

The Effect of Reciprocal Peer Tutoring Strategy to Students' Mathematics Performance

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ABSTRACT

This study focused on the effect of reciprocal peer tutoring strategy in teaching rational algebraic expressions to the mathematics performance of the Guindulungan National High School students. There forty (40) Grade 8 students who were randomly selected as the subjects of the study. A Quasi-experimental research design was employed in this study. Pre-test and post-test questionnaire on rational algebraic expressions was used as the main instrument of the study. Quantitative analysis on both pre-test and post-test scores of the students were made using this method. The simple frequency and percentage counts were used to analyze the students' performance before and after the reciprocal peer tutoring strategy was introduced. t-test was utilized to determine the significant difference between the students' performance in mathematics before and after the reciprocal peer tutoring strategy. This test was set at 5% level of significance. The minimum t-value of -1.665 was used to determine the significance of the test. The results revealed that there is a significant increase in the students' mathematics performance in learning rational algebraic expressions using reciprocal peer tutoring strategy. This means that reciprocal peer tutoring strategy is effective in increasing students' mathematics performance.

KEYWORDS

mathematics performance; reciprocal peer tutoring; rational algebraic expression

INTRODUCTION

The way how a teacher or the teaching strategy used in teaching a concept or procedure can affect in the attainment of the learning outcomes. Teaching strategy is the careful plan designed by the teacher as to how he can impart the knowledge to his students. It can be the main tool of a teacher to achieve objective he has set forth for a lesson.

Acquiring facts and information and imparting them to the learners is a tremendous task of a teacher. Furthermore, a strategy used by the teachers is very important to meet the goals and objectives of the teaching-learning process. The methods will guide the teachers in orderly routine, which will accomplish certain definite results. Teaching strategies to be used in a classroom need to be selected carefully in order to contribute most effectively to student learning. Stone and Morris (1972) as cited in Isaac (2010) describe teaching strategy as a generalized plan for a lesson which includes structure, instructional objectives and an outline of planned tactics, necessary to implement the strategies. The strategy should state the behavioral objectives that would eventually describe the observable behavior of his students after performing the task of teaching.

Research-based teaching strategies have far more impact than others (Killian, 2014). Thus effective teachers are always on the prowl for new and exciting teaching strategy that will help their student be motivated and engaged (Cox, 2019). One of these new and exciting strategies is the Peer Tutoring Strategy. Peer tutoring is an instructional strategy that consists of student partnerships, linking the higher performing student to the lower performing student. Typically, the higher performing students were paired with the lower performing ones. There are several kinds of Peer Tutoring Models such Class Wide Peer Tutoring, Cross-age Peer Tutoring, Peer Assisted Learning Strategy, Reciprocal Peer Tutoring and Same-age Peer Tutoring.

Reciprocal Peer tutoring strategy is a strategy that can be used in grouping the class into pairs where one is a higher performing student and the other one is a lower performing student. Each student will be paired to another student, satisfying the aforementioned condition and follow instructions given by their teacher. After this, students will be given problems to be solved together with their partners. They will be given time to discuss with their partners how to solve the problem and vice versa. Both students in a peer tutoring pair participate and play the roles of being a tutor and a tutee.

Reciprocal peer tutoring is suitable for a heterogeneous group of learners. A mix of fast, average and slow learners will be advantageous in applying this teaching strategy. This arrangement can be observed at Guindulungan National High School. This allows active participation of the learners and each of them learns from his classmate. More importantly, students learn to collaborate and communicate in mathematics. Thus developing their social skills. Furthermore, the designed activities in this strategy promote critical thinking and creativity. It can lead to an increase in the students' performance in mathematics.

Many students are struggling in learning rational algebraic expressions. This is one of the most difficult topics in mathematics. Though it is not surprising since the concepts on rational algebraic expressions need a strong foundational knowledge in fractions. Difficulty in learning fractions is a global issue in mathematics educations. Rational algebraic expression is a complex extension of fractions.

Thus, this research was conducted to determine the effects of peer tutoring strategy in teaching rational algebraic expressions to the Guindulungan National High School Grade 8A students' performance.

RESEARCH METHODS

The study used the quasi-experimental looking into the effects of reciprocal peer tutoring strategy to students' performance on rational algebraic expressions. This is a one-group pre-test-post-test design. This has helped in determining whether the use of Reciprocal Peer Tutoring Strategy has effects on the mathematics performance of the Grade 8 students of Guindulungan National High School.

