GALAXY INTERNATIONAL INTERDISCIPLINARY RESEARCH JOURNAL (GIIRJ)
ISSN (E): 2347-6915
Vol. 12, Issue 3, March (2024)

MATH-SAYA ANG BAKASYON: A REMEDIATION PROGRAM FOR STUDENTS WITH MATHEMATICS DIFFICULTIES

Geselle T. Dela Cruz
Doctor of Philosophy Major in Mathematics Education, Nueva Ecija
University of Science and Technology, Cabanatuan City, Nueva Ecija, Philippines
geselledelacruz07@gmail.com, +639174418156

ABSTRACT

This study entitled "Math-Saya Ang Bakasyon: A Remediation Program for students with Mathematics Difficulties" investigated the effectiveness of the remediation program in the level of proficiency in Mathematics of selected incoming students of Grade 10 in Galvan High School, S.Y. 2022 - 2023. The researcher employed experimental pretest-posttest design of research. Using purposive sampling, 34 students were chosen in the said program. Students were classified as students with Mathematics difficulties based on the result of the pre-test given by the researcher with the use of Quizalize application. The study revealed that before the remediation program, students' level of proficiency in Mathematics was under "Developing" level. After series of Mathematics tutorial classes via Google Meet, the level of proficiency in Mathematics reached the "Approaching Proficiency" after the post-test administration. Moreover, the result of the paired t-test revealed that there is a significant difference between the level of proficiency in Mathematics before and after the remediation program. Thus, "Math-Saya ang Bakasyon" was effective remediation program in increasing the level of proficiency in Mathematics. Based on the positive effect of the remediation program, the researcher decided to continue this kind of program to improve and enhance the student' level of proficiency in Mathematics.

Keywords: level of proficiency in Mathematics, Mathematics difficulties, online Math tutorial, remediation program, paired t-test

INTRODUCTION

Mathematics is often viewed as challenging by many individuals (e.g., Fritz et al., 2019). That is why teaching Mathematics is not that easy because students treat the subject as one of their most hated subjects. Moreover, many believe "it is ok–not everyone can be good at Math" (Rattan et al. 2012). With such perceptions, many students are not putting so much effort in learning the concepts and skills in Mathematics unless they are required to do so.

Mathematics serves as a cornerstone for numerous professions and offers various practical advantages, yet numerous students fail to recognize its importance. The challenge of learning mathematics is a prevalent and noteworthy issue across all levels of schooling. According to the Annual Status of Education Report (ASER, 2014), 50% of fifth-grade students failed to meet the standards expected of second-grade students, while 44% of eighth-grade students lacked even basic arithmetic skills.

Learning is important because no one is born with the ability to function competently as an adult in society (National Academy of Sciences, 2019), but guiding students to learn how to learn is more important for them to process the information they acquire (Santos, 2020).

Students differ to each other; they do not have the same level of thinking and acquiring knowledge. Some students are fast learners while some need more time and effort in understanding a lesson.

Empirical evidences suggest that low achievement in Mathematics at the secondary level can often be traced back to deficits in the understanding of certain basic arithmetic concepts taught in primary school (Andersson, 2010; Jones, Wilson, & Bhojwani, 1997; Moser Opitz, 2013; Peterson Miller, & Mercer, 1997). In addition, large scale studies have shown that many middle school students fail to acquire basic arithmetic skills (e.g. Maccini, Mulcahy, & Wilson, 2007). These pre-requisite skills and/or concepts are being identified by some schools by means of assessment examinations and item analysis; most and least learned competencies are being determined.

Ennemoser, Krajewski, and Schmidt (2011) found that approximately 67% of the variation in ninth-grade Mathematics achievement can be attributed to fundamental quantity-number competencies, such as placing numbers up to 10,000 on the number line, comparing numbers, and understanding mathematical conventions. According to Andersson (2010), students with Mathematical Difficulties (MD) consistently struggle across four specific arithmetic domains: conceptual understanding, word problem solving, procedural knowledge, and factual understanding.

