

Effectiveness of Reward System on Assessment Outcomes in Mathematics

May Semira Inandan*

College of Teacher Education-Graduate School, Batangas State University-The National Engineering University, 4200, Batangas City, Batangas, Philippines

*Corresponding author: May Semira Inandan, may.inandan@deped.gov.ph, yamzsemira@gmail.com

Copyright: © 2023 Author(s). This is an open-access article distributed under the terms of the Creative Commons Attribution License (CC BY 4.0), permitting distribution and reproduction in any medium, provided the original work is cited.

Abstract: As assessment outcomes provide students with a sense of accomplishment that is boosted by the reward system, learning becomes more effective. This research aims to determine the effects of reward system prior to assessment in Mathematics. Quasi-experimental research design was used to examine whether there was a significant difference between the use of reward system and students' level of performance in Mathematics. Through purposive sampling, the respondents of the study involve 80 Grade 9 students belonging to two sections from Gaudencio B. Lontok Memorial Integrated School. Based on similar demographics and pre-test results, control and study group were involved as participants of the study. Data were treated and analyzed accordingly using statistical treatments such as mean and *t*-test for independent variables. There was a significant finding revealing the advantage of using the reward system compare to the non-reward system in increasing students' level of performance in Mathematics. It is concluded that the use of reward system is effective in improving the assessment outcomes in Mathematics. It is recommended to use reward system for persistent assessment outcomes prior to assessment, to be a reflection of the intended outcomes in Mathematics.

Keywords: Mathematics; Reward system; Assessment outcomes

Online publication: September 26, 2023

1. Introduction

Teachers now confront stringent accountability requirements and a standard-based curriculum as a result of legislation, political demands, and high-stakes testing. Teachers, administrators, community members, and legislators want to ensure that students obtain high-quality education. However, dependence is one of the factors that has forced many educators to concentrate on teaching students who can satisfy a minimal pre-established competency criterion.

The goal of rewards is to increase student motivation, which is responsible for low student achievement. Students with learning disabilities usually lack motivation since they consistently perform poorly in school. These students frequently claim that if they would simply try more, they would do better on tests, take more risks, or achieve better grades. When rewards are given, they usually have the opposite effect of what was intended. Students who are personally motivated accomplish highly. To provide a decent education while

adhering to strict political standards, teachers must continually train students to become organically motivated.

It is critical to understand that these incentive programs should be reliable, equitable, and inspiring and motivating kids. In the classroom, rewards are a sort of extrinsic incentive that students can utilize to encourage cooperation in academic and social learning contexts.

For students, mathematics classes are frequently a stimulating subject that prove higher thinking skills. Since it deals with numbers and numeracy, mathematics is seen as a challenging subject. The formulas that must be employed to solve a problem are another issue that students face. Students frequently struggle to understand mathematics concepts and solve mathematical problems. Therefore, they tend to avoid assessment in Mathematics. With this hindrance in assessment outcomes, reward system tends to strengthen the attitude of students toward learning, this must be taken into account to ensure the best possible learning outcomes for all students. A successful learning process should be one that considers the traits of the students as they are demonstrated by their learning attitudes.

Rewards should not be the emphasis of learning in instruction that is centered on the student's intrinsic motivation. Instead, rewards should be secondary to the student's interest in what they are learning. There is more control over learning so that students have more self-esteem. With this fundamental perspective, teachers must receive instruction on how to instruct students so that they develop intrinsic motivation rather than being driven by the idea of the next external reward. It is essential to encourage students to think for themselves as decision-makers and to foster an independent learning environment in the classroom. Teachers must also have a sense of control over the material they are going to teach, how they are going to teach it, and how they are going to teach the students to have control over the material ^[1].

Providing students feedback while they are learning is one method associated to learning goals. With evaluations, it is possible to identify the discrepancy between a desired target and the actual knowledge, skills, and abilities of a student. Any assessment that involves a target standard, goal, or criteria attempts to reach a conclusion ^[2].

