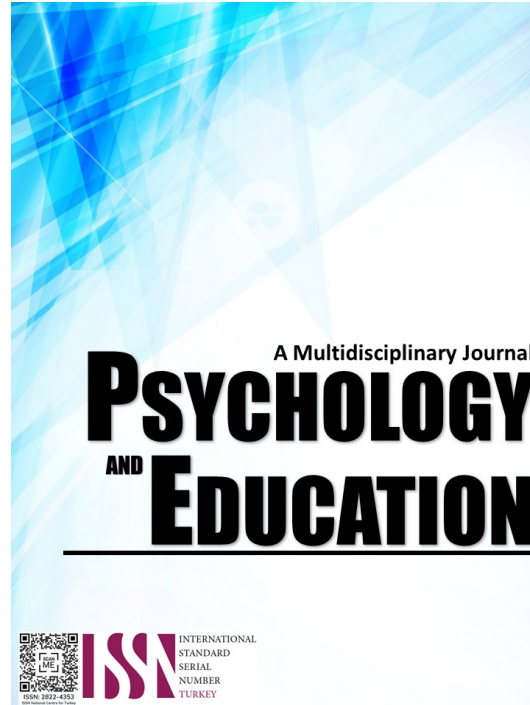


# USING COIN COUNTERS IN THEMED STORES: WAY OF IMPROVING MATHEMATICS PERFORMANCE



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# Using Coin Counters in Themed Stores: Way of Improving Mathematics Performance

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## Abstract

The present study aims to research and develop recommendations for improving the academic performance of Grade 11 students in a hybrid flexible modality. This was implemented by creating a self-made instrument, along with themed stores using coin counters from the incentives earned in the class, which was tested using a sample of 50 Grade 11 students from the Morong National High School. The results of this investigation revealed the effectiveness of themed stores using coin counters to not only improve students learning, but also the student's ability retention, critical thinking, and time management. The themed stores using coin counters created interest in the students and kept them focused on improving themselves and their learning. As a result, it is recommended that educators and policymakers keep using the themed stores through the coin counters incentive system to enhance student learning and engagement.

**Keywords:** Academic Performance, Philippines, Senior High School Students, Hybrid Flexible Modality, Themed Stores

## Introduction

The worldwide spread of the Covid-19 virus has been a big challenge for every aspect of human life. It transformed the people's ways of living differently as they were forced to adapt to the so-called "New Normal". Every nation had to comply with this where lockdowns, quarantines, compulsory use of face masks and face shields, social or physical distancing, limited interactions, constant reminders of washing hands, and any necessities are required to minimize the spread of this communicable and deadly disease. With these changes, the utilization of new ways for the industries to push through despite restrictions had been emphasized. This compelled educational institutions and universities to switch to a new mode of learning which can be the online delivery of lessons or the modular way of learning, or a combination of both.

After almost a year, the transition of the mode of learning from face-to-face classes to the new normal setting greatly affected not just the students but also the educators. It has been difficult for everyone to adapt to these changes especially since the Philippines minimally practices online learning due to slow internet connectivity and inadequate resources to support this delivery of education. As an alternative, modular and combination learning has been implemented. According to Manlangit et al. (2020), modular learning is a type of learning modality that can be innovated through coin counters implementing game-based assessment learning.

The implementation of this mode of education challenged educators to improvise effective and

enjoyable learning techniques as part of their instructional planning. Thus, game-based activities have been taken into consideration as a gamified approach that seems to have a positive effect on engagement. Many learners agree that gamification presence can motivate them to work harder. Gamification is defined as the application of typical elements of game playing (e.g. point scoring, competition with others, rules of play) to other areas of activity, typically as an online marketing technique to encourage engagement with a product or service. It is the use of game-style features to incentivize people's participation in non-game environments and activities. Gamification takes advantage of people's naturally competitive, accomplishment, collaborative, and charitable instincts. Tools used in game design, such as rewarding users for achievements, "leveling up," and earning badges, are used in the real world to encourage people to achieve their goals or improve their performance (The Invertopedia Team, 2020).

As Smith (2017) stated, in gamified assessments, some games contain empirically proven taxonomy components to enhance students' attitudes toward the tasks. Also, students are asked to complete a fictional scenario with explicit aims and guidelines (as cited in Filiz et al., 2020).

In this study themed stores were used through coin counters. The themed stores were used to motivate and enhance students' performance, whether they buy items in the store to boost students' grades or items that can be used as learning material for their education. LA, Coin counters can be a great way to teach students the importance of budgeting and money



management in a classroom setting. Through game-based learning activities, students can learn basic money concepts and principles as they use coin counters to buy items in classroom-themed stores.