The subjects of this study were Grade 8-A students of Guindulungan National High School at Guindulungan, Tambunan II, Maguindanao. Complete enumeration was attempted to collect the necessary data. There was a total of forty-three (43) Grade 8A students. However, three (3) of them were not present during the pre-test administration. Thus, only forty (40) students were considered to be the subjects of this study. These subjects were chosen since the concepts of rational algebraic expressions are introduced in the eighth grade. At the same time they are heterogeneously grouped, and this is a requirement in using the reciprocal peer tutoring strategy.

Before administering the pre-test questionnaire, a brief introduction of the nature of the study was done to inform the students on their part in the study. Afterwards, the researchers distributed the questionnaires to all forty (40) students and allowed them to answer the said

questionnaire for an hour. Since this is a one-group quasi-experimental design, the intervention started a day after administering the pre-test questionnaire. The researchers then took their part in teaching students the concepts of rational algebraic expressions using reciprocal peer tutoring strategy. The researchers grouped the students by pairs and taught the concepts of rational algebraic expression using reciprocal peer tutoring strategy on the following days. They have designed lessons involving mathematical tasks that are appropriate to this strategy. The intervention took for two weeks. Post-test is given after the intervention.

The study used the pre-test and post-test questionnaire as an instrument. The questions were based on the concepts of rational algebraic expressions. The pre-test and post-test questions were formulated by the researchers and were sent for validity checking to some experts in mathematics education and measurement and evaluation for comments and suggestions. A table of specifications, a test blueprint was prepared by the researcher in constructing the instrument. The questionnaire consists 30 items involving rational algebraic expressions.

The simple frequency and percentage counts were used to analyze the students' performance before and after the reciprocal peer tutoring strategy was introduced. t-test was utilized to determine whether a significant increase exists between the students' performance in mathematics before and after the reciprocal peer tutoring strategy. This test was set at 5% level of significance. The minimum t-value of -1.66 was used to determine the significance of the test.

RESULTS AND DISCUSSION

In this section, students' performance on rational algebraic expressions before and after the use of peer tutoring strategy are displayed. Also, the comparison of the students' performances using *t*-test is presented.

Table 1 shows the students' performance on rational algebraic expressions before the use of reciprocal peer tutoring strategy.

Table 1. Pre-Test Scores Distribution of Students in Terms of Rational Algebraic Expressions

Score	Description	Frequency	Percentage
49 – 60	Excellent	0	0.00
37 – 48	Very Good	0	0.00
25 – 36	Good	2	5.00
13 – 24	Very Satisfactory	26	65.00
1 – 12	Satisfactory	12	30.00
Mean = 15.70	(Very Satisfactory)	n = 40	100.00
Highest Score = 32		Lowest Score = 8	

Table 1 shows the students' pre-test scores in terms of rational algebraic expressions. It can be noted that none among the students who scored 37 – 48 and 49 – 60. It shows that the highest score obtained is 32 and the lowest score obtained is 8 out of 60 items. This can be alarming since 32 is very slightly higher than half of 60. This follows also that the rest of the students scored even lower than 32.

Out of 40 students, twelve (12) or 30% of the students got scores ranging from 1 to 12 which are described as very satisfactory. This means that some of the students have difficulties solving rational algebraic expression or they might have little understanding of the concept, especially in factoring. It also shows that twenty-six (26) or 65% of the students

obtained scores ranging from 13 to 24. This is more than half of the total number of students. These students are performed “Very Satisfactory” in rational algebraic expressions.

There are also two (2) or 5% of the students reached the scores ranging from 25 to 36. These scores are categorized as “Good”. This implies that there are only 2 students who have better understanding on the rational algebraic expressions.

Overall, the table shows that the mean score of the Grade 8-A students in rational algebraic expressions is 15.70 and it was described as “Very Satisfactory”. This figure is really low and this can be because students from this group are heterogeneous and that the teaching strategy being used cannot cater this heterogeneity. Thus, it is important that teachers consider learners’ differences. And finding a suitable teaching strategy can be a response to this problem.

Similar to Table 1, the following table, Table 2, displays the students’ performance on rational algebraic expressions after the use of reciprocal peer tutoring strategy.

Table 2. Post-Test Scores Distribution of Students in Terms of Rational Algebraic Expressions

Score	Description	Frequency	Percentage
49 – 60	Excellent	0	0.00
37 – 48	Very Good	8	20.00
25 – 36	Good	23	57.50
13 – 24	Very Satisfactory	9	22.50
1 – 12	Satisfactory	0	0.00
Mean = 30.65	(Very Satisfactory)	n = 40	100.00
Highest Score = 46		Lowest Score = 20	

Table 2 shows the students’ post-test scores in learning rational algebraic expressions after the reciprocal peer tutoring strategy was employed. The table shows that the highest score obtained was 46 and the lowest score was 20 out of 60 items. This tells us further that the highest score is slightly higher than 75% of the total score while the lowest score is 33.33% of the total score.