This would call for a student to respond to a certain number of formative evaluations in the context of formative assessments. Instead of measuring accuracy for those evaluation events, this quantity incentive would count the number of participants. Using a golf analogy, this score corresponds to how many holes were completed within the allocated time, regardless of the number of strokes used. Students who are trying to "game" the prize can answer the questions in a random manner and still be eligible for the full reward. It is recommended that rewards for educational settings emphasize both completion and excellence. Extrinsic rewards have long been proven to be effective in the classroom ^[3].

Students' motivation to learn is increased by rewards in both biological and psychological ways. A lack of motivation among students may be the cause of their low academic performance. Students who receive poor grades are unhappy and unsure of how to turn things around. Without assistance, they might feel less driven to discover answers, which would result in continued underperformance.

Students do better when the teacher makes suggestions for raising grades and rewards them when they succeed. Reward is a desirable thing for students, according to a longitudinal study by researchers at the University of Illinois. It can act as an external reinforcement to boost students' motivation to finish tasks and retain good marks. Additionally, students could develop a "healthy learning habit" by receiving rewards in the right way ^[4].

High school students experience significant stress related to their academic obligations. However, there are several components of the improvements that helped them to overcome some obstacles. For instance, their brains grow maturely. Students' forebrain development allows them to think critically and weigh the effects

of their actions appropriately, control their emotions appropriately, and effectively memorize information. Additionally, having a strong sense of self-worth may help students to maintain their competitiveness in the classroom ^[5].

This study determined the effects of reward system in the mathematics classroom. Teachers may be urged to suit each student's needs since the results present a positive relationship between reward system prior to the assessment and performance in mathematics. The researcher, being a Mathematics teacher in the research locale, is cognizant of the challenges faced by the learners in Mathematics classroom. It is along this light that this study was conducted, with the hope that as a fitting reward system can be crafted, the teaching and learning process will become more beneficial to all types of learners.

2. Research objectives

This study aimed to determine the effectiveness of reward system on assessment outcomes in Mathematics in Gaudencio B. Lontok Memorial Integrated School. Specifically, it had the following objectives:

- (1) To determine the level of performance of the students before the conduct of the experiments based on the pre-test results.
- (2) To determine the level of performance of the students after the conduct of the experiments based on the post-test results.
- (3) To determine if there is a significant difference between the pre-test and post-test results of those who have received reward system prior to assessment and non-reward system prior to assessment.
- (4) To determine if there is a significant difference in the level of performance between those who have received reward system and non-reward system prior to assessment.

3. Research method

3.1. Research design

This study aimed to support or reject the effectiveness of reward system on assessment outcomes in Mathematics in Gaudencio B. Lontok Memorial Integrated School. A quantitative method was appropriate to be utilized if there is a significant difference in the level of performance between those who have received reward system and non-reward system prior to assessment. Since classes were established prior to the research study, a quasi-experimental study design was used. In this design, two heterogeneous groups were classified and given a pre-test, underwent different teaching instruction, and then answered a post-test. The data gathered were interpreted with the use of appropriate statistical test and computation.

3.2. Respondents and sampling

In the target locale, a total of 80 Grade 9 students belonging to two sections from Gaudencio B. Lontok Memorial Integrated School were involved as participants in the study. Sections were divided into control and study groups, based on similar demographics and pre-test results. Using stratified random sampling with pre-test results as basis for randomization, the students were categorized into the control group and study group. The control group received non-reward system prior to assessment and the study group received reward system prior to assessment.

3.3. Research instrument

Predetermined lessons on quadrilaterals were used for this study. Instructional sequences for each lesson

were in the curriculum alignment paper, there are specific guidelines for participating teacher to follow. The instrument used for the pre-test and post-test was validated by experts in the field and is appropriate to be used in this study.

3.4. Data collection

Predetermined lessons and assessments on quadrilaterals and triangles were used for this study. In the curriculum alignment document, there were precisely defining assessment sequences for each lesson for the participating teacher to follow. The next assessment was given if the respondents passed the unit course for the study group. The teacher was given comparable training for each student unit’s purpose, vocabulary, and subject. Nonetheless, the next assessment was given regardless of passing the unit course for the control group.