Coin counters allow students to engage in interactive math and money activities that make the learning process enjoyable. Students start with a set amount of coins and can quickly learn about the value of money by sorting, counting, and transferring coins into designated slots. In classroom-themed stores, students can use their coins to purchase items using a shopping list. This type of activity introduces students to basic budgeting principles and encourages them to use sound money management skills.

Furthermore, teachers can use coin counters as an assessment tool to evaluate student understanding. By providing students with record sheets and store menus, teachers can track and assess student investment choices and spending habits. Coin counters can also be used to introduce students to basic economic vocabulary and principles. Through real-world simulations, students can learn about trade, bartering, and taxation as they engage in simulated transactions. To sum up, using coin counters to purchase items in classroom-themed stores can provide students with a fun and engaging way to learn about budgeting and money management. Through hands-on activities, students can gain an understanding of basic economic principles, learn essential money management skills, and develop an appreciation for the value of money.

### Research Objective

This study aimed to determine the effect of using themed stores through coin counters acquired from game-based assessments. Specifically, the study aimed to determine the pretest and post-test performance of Grade 11 in Mathematics in both controlled and experimental groups, testing the difference in the test scores in all pairwise comparisons. Describe the perception of the respondents on the use of themed stores through coin counters acquired in game-based activities. Lastly, determine the relationship between the perceived use and the post-test scores.

### Literature Review

### Methodology

This study is quasi-experimental research. The researchers gather information about the present

existing condition by which the use of Pirate Pizzeria and Wizard Watch Mathematics Store are the main concerns. This method also involved the collection of data to test the hypotheses and to answer questions concerning the subject of this study.

### Sampling and Participants

For the enhancement of this research uses convenience purposive sampling. The researchers choose the Morong National High School as the locale of the study where 50 students are conveniently purposive selected 25 students served as the control group and the other 25 is the experimental group. This school was comprised of Junior High School which takes Mathematics as one of their subjects. The researchers also conducted the study because this educational foundation was relevant to the study and was convenient for the researchers to come to since the pandemic had put boundaries and limitations on people's daily lives.

### Instruments

The researcher used the self-made module, perception questionnaire, and pre-test and post-test. The self-made module was composed of an introduction, learning task, assimilation, and assessment where the student helps to learn or to know the knowledge that they needed for the post-test. The pre-test was composed of 30 multiple-choice questions and the post-test was the same as the pre-test but arranged randomly. The study was presented and validated by teachers and professors. The validators approved the pre-tests and post-tests that would be used for this study. After their validators gave some corrections and approved their instrument, the researchers organized and finalized their draft of tests that were distributed to the respondents.

### Data Gathering Procedure

After the research instruments were approved, the researchers asked permission from the School Principal to allow the distribution of the tests among the Grade 11 students at Morong National High School. After the approval, the researchers distributed the pre-test. 2 weeks became the duration of implementing the incentive system where these incentives can be derived by performing better in every game-based learning activity in the class. After a 2-week long intervention, the students exchanged the points as coins, then the students are the ones to spend them in created-themed stores, whether to buy school-usable items or to boost their grades in Mathematics.



After that post-test was administered and analyzed.

### Data Analysis

Data from the perception questionnaire, pre-test, and post-test were analyzed using the following quasi-experimental statistics: Arithmetic mean, paired t-test, and independent t-test were used. In the perception questionnaire, the conventional weighted mean was used to describe the perception characteristics of using game-based learning activities in coin counter classrooms.

### Result

The data were presented based on the chronological arrangement of the statement of objectives.

Table 1. *The frequency distribution on the performance of the experimental and control group based on their pre-test and post-test.*

| Levels                                    | Control Group       |                     | Experimental Group  |              |
|---|---------------------|---------------------|---------------------|--------------|
|   | Pre-Test            | Post-Test           | Pre-Test            | Post-Test    |
| Satisfactory (80 – 85)                    | 0                   | 1                   | 0                   | 4            |
| Fairly Satisfactory (75 – 79)             | 1                   | 0                   | 1                   | 1            |
| Did not meet the expectation (74 – below) | 24                  | 24                  | 24                  | 16           |
| Total                                     | 25                  | 25                  | 25                  | 25           |
| Mean Grade                                | 75.68               | 79.52               | 76.28               | 93.20        |
| Level of Performance                      | Fairly Satisfactory | Fairly Satisfactory | Fairly Satisfactory | Satisfactory |

Figure 1. .

Table 1 shows the results of the conducted test for the experimental group and control group. The pre-test scores have a mean grade of 76.28 which is in the level of fairly satisfactory, and then their post-test scores have a mean grade of 93.20 which is in the Satisfactory performance level. On the other hand, the control group showed that their pre-test scores have a mean grade of 75.68 which is at a fairly satisfactory level, and then their post-test scores have a mean of 79.52 which is also in their performance level as well.

