Effectiveness of Level-Up! Game as Remedial Tool in Improving the Academic Performance in Mathematics among Grade 8 Students

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Abstract — This study aimed to determine the effectiveness of the Level-Up! Game as remedial tool in improving academic performance in Mathematics among Grade 8 students. The researcher used the pre-test post-test quasi-experimental research design since the subjects were not randomly assigned. Subjects included only those who got below 50% mark in the first quarter periodical test. Research instruments include the researcher-made questionnaire for the socio-demographic profile of the subjects and the Level-Up! Game tool as intervention. After the data were gathered, the researcher employed frequency tables, percentages, weighted mean, and t-testing as statistical treatment.

Results showed that most of those who had below 50% mark in the first quarter periodical are male and 13-14 years old. Some of them are repeaters of the grade level. Moreover, most had a fair mark of 11-20 in the pre-test. After the Level Up! Game was utilized, most of the subjects had excellent and very good performance in the post test. The data revealed that there is a significant improvement of the academic performance of the subjects before and after the implementation of the Level-Up! Game.

Thus, it is recommended to utilize the Level-Up! Game as remedial tool to improve numeracy and eventually the academic performance of students in Mathematics. This tool will also increase the interest of learners towards the subject.

Keywords — Level-Up! Game; Mathematics; Academic Performance; Grade 8

I. Introduction

The discipline Mathematics has been perceived to be difficult for most learners. It presents many challenges to dissimilar learners. National Research Council reports that Mathematics has often been termed the "gatekeeper" of success or failure for high school graduation and career success (Richardson, et. al., 2014)

Some perceive difficulty in Math as something equated to dislike. In a study conducted by Abidha Kaurukkan and K. Abdul Gafoor(2015), 88% of their respondents selected Mathematics as the subject they hated and only 6% report that they like the subject.

There are many possible reasons why Mathematics has been perceived as most disliked subject and difficult to pass. Number one of the seven discovered causes for underachievement in Mathematics is that performance in fundamental mathematics is poor (Andaya, 2018). This suggests that mastery of the fundamental skills in Mathematics is essential in learning the complicated skills.

Upon the implementation of k-to-12 curriculum in the Philippines, changes could be observed in the flow of content. Subjects are taught from the simplest concepts to more complicated concepts through grade levels in a spiral progression. As early as elementary, students gain knowledge in areas such as Algebra and even Statistics. These areas were taught only in high school in the previous curriculum. Researchers have questioned the spiral progression of k-to-12 especially in the case of heterogenous classroom where the students that do not even know how to do fundamental operations learn alongside those who are proficient. This is a common scenario in junior high public schools where there exists the 100% promotion rule in elementary.

In Balugo National High School where the researcher is stationed by the Department of Education, academic performance in Mathematics has been reported to be low in almost all grade levels. This urged the researcher to devise her own remedial tool for those who have not mastered the fundamentals of Mathematics. Thus, the researcher conducted this study entitled, "The Effectiveness of Level-Up! Game as Remedial Tool to Improve Academic Performance in Mathematics among Grade 8 Students". This study primarily aimed to determine the effectiveness of Level-Up! Game as remedial tool to improve academic performance. Specifically, it aimed to identify the socio-demographic profile of the respondents, determine the academic performance before and after the implementation of the Level-Up! Game in the remediation, and confirm if there is a significant improvement in the academic performance.

This research will be relevant not only to Mathematics teachers, but also to the learners who were the main subjects of this study, the administration, the law-making bodies of the Department of Education, and other researchers.

This study primarily aimed to determine the effectiveness of the Level-Up! Game as remedial tool in improving academic performance in Mathematics among Grade 8 students.

Specifically, it aimed to answer the following questions:

1. What is the socio-demographic profile of the selected Grade 8 learners in Balugo National High School in terms of:
   1.1 age,
   1.2 gender, and

1.3 repeater or non-repeater?
2. What is the academic performance of the subjects based on their quarterly assessment before the implementation of the Level Up! Game for remedial?
3. What is the academic performance of the subjects based on their retake of the quarterly assessment after the implementation of the Level-Up! Game for remedial?
4. Is there a significant improvement of the academic performance of the subjects before and after the implementation of the Level-Up! Game?
5. What Improvement plan can be proposed based on findings of the study?

II. Methodology

Design. This study utilized the pre-test post-test quasi-experimental research design since the subjects are not randomly assigned. Subjects were assigned to groups based on non-random criteria. In this study, the criteria is that subjects include those students who got below 50% mark in the first quarterly assessment.