In the 2018 Programme for International Student Assessment (PISA), Filipino students ranked among the poorest performing groups compared to students from other participating countries. In mathematics, less than 20% of students reached the minimum proficiency level (Level 2), while over 50% exhibited very low proficiency (below Level 1). By scoring below the minimum proficiency level in PISA, these Filipino students have clearly fallen behind in terms of mathematics education; more than half of this demographic lack sufficient mathematical skills compared to their global peers. Disparities in math performance also existed between students attending public and private schools, with mean scores of 343 and 395, respectively (Department of Education, 2019).

Past research has indicated significant disparities in the learning resources available between public and private schools in the Philippines (Trinidad, 2020). The proficiency of students in mathematics, as assessed by PISA, is closely linked to their ability to apply mathematical concepts in various contexts, ranging from personal experiences to broader, more abstract realms such as work, society, and science. Students demonstrating strong mathematics proficiency exhibit the capability to engage in mathematical reasoning and utilize mathematical principles, procedures, facts, and tools to articulate, elucidate, and anticipate phenomena (OECD, 2019a, p. 104).

The results of the PISA assessment suggest that most Filipino high school students are not learning what they are supposed to in mathematics, the situation seems to be worse for the students in Philippine high schools.

Not all students can readily adapt to the learning processes, leading to varied outcomes. Bearing this in mind, teachers must devise intervention plans to prevent certain students from lagging behind and enable them to catch up with the ongoing lessons. A remedial class is always an impressive way to solve this common problem (Asio & Jimenez, 2020).

Remediation and intervention have become a big educational push in both mathematics and reading (Rodrigue, 2017). The primary step in remediation or intervention program is to determine the weaknesses of the students, the competencies or skills they lack of that causes the student to struggle. Remedial action becomes feasible only when teachers grasp the underlying causes of student challenges, recognize their individual needs, and respond proactively to address them (Ottenbreit-Leftwich et al., 2010; Brownell et al., 2006; Hyland, 2002). These can be determined through the use of assessment or test. Once these weaknesses are identified, the needs of the students will also be determined. The stage of intervention or remediation process begins.

One of the known remediation programs in the Philippines is the Math Remediation for High School – ETUlay initiated by DepEd Educational Technology Unit (ETU) under the Information and Communications Technology Service. ETULay is a no-cost digital tutorial platform designed for learners, led by exceptional and motivating educators who act as facilitators, guiding students to elevate their learning experiences. Additionally, this online tutorial resource assists parents in supporting their children's studies from the convenience of their homes. This program of DepEd ETU is one of the bases how and why the remediation program, "Math-Saya ang Bakasyon", is being conducted by the mathematics teacher, including the researcher, in Galvan High School. The main objective of the remediation program is to enhance the pre-requisite skills and concepts needed by the students in able for them to improve their level of proficiency in Mathematics, especially those students with Mathematics difficulties.

The remediation program will also help them to become prepare for the next grade level they will take in since the program is being conducted during school vacation. As Capuyan et al. (2019) revealed, there is a positive relationship between the previous and the current grade levels' grades of students attending remediation lessons. Due to the challenges our students encounter, which hinder their ability to fully acquire learning competencies, this study was undertaken to provide every learner with an opportunity to excel in various subject competencies.

The researcher believes that the use of this remediation will help increase the level of proficiency in Mathematics. This will support each student to master the competencies required in the subject and at the same time, shall be able to increase performance level of the school in terms of literacy.

STATEMENT OF THE PROBLEMS

The primary purpose of this study is to assess the effectiveness of "Math-Saya ang Bakasyon", a remediation program, among the selected incoming Grade 10 students with Mathematics difficulties in Galvan High School, Galvan, Guimba, Nueva Ecija for the school year 2022 - 2023.