As presented in table 2, out of 40 students, none of the students have reached scores ranging from 49 to 60. This is also the same with the score range 1 – 12. It can be noted that only nine (9) or 22.5% of the students got scores ranging from 13 to 24, which was described as “Very Satisfactory”. This means that a few number of students have a very satisfactory performance in solving problems related to rational algebraic expressions. On the other hand, most of the students have scores ranging from 25 to 36. There are twenty-three (23) or 57.5% of the students who obtained these scores. It means that more than half of the students have a good performance in rational algebraic expressions. Furthermore, this also implies that these students have a good understanding of the concept. There are also eight (8) students or 20% reached the scores ranging from 37 to 48 which were described as “Very Good”. This simply implies that only 8 students have improved their mathematical skills in solving rational algebraic expression especially in factoring rational algebraic expressions.

The mean score after the use of peer tutoring strategy was 30.65. This has a qualitative description of “Good”. This reveals that, on the average, students’ performance on algebraic expression after the intervention have increased. This also implies that almost all of the students have improved and performed better in solving rational algebraic expressions. One of the reasons can be because of collaborative learning generates higher level of reasoning and creates more perspectives than learning individually. Utley and Mortweet (1997) emphasize that relations among learners affect classroom behavior. That is reciprocal

interactions among and between students. When there exists a positive classroom behavior academic skills of the students will also follow.

This supports the notion of Menesses and Gresham (2009) that previous research has documented the benefits of peer tutoring, including the acquisition of academic skills, enhancement of peer-relations and improved classroom behavior. Thus, it follows that after the use of reciprocal peer tutoring strategy, peer relation among students is enhanced. This may be because of the process associated with this reciprocal peer tutoring strategy. Students are grouped by two or more and are trained to work together on a specific classroom task. Through this teaching strategy, students work collaboratively together, keep track on their progress and assess each other performances (Henson & Hagos, 2009).

Lastly, Table 3 shows the compared variables with their corresponding sample mean and standard deviation. The computed *t*-value of students' performance on rational algebraic expression before and after the use of reciprocal peer tutoring strategy the most important figure in this table.

Table 3. Comparison of Students' Pre-Test and Post Test Score Distribution in Terms of Rational Algebraic Expressions

Compared Variables	Size, <i>n</i>	Mean, \bar{X}	Standard Deviation, <i>s</i>	Computed <i>t</i> -value	Description
Pre-Test Scores	40	15.70	5.095	-12.094*	Significant
Post-Test Scores	40	30.65	6.934		

* = significant at 5% level if the computed *t*-value is less than or equal to -1.665.

The mean score of pre-test and post-test results are 15.70 with a standard deviation of 5.095 and 30.65 with a standard deviation of 6.934 respectively. It can be noticed that the post-test mean score is greater than that of the pre-test mean score. However, it can also be seen that based on the sample standard deviations, post-test scores are slightly dispersed than the pre-test scores. This is because the post-test standard deviation is slightly greater than the pre-test standard deviation.

The computed *t*-value between the pre-test and post-test scores is -12.094. Since -12.094 is less than the critical *t*-value -1.665, then there is an enough evidence to support the claim that there is a significant increase between the students' performance on rational algebraic expressions before and after the use of reciprocal peer tutoring strategy. This further implies that the said strategy is effective on increasing students' performance on rational algebraic expressions. This result agrees with some research findings conducted in studying the effectiveness of reciprocal peer tutoring strategy on students' performance. For example, Allen (2003), had found significant improvement in the subjects' achievement after being taught using reciprocal peer tutoring strategy.

CONCLUSION

The use of peer tutoring strategy to eight-grade students has significantly improved. This implies that reciprocal peer tutoring strategy is effective in increasing students' performance on rational algebraic expressions. This research finding can contribute to the culture of the effectiveness of the strategy.

Also, the finding in this study suggests that students need to be given group activities that allow them to share ideas and evaluates these ideas. This demands that the teacher should not only focus on how to deliver the lesson, but more importantly, how students' can actively participate in learning the concept. Thus, mathematics teachers may utilize this strategy in improving students' mathematics performance. They may try employing this strategy in different topics in mathematics. Since reciprocal peer tutoring is one of the peer tutoring

strategies, teachers can also conduct a similar study using other peer tutoring strategies such as class wide peer tutoring, cross-age peer tutoring, peer assisted learning, and same-age peer tutoring. Collaboration is one of the 21st century skills and reciprocal peer tutoring strategy can be a powerful tool in acquiring this skill. The ‘helpless’ feeling students have when doing mathematical tasks can be lessened, if not eradicated.

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