Environment. The research environment was the Balugo national High School in the Albuera District. It is located in Brgy. Balugo II, Albuera, Leyte. The school can be accessed through various land transportation since it is located along the national highway. The study proper was conducted in the Mathematics room of Balugo National High School where the junior Math classes are held.

Subjects. The research subjects were taken from both sections of Grade 8. Specifically, these include only those students who had a grade below 50% during the First Quarter Periodical Exam. This included 32 students out of the 86 total population.

Instrument. This study utilized two instruments. First is the researcher-made questionnaire consisting the socio-demographic profile of the subject, the consent form, and the grade in the first quarter periodical exam, and their grade after the re-take. Second, in the implementation phase, the study utilized the Level-Up! Game during remedial sessions of the subjects. This tool has five color levels (Red, Yellow, Green, Blue, Purple) with Red as the easiest and Purple as the most complex level. Each color level has four sublevels including Fundamental Operations, Decimals, Fractions, and PEMDAS. Each subject should get a perfect score in each sublevel before they can move on to the next color level. The goal is to complete up to Purple Level.

Research Procedure. A transmittal letter was first sent to the principal of Balugo National High School seeking permission to conduct the study. Once approved, the subjects are thereby selected based on the given criteria: obtained a grade less than 50% in the first quarter periodical exam. Once identified, the subjects were asked to fill-up the questionnaire and sign the consent form. The subjects then began remedial sessions scheduled 4:00-5:00PM from Monday to Friday. During the remedial session, the Level-Up! Game was used. The subjects race to finish all the levels within a span of ten sessions. The time allocated was two sessions for each color level. Once

the ten sessions were done, the subjects were then asked to retake the first quarter periodical exam which mainly covered Algebra topics. Results were then recorded and compared.

Ethical Issues. The right to conduct the study was strictly adhered through the approval of the principal, approval of the Superintendent of the Division. Orientation of the respondents both the students and the teachers and the industry partners was done separately. In the orientation, the issue on, an Informed Consent Form was accomplished prior to the Focus Group Discussion. The need for the secondary data, a written permission was sought to the principal confidentiality and anonymity was discussed requiring them not to write names on the tools.

Treatment of Data. This research made use of Microsoft Excel and SPSS as statistical tools for analyzing the data gathered. The results were tallied before encoding them for analysis. Statistical measurements used included frequency tables, percentages, weighted mean, and t-testing. Frequencies indicate the number of subjects which falls on the available categories. These were used to tabulate the different responses of the subjects in the questionnaire. Percentages present the proportion of subjects in a frequency distribution under a particular category. A weighted mean is a kind of average. Instead of each data point contributing equally to the final mean, some data points contribute more "weight" than others. If all the weights are equal, then the weighted mean equals the arithmetic mean (the regular "average" you're used to). Weighted means are very common in statistics, especially when studying populations. The t test tells you how significant the differences between groups are; In other words it lets you know if those differences (measured in means) could have happened by chance.

III. Results and Discussion

Using the questionnaires distributed by the researchers, the following data were obtained, analyzed, and interpreted.

Table 1
Socio-demographic Profile of the Subjects

GENDER	AGE						REPEATER/NON-REPEATER		
	13	14	15	18	20	**TOTAL**	Repeater	Non-repeater	**TOTAL**
Male	6	3	2	1	1	**13**	4	9	**13**
Female	7	12	0	0	0	**19**	0	19	**19**
TOTAL	13	15	2	1	1	**32**	4	28	**32**

Table 1 shows the summarized socio-demographic profile of the respondents including gender, age, and repeater or non-repeater.

This table presents that most of the subjects who got a below 50% mark in the periodical exam are females.

It also shows that most of the subjects who got a below 50% mark in the periodical exam are 14 years old followed by 13 years old. Lowest percentage goes to 18 and 20 years old.

Lastly, it reveals that repeaters of this grade level got marks less than 50% in the periodical exam.

Table 2
Pre-Test Scores of the Subjects

Score Range	Description	PRE TEST	
		Frequency	%
41-50	Excellent	0	0
31-40	Very Good	0	0
21-30	Good	8	25%
11-20	Fair	22	69%
1-10	Poor	2	6%
Total		**32**	**100%**
Weighted Mean		**17.03**	**Fair**

This table shows most of the subjects fall in a score range of 11-20 in the pre-test which is described as fair. This is followed by those who scored 21-30 which is described as good. Lastly, only two subjects scored 1-10 which is described as poor. None of the chosen subjects scored 31 and above since the criteria set in selecting the subjects are those who scored less than 50% in the pre-test which means the selected subjects all scored 25 and below. Meanwhile, the weighted mean of the scores is 17.03 which is classified as fair.