Specifically, this study sought to answer the following questions:

1. How may the level of proficiency of the students in Mathematics be described before and after the remediation program?
2. Is there a significant difference in the level of proficiency of the students in Mathematics before and after the remediation program?

HYPOTHESIS

H_0: There is no significant difference in the level of proficiency of the students in Mathematics after the remediation program.

METHODOLOGY

Research Design

This study employed the experimental pretest-posttest design of research. This is the preferred method to compare and measure the degree of change occurring as a result of treatment or intervention (Shuttleworth, 2009). The researcher conducted the actual remediation program to improve the students' level of proficiency in Mathematics and employ a post-test to check the validity and effectivity of remediation activities. The researcher gathered data to interpret using the results of the pre-test and post-test given to the students to measure any significant difference.

Research Locale

The locale of the study was in a public high school named Galvan High School situated in Galvan, Guimba, Nueva Ecija, Philippines. It is along Gerona, Guimba Rd, Guimba, Nueva Ecija. Galvan High School is one of the Secondary Schools in Guimba which is already considered to be a big school.

The school has already three curricula in the Junior High School, the Basic Education Curriculum (BEC), Special Program in ICT (SP ICT), and the Special Program in the Arts (SPA); and three strands in the Senior High. The researcher chose the said school because it would be convenient for the researcher to implement the study and to gather data because this is where the researcher has been teaching for years.

Participants of the Study

The participants of this study were incoming Grade 10 students in Galvan High School for the School Year 2022 – 2023. The selection of the students was via purposive sampling; students were chosen based on their grades in the previous grade level. Thus, these were the students having difficulties in Mathematics.

The participants consisted of 34 incoming Grade 10 students who were registered via online registration, received Mathematics worksheets and engaged in series of online class via Google Meet.

For ethical considerations, the researcher informed and secured permission from the parents/guardians of the students about the remediation program to be undertaken.

Research Instrument

This study used instruments which were of great help in obtaining data leading to the success of this study. This study used (1) 40 – item Teacher Made Test about the different topics being discussed all throughout the remediation program; (2) Mathematics Worksheets and/or practice workbook made by the researcher; and (3) Google Meet.

1. Teacher-made Test

A teacher made test were utilized as a pre-test and post-test to monitor students' progress and to measure the success of this program. To administer the test, we utilized an on-line application called Quizalize. Quizalize is a quiz platform for remote classrooms that delivers game – changing results, this platform gives instant data on student mastery. It is a gamified quiz making tool that you can use to drive student's engagement, increase their participation, and enhance their learning (Kharbach, 2022). This also allows the teacher to quickly see where the students are struggling and work out where to focus your teaching.

2. Mathematics Worksheets

Worksheets were developed by Mathematics teacher/researcher and provided to each student for practice and further understanding of the lesson. Worksheets activities were answered by each student after discussion via Google Meet. The workbooks were funded by Gintong Araw Association, a Non-Government Organization located at Barangay Manggang Marikit, Guimba, Nueva Ecija.

3. Google Meet

Google Meet, also known as Google Hangouts Meet, is built to let dozens of people join the same virtual meeting, and speak or share video with each other from anywhere with internet access (John, 2020). With this feature, it was one of the online platforms being used by the teachers replacing the face-to-face classroom set up since the remediation program was conducted during vacation of the students. The series of online class was facilitated using Google Meet. Checking of students' output and follow – up were also done via same platform.

Data Gathering Procedures

The following are the different stages by which the researcher underwent in conducting this study:

In this study, the researcher took several ethical considerations such as ensuring that a permission to conduct would be given by the authority before the remediation program began and to ask the parents of the participants to sign a waiver allowing them to participate in the activity.

The researcher secured an approved proposal signed by the Principal of Galvan High School, Sir Eugenio V. Madriaga Jr., School Principal III, which served as the permission to conduct the program and allow the students to be the participants of the said remediation program.