This implies that the level of performance of both groups revealed an improvement from given pre-tests and post-tests, with an increase of 16.92 for those who had experimented using gamification compared to those who did not use it, 3.84 for those who used gamification but not an experiment; and 6.88 for those who did not use either type of gamification or experimentation (Filiz et al., 2020).

Table 2. *Mean distribution on the Comparison of pre-test scores of the experimental group and control group*

| Areas                       | Control Group                        | Experimental Group |
|-----------------------------|--------------------------------------|--------------------|
| Total number of respondents | 25                                   | 25                 |
| Mean score                  | 12.76                                | 13.36              |
| Standard Deviation          | 5.5097                               | 4.9487             |
| t – computed                |                                      | -0.4051            |
| t – critical                |                                      | ±2.0117            |
| Level of significance       |                                      | 0.05               |
| Decision on H <sub>0</sub>  | Failed to Reject the Null Hypothesis |                    |
| Conclusion                  | Not Significant                      |                    |

Figure 2. .

The data for Table 2 show that the control group scored 12.76 with a standard deviation of 5.5097, while the experimental group scored 13.36 with a standard deviation of 4.9587. The absolute computed t-value of the two groups is  $-0.4051/$  which is less than the critical t-value of 2.0117 with a 5% level of significance implying that there is no significant difference between the conducted pre-test in the two groups. It simply shows that the scores of the experimental group are at the knot same level or got a higher score than those in the control group.

Table 3. *The mean distribution on the Comparison of pre-test and post-test scores of the experimental group and control group*

| Areas                      | Control Group |           | Experimental Group |           |
|----------------------------|---------------|-----------|--------------------|-----------|
|                            | Pre-Test      | Post-Test | Pre-Test           | Post-Test |
| 30 items                   | 12.76         | 15.72     | 13.36              | 22.68     |
| Mean scores                | 12.76         | 15.72     | 13.36              | 22.68     |
| Standard Deviation         | 5.5097        | 3.9319    | 4.9487             | 4.4132    |
| t-computed                 |               | -2.1865   |                    | -7.0279   |
| t-critical                 |               | ±2.0167   |                    | ±2.0117   |
| Level of Significance      |               | 0.05      |                    | 0.05      |
| Decision on H <sub>0</sub> | Reject        |           | Reject             |           |
| Conclusion                 | Significant   |           | Significant        |           |

Figure 3. .

Table 3 shows the comparison of the pre-test and post-test performance of the participants. The result shows that the pre-test of the control group has a mean score of 12.76 with a standard deviation of 5.5097 while the post-test has a mean score of 15.76 with a standard



deviation of 3.9319. Meanwhile, the pre-test for the experimental group has a mean score of 13.36 with a standard deviation of 4.9487 while the post-test has a mean score of 22.68 with a standard deviation of 4.4132. Results for the pre-test and post-test scores of the control group reveal the absolute *computed t-value* of  $\pm 2.1865$  which is greater than the *critical t-value* of  $\pm 2.0167$ ; thus, the decision is to reject the null hypothesis. This result further clarifies that there is a significant difference between the pre-test and post-test scores of the control group. In the same way, the experimental group obtained an absolute *computed t-value* of  $\pm 7.0279$  which is greater than the *critical t-value* of  $\pm 2.0117$  concludes that the null hypothesis has been rejected. This means that there is a significant difference between the pre-test and post-test scores of the experimental group. Lanuza (2021) cited that the use of gamification is a pedagogical tool that has the potential to evoke and impact the attributes. He believed, that are necessary for learning to occur. This qualitative exploratory case study explored teachers' perception of gamification on students' success as well as student's academic performance on mathematics standardized exams. The results tell that gamification is useful to the students, compare to the standard type of module. This gamified module can be used and improved the performance of the students.

Table 4. Mean Distribution on the Comparison of post-test scores of the experimental group and control group

| Areas                       | Control Group | Experimental Group |
|-----------------------------|---------------|--------------------|
| Total number of respondents | 25            | 25                 |
| Mean score                  | 15.72         | 22.68              |
| Standard Deviation          | 3.9319        | 4.4132             |
| t – computed                |               | - 5.8876           |
| t – critical                |               | $\pm 2.0117$       |
| Level of significance       |               | 0.05               |
| Decision on $H_0$           |               | Reject             |
| Conclusion                  |               | Significant        |

Figure 4. .