Pre-test result was the basis for randomization. Control group was taught using the non-reward system and the study group was taught using the reward system prior to assessment. Post-test results were the basis for their performance. If there are any significant differences between the control and study groups, it was determined by the interpretation of the data.

The permission to conduct the study was asked from the school principal prior to the distribution of the pre-test. After all the lessons and assessments covered by the experiment were given, both control and study groups took the post-test. Post-test was checked and tallied for the application of the appropriate statistical tool. Interpretation of the data determined if significant differences are present between the control and study groups. Informal visits and observation during the entire course of the experiment will be done to note for any gaps or challenges faced along the way.

3.5. Data analysis

This study used the mean average for analyzing the test results. The mean (or average) can be used with both discrete and continuous data, although its use is most often with continuous data. The *t*-test for independent variables was used to determine whether the two means are significantly different at 5 percent probability level.

3.6. Ethical considerations

Research participants should not be questioned to harm in any ways whatsoever. Researcher must uphold the Data Privacy Act which mandates that in interpreting the law, any and all policies or procedures must take into account the rights of the respondents. Respect for the dignity of research participants should be prioritized and confidential. Full consent was obtained from the respondents prior to the study and no one has been forced to participate in the study. The respondents were informed about the research objectives and what they are about to do.

4. Results and discussion

4.1. Level of performance of the respondents based on pre-test results

The mean scores of the two groups in the pre-test is shown in **Table 1**.

Table 1. Comparison of the pre-test results

Group	Mean	Standard deviation
Control	8.9000	1.64441
Study	8.9000	1.63195

The result signifies that at the beginning of the study, they have the same level of baseline knowledge in quadrilaterals and triangles. According to research, the difficulties of cramped classrooms, a lack of resources, and quick curriculum changes are the causes of a high percentage of failure in mathematics ^[1]. It determines whether the students possess the fundamental abilities and levels of knowledge necessary to understand a particular Mathematics course topic prior to the study.

4.2. Level of performance of the respondents based on post test results

Table 2 presents the comparison of post-test results of the study group exposed to reward system and the control group with the non-reward system prior to assessment.

Table 2. Comparison of the post-test results

Group	Mean	Standard deviation
Control	35.9200	2.85600
Study	37.5800	3.26447

Based on the mean scores, it shows that the participants scored significantly higher during the post-test in the study group. This translates into positive learning gains. The reward system shows an increase which indicates the benefits of reward system prior to assessment in learning process.

These findings support a growing number of research that shows positive results for full implementation of reward system prior to assessment. Rewards are intrinsic motivation of the student with a common goal, which is to have the student's interest at the center of their learning, instead of a reward. Furthermore, students are agents in the classroom and engage in more risk-taking behavior, and increase their achievement ^[2]. Students have the eagerness to pass the assessment to proceed to the next assessment.

4.3. Difference between the pre-test and post-test results of the study group

Table 3 shows the comparison of pre-test and post-test of the section that follows the rewards system.

Table 3. Comparison of examination results in study group

Study group	Mean	Mean difference	P value	Verbal interpretation
Pre-test	8.9000	-28.6800	0.000	Significant
Post-test	37.5800			

Based on the table, it has a significant difference between pre-test and post-test. This implies the significant increase after implementing the reward system. Overall, on a reward system, it shows that pre-test and post-test has statistical difference with a mean difference of 28.68, leaning to the post-test with *P* value of 0.000. This shows a huge jump of score after using the system.

The key factor of increasing the eagerness of students to earn the certificate in the reward system is that they believe they are capable of making decisions. Teachers need to feel in control of the subject matter to be taught, how to teach it, and how to teach the students to be in charge of the subject matter in order to do this ^[2].

4.4. Difference between the pre-test and post test results of the control group

Table 4 shows the comparison of pre-test and post-test of the section that follows the non-rewards system.

Table 4. Comparison of examination results in control group

Control group	Mean	Mean difference	<i>P</i> value	Verbal interpretation
Pre-test	8.9000	-27.0200	0.000	Significant
Post-test	35.9200			

Based on the result, it implies the significant increase after the non-reward system. Overall, on a reward system, it shows that pre-test and post-test has statistical difference with the mean difference leaning to the post-test.