The instruments such as the mathematics worksheets and the teacher-made test created in the Quizalize application had been prepared and validated through the collaboration of Mathematics teachers in the school together with their area chair.

Prior to the conduct of online classes through the use of the online platform Google Meet, the researcher administered the pre-test by sending the link of the teacher-made test created in the Quizalize application to the participants. After that, a series of online classes had been conducted and worksheets were being answered by the students.

Afterwards, post-test was given by sending again the link provided by the Quizalize application. Pre-test and post-test results were then analysed to describe how the pre-test and post-test scores differ significantly.

Statistical Treatment

In this study, the data obtained were organized, presented, analysed, and interpreted using the statistical tools such as t-test for the dependent samples and statistical software such as Microsoft Excel and Statistical Packages for Social Sciences (SPSS).

To describe the students' level of proficiency in Mathematics, before and after the experiment, scores and mean score were being used and interpreted using the following interval.

Table 1 shows the verbal interpretation for every interval.

Table 1 Verbal Interpretation for the Students' Level of Proficiency in Mathematics

Interval	Verbal Interpretation
32.2 – 40.0	Advance
24.4 – 32.1	Proficient
16.6 – 24.3	Approaching Proficiency
8.8 – 16.5	Developing
1.0 – 8.7	Beginning

To determine if there is a significant difference between the pre-test and post-test of the group, t– test for the dependent samples was used. The t–test for the dependent samples (also called the paired t-test or paired-samples t-test) compared the means of the two related groups to determine whether there is a statistically significant difference or not.

To easily obtain the result, the data were analysed through the use of the statistical software, SPSS (Statistical package for the social sciences) version 20. It is a set of software programs used to analyse, transform, and produce a characteristic pattern between the different data variables. In addition to it, the output can be obtained through graphical representation so that a user can easily understand the result (Noel, 2018).

RESULTS AND DISCUSSION

The main purpose of this study is to assess the effectiveness of "Math-Saya ang Bakasyon", a remediation program, among the selected incoming Grade 10 students with Mathematics difficulties. It looked into the level of proficiency of students in Mathematics by the pre-test and post-test provided.

Students' Level of Proficiency before and after Remediation Program

Table 2 presents the pre-test results of the students.

Table 2 Pre-test Performance of the Control Group

Pre-test Score	f	Percentage (%)	Interpretation
32.2 – 40.0	0	0	Advance
24.4 – 32.1	0	0	Proficient
16.6 – 24.3	1	2.94	Approaching Proficiency
8.8 – 16.5	28	82.35	Developing
1.0 – 8.7	5	14.71	Beginning
Mean Pre-test Score:		**11.03**	**Developing**

Based on the findings, out of 34 students, 5 or 14.71 percent fell under "Beginning" while 28 or 82.35 percent got "Developing". Only 1 student fell under "Approaching Proficiency".
The mean score of the group in the pre-test was 11.03 which was categorized as "Developing" as their level of proficiency in Mathematics.
The poor pre-test performance depicted in this study was further explained by Kuehn (2019). He identified pre-test as a diagnostic tool that did not expect students to answer all the questions. However, previous knowledge must be utilized to predict rational answers.
After series of online classes/tutorials via Google Meet and with matching worksheets being answered by the students, the post-test was administered.
Table 3 presents the post-test results of the students.

Table 3 Post-test Performance of the Control Group

Post-test Score	f	Percentage (%)	Interpretation
32.2 – 40.0	0	0	Advance
24.4 – 32.1	14	41.18	Proficient
16.6 – 24.3	17	50	Approaching Proficiency
8.8 – 16.5	3	8.82	Developing
1.0 – 8.7	0	0	Beginning
Mean Post-test Score:		**22.82**	**Approaching Proficiency**

The table above presents that out of 34 students, there were no students fell under "Beginning". There were only 3 or 8.82% left under "Developing" while 17 of the students or 50 percent reached "Approaching Proficiency" level, and 14 or 41.18% already reached the "Proficient" Level. The mean score of the group in the post-test was 22.82, higher than the mean score of their pre-test (11.03). The level of proficiency based on the post-test result was categorized as "Approaching Proficiency".
The results implies that the students' level of proficiency in Mathematics were improved after the remediation program was conducted.
Significant Difference in the Level of Proficiency of the Students in Mathematics Before and After the Remediation Program
Table 4 reveals the significant difference between the level of proficiency of the students based on the results of their pre-test and post-test.