Table 4 shows that the control group is composed of 25 students who gained a mean score of 15.72 with a standard deviation of 3.9319 while the experimental group which is also composed of 25 students gained a mean score of 22.68 with a standard deviation of

4.4132. The absolute *computed t-value* of the two groups is  $\pm 5.8876$  which is greater than the *critical t-value* of  $\pm 2.0117$  with a 5% level of significance leading to the decision to reject the null hypothesis. This implies that there is a significant difference between the conducted post-test of the experimental group and the control group. Lanuza (2021) cited that for students to learn and be successful, motivation, engagement, attention, interest, effort, enthusiasm, participation, and involvement are some important attributes that must be impacted. By using gamification students will be motivated to learn mathematics, and have an interest in it.

Table 5. The mean distribution of the perception of the respondents on the use of the gamified module in their lesson.

| Indicators  | Mean | $\bar{V}_i$ |
|---|------|-------------|
| 1. Wizard Watch and Pirate Pizzeria Mathematics Store helped me to easily understand the discussion.                | 3.4  | SA          |
| 2. Wizard Watch and Pirate Pizzeria Mathematics Store helped me to be independent in solving mathematical problems. | 3.28 | SA          |
| 3. Wizard Watch and Pirate Pizzeria Mathematics Store helped me to solve mathematical problems easily and faster.   | 3.36 | SA          |
| 4. Wizard Watch and Pirate Pizzeria Mathematics Store helped me to enjoy the discussion more.                       | 3.88 | SA          |
| 5. Wizard Watch and Pirate Pizzeria Mathematics Store helped me to actively answer mathematical problems.           | 3.76 | SA          |

Figure 5. .

|   |             |           |
|---|-------------|-----------|
| 6. Wizard Watch and Pirate Pizzeria Mathematics Store are appropriate for solving mathematical problems.                  | 3.44        | SA        |
| 7. Wizard Watch and Pirate Pizzeria Mathematics Store helped me to develop my critical thinking skills.                   | 3.48        | SA        |
| 8. Wizard Watch and Pirate Pizzeria Mathematics Store helped me to be more interested in Mathematics.                     | 3.96        | SA        |
| 9. Wizard Watch and Pirate Pizzeria Mathematics Store helped me to build more friends.                                    | 3.8         | SA        |
| 10. Wizard Watch and Pirate Pizzeria Mathematics Store helped me to boost my confidence in solving mathematical problems. | 3.8         | SA        |
| <b>Grand Mean</b>   | <b>3.62</b> | <b>SA</b> |

Figure 6. .

Table 5 shows the perception of the student about the pirate pizzeria mathematics store and wizard watch, it reveals that the wizard watch and pirate pizzeria

mathematics store helped them to easily understand the discussion with a mean score of 3.4; to be independent in solving mathematical problems with a mean score of 3.28; helped them to solve mathematical problems easily and faster with a mean score of 3.36; helped them to enjoy the discussion more with a mean score of 3.88; helped them to actively answered the mathematical problems with a mean score of 3.76; appropriate in solving mathematical problems with a mean score of 3.44; helped them to develop my critical thinking skills with a mean score of 3.48; helped them to be more interested in Mathematics with a mean score of 3.96; helped them to build more friends with a mean score of 3.8; helped me to boost my confidence in solving mathematical problems with a mean score of 3.8.

All of the listed perceptions can be verbally interpreted as Strongly Agreeing. Overall, the students gained a mean grade of 3.62 which is interpreted also as Strongly Agree that the Pirate Pizzeria and Wizard Watch mathematics store in gamified module gives more interest in solving mathematics with the highest frequency of 24.

With this result, it implies that the participants perceived that Pirate Pizzeria and Wizard Watch mathematics store in a gamified module is useful in solving and can gain more of their interest. The main goals of gamification are to enhance certain abilities, introduce objectives that give learning a purpose, engage students, optimize learning, support behavior change, and socialize (Lanuza, 2017). We can say that gamification gives them an interest in learning and changes their perspective while answering their modules.

## Discussion

In conclusion, this study showed that, when compared to the traditional teaching method, the use of game-based learning activities and the integration of themed stores with Pirate Pizzeria and Wizard Watch Mathematics Store was found to be an effective method of teaching Grade 11 Mathematics. The students in the experimental group had a positive view of the use of the coin counters, and their perceptions seemed to have a positive impact on their mathematical output. It is thus suggested that teachers should consider the use of this innovative game-based approach when teaching Mathematics 11.

Based on the summary of findings and conclusion the researchers recommended the following:

1. Mathematics may continue using the coin counter game-based approach to improving learning.
2. The students may continue to participate actively in this kind of teaching innovation since without their active participation, successful integration of this approach will not be possible.
3. The teacher may provide another type of gamification that may help their students realize the importance of learning mathematics.
4. Future researchers may continue conducting the study by looking into a different branch of Mathematics and another discipline not only Mathematics.

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