2007. Model-model Pembelajaran Inovatif Berorientasi Konstruktivistik. Surabaya: Prestasi Pustaka.
- Widodo. 2000. Kamus Ilmiah Populer. Yogyakarta: Absolut.
- Winkel, W.S. (1996). Psikologi Pengajaran. Jakarta: Grasindo.