Table 3
Post-Test Scores of the Subjects

Score Range	Description	POST TEST	
		Frequency	%
41-50	Excellent	11	34%
31-40	Very Good	12	38%
21-30	Good	9	28%
11-20	Fair	0	0%
1-10	Poor	0	0%
Total		**32**	**100%**
Weighted Mean		**37.91**	**Very Good**

This table shows that most of the subjects got a score of 31-40 which is described as Very Good followed by 41-50 which is described as Excellent during the retake of the Periodical Exam. Only 8 of the subjects got 21-30 which is described as Good. All in all, the weighted mean of the scores is 37.91 which is classified as Very Good. This shows a great improvement from the results in Table 1 since all subjects now scored higher than 50% in the retake of the Periodical Test.

Table 4
T-testing of the Pre-Test and Post-Test Scores

Participants	Test Scores		Computed T	Critical T @ 0.05 level of significance	Decision	Interpretation
Grade 8 Students	Pre Post	17.03 37.91	3.223	1.221	Reject H_o	Significant

This table shows whether there is a significant difference between the pre-test and post-test results. It compares the weighted mean of both tests wherein the pre-test has a weighted mean of 17.03 while the post-test has a weighted mean of 37.91. At a critical value of 5%, the level of significance was calculated and revealed a figure of 1.221 which is interpreted as Significant. This means that there is a significant difference between the two weighted averages. With this, the null hypothesis is therefore rejected.

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IV. Conclusion

The data revealed that most of those who had below 50% mark in the first quarter periodical are male and 13-14 years old. Some of them are repeaters of the grade level. Moreover, most had a fair mark of 11-20 in the pre-test. After the Level Up! Game was utilized, most of the subjects had excellent and very good performance in the post test. Therefore, there is a significant improvement of the academic performance of the subjects before and after the implementation of the Level-Up! Game as remedial tool to strengthen Fundamental Mathematics.

V. Recommendations

In line with the conclusions drawn from this study, the researcher would like to recommend that:

1. Math teachers use the Level-Up! Game as a tool in improving not only the numeracy level of students but eventually their academic performance in Mathematics. This will not only bring improvement to grades but also make a positive impact on the students' perception on the subject. Since it is a game, they will most likely have increased interest in the subject.
2. though the Level-Up! Game was intended as remedial tool for secondary level, using it as mastery tool in the elementary level is highly recommended. With this, the percentage of non-numerates entering high school will gradually decrease over time.

This research was done and gained its results in line with its scope and limitations. But the researcher believes that there are more significant findings that could be taken in this research subject. Thus, the researcher would like to recommend the following for those who are planning to conduct a research with the same topic as this study.

1. It would be better to include operations on integers on the skills involved in the game.
2. Widening the scope of the study by utilizing the tool across grade levels will give varied results and become an avenue for comparison.
3. It would be better to compare the academic performance throughout the fourth quarter.
4. A graphical analysis is also recommended to easily spot the trends among the scores across the quarters.
5. If one is confident enough, one could try a larger scope by getting respondents from different schools. But that would take a lot of time to finish basing on the survey distribution and gathering alone.
6. A pilot study would also be best before doing the research proper.

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AUTHOR'S PROFILE

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The author was born on June 27, 1990 at Ormoc City, Leyte, Philippines. She finished her primary, elementary, and secondary education at LIDE Learning Center, Inc. She studied Bachelor of Science in Nursing at Velez College, Cebu City from 2007 to 2010. She got sick and was not able to finish the degree. In 2012, she studied Bachelor of Secondary Education Major in Mathematics at Visayas State University – Isabel Campus. She graduated the degree on October 2016. She got licensed on March 2017. She then took Master of Arts in Education Major in Administration and Supervision at Western Leyte College.

Her first employment was as a tutor in a private tutorial center wherein she handled Grade 3-6 learners for summer class. She then worked as Administrative Assistant/Math Teacher in St. Augustine Parish School of Matlang, Inc. (SAPSMI). After joining the ranklist in the hiring of Teacher I in DepEd, she was then assigned in Balugo National High School which is also her current station.