Table 4 Significant Difference between the Pre-test and Post-test Scores

	Mean	SD	t-value	p-value
Pre-test	11.03	2.89	-12.767	0.000
Post-test	22.82	4.32		

Paired samples t-test was used to determine the significant difference between the pretest and posttest of the group. All computations were significant at 0.05 level of significance.
Bases on the results, there is a significant difference in the pre-test and post-test of the students, t = -12.767, p = 0.000, the result had p value of less than 0.05. Hence, H_O (There is no significant difference in the level of proficiency of the students in Mathematics after the remediation program) was rejected.

The students performed better in their post-test than in their pre-test as reflected by their corresponding mean scores. This implies that "Math-Saya and Bakasyon" program was effective in improving the level of proficiency of the students in Mathematics. In another study, Lombardi (2019) pointed out that teachers barely assigned to remediation improve their pedagogical practices. These studies, along with the conducted research, prove that remediation activities to pupils are an effective tool that improves their academic performance.

CONCLUSIONS AND RECOMMENDATIONS

CONCLUSION

Based on the result of the study, it is observed that remediation and intervention have a significant impact on the students' level of proficiency in Mathematics. This is so since there is a significant difference in the scores between the pre-test and post-test of the students. Thus, it is safe to end that remediation interventions can effectively improve students' level of proficiency and performance in Mathematics.

However, just like in any other researches, this study also has its limitations. First is the number of respondents, the result could be more reliable if there were more participants included in the study. Secondly, the duration of the study only covered four weeks (eight sessions of online class/tutorial) because it could have been more practical if the measures were done longer to decide if the intervention really worked out substantially for the students who participated in the study. And third is the scope of the research, as the study only considered one aspect of evaluation, which is the test created in the Quizalize app. There are other ways to measure the real impact of remediation activities like grading examinations or unit tests, achievement tests, and the like. Remediation activities can help students augment their learning behaviour and achieve their goals in their studies.

RECOMMENDATIONS

In the light of the conclusions drawn, the following recommendations are hereby drawn out by the researcher:

Mathematics should continue the remediation program in able to sustain the positive impact on the students' performance in Math.

Teachers should continuously attend more trainings and seminars on different teaching strategies in Mathematics for better teaching competency.

Teachers may use different websites, applications and online platforms to improve remedial activities.

There must be a continuous follow-up in the implementation of the remediation program.

It can be adopted by other teacher like in senior high school department or even tertiary level; and/or in other learning areas not only in Mathematics.

REFERENCES

1. Abdul Gafoor, K. & Kurukkan, A. (2015). Learner and Teacher perception on Difficulties in Learning and Teaching Mathematics: Some Implications. OI:10.13140/RG.2.2.21816. 14085

