A Journal of Language, Literature, Culture, and Education
POLYGLOT Vol. 12 No. 1 January 2016

A Comparison of STAD and Drill Strategy in Increasing Grade V Students' Cognitive Achievement on Ratio

Dorothy Rimba
Mahasiswa Jurusan Pendidikan Matematika, FIP-Universitas Pelita Harapan
ald.dorothy@gmail.com

Dylmoon Hidayat
Program Studi Pendidikan Matematika, Fakultas Ilmu Pendidikan,
Universitas Pelita Harapan
dylmoon.hidayat@uph.edu

ABSTRACT

This research was aimed to know whether grade V students' cognitive achievement could increase using STAD and drill strategy. This research was also aimed to compare STAD and drill strategy in order to increase grade V students' cognitive achievement on ratio in learning mathematics. The design of this research was a pretest-posttest two-group design. The sampling technique was a simple random sampling. The descriptive statistics and non-parametric statistics were used to analyze the data. Using SPSS, the result showed that the grade V students' cognitive achievement on ratio increased after studying mathematics using STAD and drill strategy. However, there was no significant different between STAD and drill strategy in increasing grade V students' cognitive achievement on ratio. Therefore, the grade V students' cognitive achievement in both classes increased at similar level using STAD and drill strategy.

Keywords: *STAD, drill strategy, cognitive, achievement, ratio, pretest-posttest, design*

INTRODUCTION

Teachers have an important role in learning activities at school. They are the dominant determinant in education since learning activities are the core of educational process as a whole (Rusman, 2012, p. 58). The teacher may help the

lower students using effective teaching strategy for increasing cognitive achievement. A strategy is "a plan of operation achieving something" (Sanjaya, Strategi Pembelajaran Berorientasi Standar Proses Pendidikan, 2006, p. 125). A strategy must be arranged according to a specific purpose because a strategy for one thing is sometime different from that of others (Sanjaya, Strategi Pembelajaran Berorientasi Standar Proses Pendidikan, 2006, p. 129). The teacher should know effective teaching strategy to help the students get a good cognitive achievement. By using a right teaching strategy, the teacher may help the lower students in mathematics to understand the material easier and pass the standard minimum grade.

There are many teaching strategies that the teacher can use to achieve the goal in cognitive aspect, for examples drill strategy and cooperative teaching. Drill strategy is a strategy with teacher-centered approach because the teacher explains the material and guides the students in practicing directly. Tom V. Savage, Marsha K. Savage, & David G. Armstrong (2006, p. 233) found that a direct instruction, a strategy that uses teacher-centered approach, has improved cognitive skills of the students dramatically through Project Follow Through, completed in the 1970s, involved 79,000 students in 80 communities. On the other hand, "Marzano and Associates, in their summary of various meta-analyses of nearly a thousand research studies, found dramatic increases in achievement to the extent teachers used cooperative learning" (Kagan & Kagan, 2009, p. 1.4). This opens up question to discuss which one is better on increasing students' cognitive achievement, cooperative learning or drill strategy. The researchers decided to implement Student Teams-Achievement Divisions, one of the methods of cooperative teaching, because STAD is the simplest method of cooperative learning so the beginner teachers can implement STAD easily (Ismail et al., 2008, p. 3.23). Thus, the researchers wanted to compare STAD and drill strategy on grade V students' cognitive achievement.

According to background of the study, the statements of the problem in this research are:

1. Did the grade V students' cognitive achievement increase after studying mathematics using STAD?
2. Did the grade V students' cognitive achievement increase after studying mathematics using drill strategy?
3. Was there a difference between STAD and drill strategy in increasing grade V students' cognitive achievement?

Student Teams-Achievement Divisions (STAD)

Student Teams-Achievement Divisions (STAD) is one of cooperative teaching methods that places the students in a heterogeneous team that contains the students from difference academic performance, gender, and tribe (Slavin, 2005, p. 144). In STAD, teacher is a facilitator who builds the bridge of knowledge so students can achieve higher understanding (Rusman, 2012, p. 201). Students are directed to find their own ideas and experience the process of concept understanding in the learning activity. The students will study in group or team in order to discuss and achieve higher understanding.

According to Rusman(2012, pp. 215-216), there are six steps of STAD. The first step is the teacher tells about the learning objective and motivations. The second step is the teacher divides the students into a heterogeneous group that contains 4-5 students. The third step is the teacher presents the lesson material. The fourth step is the learning activities in a team (teamwork). In this step, the students will solve the worksheet and the teachers will observe, provide guidance, encouragement, and support when students need it. The fifth step is quiz or evaluation. After that, the teacher will evaluate the students' learning result in cognitive. Each of the students has responsibility for themselves and their group. The last step is team achievement awards. The team will receive award according to certain criteria that have been determined.