It points out the possibility of raising students' arithmetic performance by thorough activity planning and selection based on abilities, needs, and interests of the students. The research showed that a reward system implemented before assessments gave students a variety of chances to exhibit their skills and passions. Benchmarking the interests, needs, and skills is a useful goal that can help to plan future learning activities for the learners. Tomlinson^[1] claims that formative evaluation gives teachers feedback on the various needs and capacities while creating teaching and learning activities in the subject.

4.5. Difference in the post-test results between the groups given the reward system and non-reward system prior to assessment

Table 5 shows the result of the comparison of post-tests of the reward system and non-reward system.

Table 5. Comparison of post-test results between the groups

Group	Mean	<i>t</i> value	<i>P</i> value	Verbal interpretation
Control	35.9200	1.6600	0.008	Significant
Study	37.8500			

Based on the result of the comparison of post-tests of the reward system and non-reward system, it shows that the system has a significant difference with *P* value of 0.008 and mean difference of 1.66 leaning towards the reward system. It implies the advantage of using the reward system compare to the non-reward system in increasing students' level of performance in Mathematics.

The positive reinforcement theory of reward refers to a change in behavior as a result of the interplay between stimulus and response. Students undergo some type of changes in their capacity to behave in novel ways as a result of the interaction between stimulus and reaction as they learn^[6].

5. Conclusion and recommendations

5.1. Conclusion

This study aimed to determine the effectiveness of reward system prior to assessment in Mathematics. This section presents the conclusion based on the objectives of the study.

- (1) Most of the learners have low baseline knowledge on geometry particular to quadrilaterals and triangles.
- (2) The implementation of reward system prior to assessment improved the level of performance of the students in Mathematics.
- (3) Reward system prior to assessment has favorable impact on learning and attitudes towards achieving better education.

5.2. Recommendations

Based on the conclusion, the following recommendations were given:

- (1) Teachers should consider the use of reward system prior to assessment in teaching mathematics as an alternative strategy to the non-reward system.
- (2) Teachers may consider their assessment to be a reflection of the intended results and be justified to reward students for the persistent success.
- (3) Other related subjects may consider reward system prior to assessment as an alternative teaching strategy.
- (4) Future researchers may perform the study on a longer period of time since this study covered only one quarter.
- (5) A follow-up descriptive study may be done to determine the teachers' and students' preference, and perceived advantages and disadvantages of reward system prior to assessment.

Acknowledgments

This study will not be possible without the help of our Almighty God for the knowledge and wisdom that He has given me throughout the course of this study. He makes everything possible. I would like to thank my family and friends for the guidance and support they have extended to me as I conduct this study. Thank you for always believing in me and my possibilities.

Disclosure statement

The author declares no conflict of interest.

References

- [1] Tomlinson CA, 2020, Fulfilling the Promise of the Differentiated Classroom: Strategies and Tools for Responsive Teaching, Alexandria, VA: ASCD.
- [2] Baranek LK, 1996, The Effect of Rewards and Motivation on Student Achievement, thesis, Grand Valley State University ProQuest Dissertations Publishing, 285.
- [3] Akin-Little KA, Eckert TL, Lovett BJ, et al., 2004, Extrinsic Reinforcement in the Classroom: Bribery or Best Practice. *School Psychology Review*, 33(3): 344–362.
- [4] Wang L, 2021, A Longitudinal Study on Activation to Behaviors of Reward. *Proceedings of the 2021 International Conference on Public Relations and Social Sciences, 2021 (ICPRSS 2021)*, 732–736. <https://doi.org/10.2991/assehr.k.211020.248>
- [5] Gustafson RF, 2020, The Physical, Social & Emotional Characteristics of High School Students, How To Adult, viewed April, 2023.
- [6] Rizkinta E, Surya E, 2017, Effect of Granting Reward on Learning Outcomes of Mathematics in Class IV of Public Primary School 014680 of Buntu Pane. *International Journal of Sciences: Basic and Applied Research*, 34(1): 101–110.

Publisher's note

Bio-Byword Scientific Publishing remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.