2. Alvarez, JI. & Galman, SMA (2023), HyFlex Learning: Continuing Tertiary Education in a Post – Pandemic Environment, Proceedings of the 3rd International Conference on Education and Technology (ICETECH 2022), Atlantis Press, 584 – 601. https://doi.org/10.2991/978-2-38476-056-5_57
3. Alvarez, J. I. (2023). Massive Open Online Course in Elementary Statistics: A Tool in Empowering Data Analysis for Philippine Pre – Service Educators. Asian Journal of Applied Education (AJAE), 2(3), 515–528. https://doi.org/10.55927/ajae.v2i3.4260
4. Alvarez, J. I., & Galman, A. S. M. A. (2023). Use of Filipino Language as Medium of Instruction in Teaching Advanced Algebra Class. European Journal of Science, Innovation and Technology, 3(2), 157-171. Retrieved from https://www.ejsit-journal.com/index.php/ejsit/article/view/192
5. Alvarez, J. I. (2023).Relationship between Mathematics Beliefs and Student Engagement in Mathematics as Mediated by Creative Self -Efficacy. EPRA International Journal of Multidisciplinary Research (IJMR), 9(3), 93-102.https://doi.org/10.36713/epra12481
6. Angeles, J.R. & Alvarez, J.I. (2023). CMS 21: Integrating Game-Based Learning in Basic Automotive. EPRA International Journal of Research and Development (IJRD), 8(3), 117 –124. https://doi.org/10.36713/epra12664
7. Alvarez, JI & Galman, SMA. (2024). UTILIZING DIGITALIZATION IN DIFFERENTIATION: INTEGRATION OF DESMOS IN LEARNING ANALYTIC GEOMETRY AND CALCULUS. Galaxy International Interdisciplinary Research Journal, 12(3), 127–140. Retrieved from https://internationaljournals.co.in/index.php/giirj/article/view/5303
8. Asio, J. M. R., & Jimenez, E. C. (2020). Effect of Remediation Activities on Grade 5 Pupils' Academic Performance in Technology and Livelihood Education (TLE). Pedagogical Research, 5(4), em0075. https://doi.org/10.29333/pr/8464
9. Bernardo, Allan B. I., Macario O. Cordel II, Minie Rose C. Lapinid, Jude Michael M. Teves, Sashmir A. Yap, and Unisse C. Chua. 2022. Contrasting Profiles of Low-Performing Mathematics Students in Public and Private Schools in the Philippines: Insights from Machine Learning. Journal of Intelligence 10: 61. https://doi.org/ 10.3390/jintelligence10030061
10. Kharbach, M. (2022). Quizalize – Engage your class using Game-based Quizzes. Retrieved from: https://www.educatorstechnology.com/2021/11/quizalize-engage-your-class-using-game.html
11. Li, Y., Schoenfeld, A.H (2019). Problematizing teaching and learning mathematics as "given" in STEM education. IJ STEM Ed 6, 44 (2019). https://doi.org/10.1186/s40594-019-0197-9
12. Mabuti, GDG. (2024). IMPROVING STUDENTS' MATHEMATICS SELF-EFFICACY AND LEARNING ACHIEVEMENT THROUGH GAME-BASED APPROACH IN INSTRUCTION. Galaxy International Interdisciplinary Research Journal, 12(3), 115–125. Retrieved from https://internationaljournals.co.in/index.php/giirj/article/view/5302
13. Moser Opitz, E., Freesemann, O., Prediger, S., Grob, U., Matull, I., & Hußmann, S. (2017). Remediation for Students with Mathematics Difficulties: An Intervention Study in Middle School. Journal of Learning Disabilities, 50(6), 724-736. Retrieved from

https://www.researchgate.net/publication/307945552_Remediation_for_Students_With_Mathematics_Difficulties_An_Intervention_Study_in_Middle_Schools

14. Rodrigue, A. T. (2017). Remediation and Intervention Strategies in Mathematics. Retrieved from https://classroom.synonym.com/remediation-intervention-strategies-mathematics-16873.html
15. Santos, J. (2021). Improving Acquisition of Learning Through Peer-Mediated Support Strategies in Teaching Research. EPRA International Journal of Multidisciplinary Research (IJMR), 6(5), 298–307. https://doi.org/https://doi.org/10.36713/epra4496, Available at SSRN: https://ssrn.com/abstract=4159143
16. Shuttleworth, M. (2009). Pretest-Posttest Designs. Retrieved Dec 13, 2022 from Explorable.com: https://explorable.com/pretest-posttest-designs