Drill Strategy

"Drill strategy is a strategy in which a piece of knowledge or skill is practiced until mastery is achieved" (Barry & King, 2006, p. 186). One of the strengths of drill strategy is the students acquire mental skills such as multiplication, addition, subtraction, symbols, etc. (Djamarah & Zain, 2006, p. 96). Because of that, mathematics teachers often use drill strategy to teach mathematics in the classroom. The students should become an individual learner in drill strategy.

There are some steps in implementing drill strategy (Barry & King, 2006, pp. 186-189). First, the teacher explains the learning objectives and all the material directly. The teacher also checks the students' understanding and emphasizes the difficult parts in solving problems. Then, each of the students will solve the worksheet by themselves. But the teacher will help them directly if they do not understand how to solve it. After the students have finished the worksheet, the teacher will check and give correction if the students' answer is

incorrect. Preferably the students check the answers by themselves according to teacher's instruction. The students will know their mistakes directly from the teacher so they can correct it soon.

Cognitive Achievement

"Cognitive achievement is the student's ability to master a set of skills or to acquire basic information enabling him or her to thoroughly grasp the subject being studied" (Galyean, 1979, p. 122). According to a revision of Bloom's taxonomy, there are six categories in cognitive aspect (Anderson & Krathwohl, 2001, pp. 67-68). The first category is *remember*. In this category, the students are required to recall interrelated knowledge from long-term memory. The second category is *understand*. In this category, the students are required to build meaning from instructional messages, including oral, written, and graphic communication. The third category is *apply*. In this category, the students are required to implement or use a method in a certain condition. The fourth category is *analyze*. In this category, the students are required to breakdown material into its component parts and define how the connection of those parts with one another and to a whole structure or purpose. The fifth category is *evaluate*. In this category, the students are required to make a judgment based on criteria and standards. The last category is *create*. In this category, the students are required to put parts together to arrange a comprehensible or rearrange parts into new pattern or structure.

RESEARCH METHOD AND DESIGN

This research was a quantitative (experimental) research because experiment is the right method to know the effect of certain treatment to the other (Sugiyono, Metode Penelitian Pendidikan: Pendekatan Kuantitatif,Kualitatif dan R&D, 2008, p. 34). According to Borg and Gall, a design that has high validity to compare two groups of study that has formed in education research is a pretest-posttest two group design (Fahyudin, Liliasari, Sabandar, & Martoprawiro, 2015, p. 36). In order for the design works, the groups were not significantly different in the pretest result (Sugiyono, Metode Penelitian Pendidikan: Pendekatan Kuantitatif,Kualitatif dan R&D, 2008, p. 113). It was expected that the posttest showed a significant different result after they study using different teaching methods.

The independent variables in this research were STAD and drill strategy and the dependent variable was a cognitive achievement. The design of this research was shown in the table below.

Group of Study	Pretest	Teaching Method	Posttest
Class A	O_1	STAD	O_2
Class B	O_3	Drill Strategy	O_4

The population in this research was all grade V students in SDK ABC Batam. The total of grade V students from two parallel classes was 47 students. There were 23 students from class A, consisting of 13 female and 10 male. In class B, there were 24 students consisting of 14 female and 10 male. The technique of sampling that was used in this research was probability sampling, which was a simple random sampling. The researchers chose 18 students of class A and 18 students of class B as the sample of this research. Based on the result of pre-test It showed that there was no significant different between the results of pretest in class A and the result of the pretest in class B (Mann-Whitney U test, $p>0.05$).

Instrument

The researchers used a written test as the instrument in this research to analyze students' cognitive achievement before and after they studied using different teaching methods. The cognitive achievement variables were measured using three indicators of the Bloom's taxonomy which is C1 (remembering), C2 (Understanding), and C3 (applying). The cognitive achievement agreed with the learning objectives that have been determined by the curriculum. The total number of problems was 12 problems for the pretest and 12 problems for the posttest. Each problem had a different score based on the difficulty level. The total score was 45 for each test and in the statistics computation this score was converted to 100. Based on the tryout result of this instrument, the instrument was sufficiently reliable with Alpha Cronbach's coefficient was 0.883. The overview of final instrument can be seen in the table below.

No Item	Indicator	Score
1	Students are able to interpret ratio a : b anda :b : c exactly,	3
2	where a, b, and c are the whole number.	4
	C3 level (Applying)	

3	Students are able to recognise and find up to 3 equivalent ratios of two or three given quantities. C1 level (Remembering)	3
4	Students are able to express a ratio in its simplest form of two or three given ratios exactly. C2 level (Understanding)	4
5 6	Students are able to find the ratio of two or three given quantities correctly. C2 level (Understanding)	3 3
7 8	Students are able to find the missing term in a pair of equivalent ratios. C1 level (Remembering)	2 4
9 10	Students are able to find one quantity given the other quantity and their ratio. C3 level (Applying)	4 4
11 12	Students are able to solve up to 2-step word problems involving ratio. C3 level (Applying)	5 6

Individual Group Results

In class A, the average of students' score in the pretest was 12.35 and the average of students' score in posttest was 67.65 so there was an increasing in the average score of 55.30 in a class A. Based on the result of Wilcoxon's matched pairs test, the null hypothesis: "there was no different cognitive achievement from pretest to posttest" is rejected (p=0.00). It means that the mean score of students' cognitive achievement in class A after studying using STAD was significantly greater than the mean score of students' cognitive achievement in the pretest.

In class B, the average of students' score in the pretest was 14.81 and the average of students' score in posttest was 75.06 so there was an increasing in the average score of 60.25 in a class B. Based on the result of Wilcoxon's matched pairs test, then the null hypothesis: "there was no different cognitive achievement from pretest to posttest" was also rejected. It means that the mean score of students' cognitive achievement in class B after studying using drill strategy was greater than the mean score of students' cognitive achievement in the pretest.

Comparing the Two Groups

The previous results showed that both of the groups got a significant cognitive achievement from pretest to posttest scores. Based on the calculation of the students' posttest result, the average of students' score in posttest was 67.65 on class A and the average of students' score in posttest was 75.06 on class B. This study is to see whether the mean of the posttest result in class A is the same (or one was higher than the other) as the mean of the posttest result in class B. The researchers wanted to compare the result of the students who studied using STAD and the result of the students who studied using drill strategy. Based on the result of Mann-Whitney U test, then the null hypothesis: "there was no different cognitive achievement between the posttest scores in both group" was not rejected (p=0.326).

DISCUSSION

The grade V students' cognitive achievement increased after studying mathematics using STAD. There were factors that influence this result, one of them was the lower students were helped by the others students in learning the material. According to Eggen & Kauchak (2007, p. 31), one of the principles that support the development of students is social interactions. The students in class A had interaction with their friends during teamwork so they could learn to look at problems from the standpoint of their friends that might be different from their viewpoint. They could share, compare, clarify, and increase their knowledge. The students also were enthusiastic about learning mathematics because the material was so applicable in their lives. They also had the motivation to make their team became the super team. Eggen & Kauchak (2007, p. 300) said that students will give an effort to understand the material if they have motivation-to-learn orientation whether or not the topics basically exciting or the method of studying is fun. Thus, the students tried hard to finish the worksheet as soon as possible. Therefore, the students' cognitive achievement in class A increased. But there was a factor that might cause the students' cognitive achievement significantly increased, which was the grade V students studied the ratio for the first time. They only had a little prior knowledge about the ratio; even there was a student who did not have any prior knowledge of the ratio so she could not answer the problems in the pretest correctly at all. After they studied the ratio for the first time, their knowledge about ratio increased so it might cause their score increased significantly. Therefore, in addition to STAD, the significant increasing of students' cognitive achievement in class A might be also influenced by learning experience factor.

The grade V students' cognitive achievement increased after studying mathematics using drill strategy. This result was influenced by some factors. One of the factors was the students were familiar with the problems in posttest because they were asked by the teacher to solve the similar problems repeatedly during drill section. Slavin (2006, p. 184) said that the students require automaticity besides of the existence of reading or other skills in long term memory. Automaticity is "a level of rapidity and ease such that a task or skill involves little or no mental effort" (Slavin, 2006, p. 184). Thus, they required automaticity through practice repeatedly so they knew how to solve the problems in posttest automatically. Their arithmetic operations also became more accurate because they did the exercise over and over again. It was appropriate with one of the strengths of drill strategy, which is the student can increase the accuracy in solving the problems using drill strategy (Djamarah & Zain, 2006, p. 96). The students also knew about their usual mistakes in solving problem because the teacher has explained it directly when the teacher saw students' mistakes in drill section. Therefore, these factors had the contribution to increase students' cognitive achievement in class B. However, there was a factor that might cause the students' cognitive achievement in class B increased dramatically. That factor was the students in class B learned about the ratio for the first time same as the students in class A so their cognitive about ratio increased. Therefore, in addition to drill strategy, the significant increasing of students' cognitive achievement in class B might be also influenced by learning experience factor.

Ismail et all (2008, p. 3.3) said that one of the weaknesses of STAD is some students tend to depend on others in finishing the exercises. It had sometimes happened during the research in class A. Based on the researcher's observation during the experiment, some of the students of class A just waited for their friend in solving the problems on the worksheet. If the smart student in a team went to the toilette, the others just played while waited for their friend back. The students with high ability in mathematics usually dominated teamwork. Because of that, the teacher came to their table and asked them to try in solving the problems on the worksheet. So they tried to work on the worksheet without waited for their friend from the toilette. Therefore, the teacher had to pay more attention to each group when teamwork so there was no team that just played and talked out of the lesson.

The students in class A also had to adapt first with their friend in a team and to help them during the teamwork. Some students of class A did not want to help or ask their friends in a team. The teacher had to remind them

repeatedly that they should help their friends in a team because they had the same purpose as a team. The teacher also had to remind them that they should ask their friends in a team first before they asked to the teacher.

However, the students in class A were better than the students in class B in the activeness and interaction with the other students. The students in class B tended to be passive because the teacher would tell all the material and how to solve the problems directly. The students in class B did not need to do discussion with their friends to know their mistakes because the teacher would explain the parts of their mistakes directly. In the other side of the students in class B, the students of class A had to check their mistakes by comparing and discussing their answers with their friends' answers. Therefore, the students in class A were better than the students in class B in the activeness and interaction with their friends.

The students of class B might be also bored because they solved the problems on the worksheet repeatedly. Some of the students in class B would sigh and complain when teachers asked them to do the worksheet again. Once, there was a student who came to the teacher and said that she wanted to learn mathematics using STAD like her friends in class A. She said that STAD was more fun than drill strategy. This situation was appropriate with one of the weaknesses of drill strategy which is drill strategy become dull aimless and boring because the students solve the similar problems (Barry & King, 2006, p. 187). The teacher usually put the name of the students as a subject in a problem so they would laugh when they saw the problems on worksheet. But they still felt that drill section was boring.

CONCLUSION

Based on the result of the pretest and the posttest in each class, the grade V students' cognitive achievement increased in the class using STAD and the class using drill strategy. However, there was no different between students' cognitive achievement in both classes.

REFERENCES

Anderson, L. W., & Krathwohl, D. R. (2001). *A Taxonomy for Learning, Teaching, andAssessing.* New York: Addison Wesley Longman.

Barry, K., & King, L. (2006). *Beginning Teaching and Beyond (3 ed.).* Sydney: 2006.

Djamarah, S. B., & Zain, A. (2006). *Strategi Belajar-Mengajar.* Jakarta: Rineka Cipta.

Eggen, P., & Kauchak, D. (2007). *Educational Psychology: Windows on Classroom (7 ed.).* Upper Saddle River: NJ: Pearson Prentice Hall.

Fahyudin, Liliasari, Sabandar, J., & Martoprawiro, M. A. (2015, February). Perbandingan Metode Kolaborasi dengan Contoh Tugas dan Belajar Individual dalam Pengembangan Kemampuan Pemecahan Masalah Kimia. *Cakrawala Pendidikan, 34*, 34-46.

Galyean, B. (1979). A Confluent Approach to Curriculum Design. *Foreign Language Annals, 12*(2), 121–127. Retrieved January 21, 2016, from http://dx.doi.org/10.1111/j.1944-9720.1979.tb00155.x

Ismail et al. (2008). *Pembaharuan dalam Pembelajaran Matematika.* Jakarta: Universitas Terbuka.

Kagan, S., & Kagan, M. (2009). *Kagan Cooperative Learning.* San Clemente: Kagan Publishing.

Rusman. (2012). *Seri Manajemen Sekolah Bermutu: Model-Model Pembelajaran (2 ed.).* Jakarta: Rajawali Pers.

Sanjaya, W. (2006). *Strategi Pembelajaran Berorientasi Standar Proses Pendidikan.* Jakarta: Prenada Media Group.

Savage, T. V., Savage, M. K., & Armstrong, D. G. (2006). *Teaching in the Secondary School (6 ed.).* USA: Pearson Merrill Prentice Hall.

Slavin, R. E. (2005). *Cooperative Learning: Teori, Riset dan Praktik.* Bandung : Nusa Media.

Slavin, R. E. (2006). *Educational Psychology: Theory and Practice (8 ed.).* Boston: Pearson Education, Inc.

Sugiyono. (2008). *Metode Penelitian Pendidikan: Pendekatan Kuantitatif, Kualitatif dan R&D.* Bandung: Alfabeta.