

Math-KABASA: A Localized Learning Innovation in Bridging Learning Gaps in Numeracy Among Struggling Secondary Learners

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Abstract: The Department of Education continues to seek improvement in the first full in-person school year after more than two years of modular distance learning. This study determined the effectiveness of Math-KABASA (Knowing and Amplifying Basic Arithmetic Skills and Attitude), a localized learning innovation that aimed to address learning loss in numeracy among 30 struggling secondary learners in Grades 7, 8, and 9 of Manalog Integrated School for the school year 2022-2023. A quantitative one-group pre-test and post-test pre-experimental design was used to examine how the Math-KABASA innovated module affected learners' learning output. An achievement test was used to measure the effectiveness of the innovation, and a survey was used to gather learners' perception and attitude toward the innovation and Mathematics learning. The findings showed a significant difference between the pretest and posttest scores. The study also found that localized learning resources helped improve the learning experience of struggling learners through simplified activities. The results of this study may be used in crafting the School Improvement Plan, Learning Continuity Plan, and School-Based Management, and may help teachers identify the interventions needed in Mathematics.

Keywords—mathematics; struggling; basic; learning outputs; innovation

INTRODUCTION

Mathematics is one of the fundamental learning areas in most educational systems, including the Philippines. It has become one of the learning parameters and is important in the development of every Filipino student so they can be competitive both locally and worldwide. However, the decline of mathematics performance among students has been a global concern in recent years (Mayer et al., 2010). Former Education Secretary Leonor Briones stated that the National Achievement Test results of Filipino learners gravitate toward low competency levels, especially in Science, Mathematics, and English. In the Program for International Student Assessment (PISA) 2018, Filipino students also ranked at the bottom in Science and Mathematics and last overall among the 79 participating countries.

The closure of schools during the rapid spread of COVID-19 put learners' education at risk and widened achievement gaps. Pecjo (2022) claimed that during the outbreak, students' mathematical abilities

advanced only to a minimal level. The study also pointed to home conditions, learners' attitudes and interest toward Mathematics, poor internet connection or lack of access, poor study habits, and distance learning as factors that affected learning output. In response, DepEd resumed in-person classes through DepEd Order No. 034, s. 2022. The Basic Education Development Plan (BEDP) 2030, Learning Recovery and Continuity Plan (LRCP), and classroom-based and system assessments were identified as guides in addressing learning gaps. Appropriate academic innovation and intervention in numeracy and literacy must therefore be provided to learners who perform poorly in reading and mathematics skills.

Different studies also show that teaching interventions can help struggling learners. Layug et al. (2021) found that different methods in teaching Mathematics can reduce the gap between learners who are likely to fail and those who are not. Behzadi et al. (2014) noted that students taught with emphasis on

study skills performed better than those taught through traditional instruction. Vang (1985) also explained that many student problems are caused by poor cognitive and metacognitive abilities. Liao et al. (2019) found improvement in learners' mathematical achievement, especially in calculation and word problems, through game-based learning. At the same time, Hwang et al. (2012) pointed out that in teacher-led instruction, all students are expected to learn in the same way, at the same time, and at the same pace. Gorman et al. (2009) observed that some interventions did not work as expected, but they also believed that group work and multiple intelligence-based activities could help learners understand and retain mathematical content. In the same way, Benazira et al. (2021) found that activities based on multiple intelligence helped the experimental group show better academic progress than those taught in the traditional way.

In Manalog Integrated School, school records showed a significant percentage of learners with low learning output in Mathematics. The average grade in Mathematics was 81.6 in school year 2021-2022 under modular learning, and 80.9 in the first and second quarters of the current school year. During in-person classes, students also expressed difficulties in Mathematics, especially in foundational skills and prerequisite competencies. Because of this, the researchers conducted an action research study using a one-group pre-test and post-test pre-experimental design to examine the effectiveness of Math-KABASA in improving the numeracy skills of struggling secondary learners.

METHODS

This study used a quantitative one-group pre-test and post-test pre-experimental design to investigate the extent to which the Math-KABASA innovated module affected learners' learning output. The participants were 30 purposively identified struggling learners from Grades 7 to 9 in Manalog Integrated School out of the 73 officially enrolled learners for the school year 2022-2023. They were identified using their first and second quarter learning output in Mathematics and the existing numeracy program profiling of the school.

Math-KABASA is a localized learning innovation that focuses on improving numeracy by helping learners know and strengthen their basic arithmetic skills and attitude toward Mathematics. It was used within the existing numeracy program of Manalog Integrated School, which was conducted during the first period in the morning every first week

of the month. The innovation focused on the least mastered competencies in Mathematics: Number Sense, Fundamental Mathematical Operations, Fractions, Operations on Integers, and Exponential Laws. In developing the innovation, the researchers adapted the ADDIE model, which includes analysis, design, development, implementation, and evaluation.

An achievement test was used to measure the effectiveness of the innovation. The test was first prepared with 40 items and was validated by subject specialists and a language expert. It covered Number Sense, Fundamental Mathematical Operations, Fractions, Integers, and Exponential Law, and it included a Table of Specifications. The instrument was pilot tested among non-struggling learners in Grades 8, 9, and 10 of Manalog Integrated School. Using the item analysis tool from DATstaT Analysis Center (2007), 9 items were identified as poor, 2 as good, and 29 as very good, with a mean score of 25.73 and a standard deviation of 4.77. After revision, the final test contained 30 items. A five-point Likert scale survey adapted and modified from Fortune et al. (2011) was also used to gather learners' perception and attitude toward the innovation and Mathematics learning.

The data were gathered by giving the achievement test before and after exposure to Math-KABASA. The pre-test was used to identify the least mastered competencies, while the post-test was used to determine the difference in learning output after the intervention. The survey was conducted after exposure to the innovation. The researchers secured a letter of authorization from the school head and obtained informed consent from parents and learners. IATF guidelines were also strictly followed during the conduct of the study. For data analysis, mean, standard deviation, and frequency were used to describe the learners' scores. A paired t-test was used to determine if there was a significant difference between pre-test and post-test scores, and descriptive statistics were used to describe learners' perception and attitude.

RESULTS AND DISCUSSION

Learning output before and after exposure to Math-KABASA. The pretest mean was 8.600 with a standard deviation of 3.338, while the posttest mean was 11.467 with a standard deviation of 3.702. Before exposure to the innovation, all 30 learners, or 100 percent of the participants, scored below 74 percent and did not meet expectations. After exposure, 28 learners, or 93 percent, still scored below 74 percent, while 2 learners, or 7 percent, reached the fairly satisfactory range of 75 to 79 percent. In the pretest,

the lowest score was 3 and the highest was 15. In the posttest, the lowest score was 8 and the highest was 20. These results show an increase in scores even if the learning output before and after the intervention remained in the lower half of the scale.

Difference between the pretest and posttest scores. The paired t-test showed a mean difference of -2.87, a 95 percent confidence interval of -4.93 to -0.81, a t-value of -2.84, and a p-value of 0.008. Since the p-value was lower than 0.05, the null hypothesis was rejected. This means that there was a significant difference between the pretest and posttest scores. The findings show that the innovation affected the learning output of the learners. The researchers also noted that the simplified progression of the lessons gave learners enough time to be assessed.

Learners' perception of the Math-KABASA innovated module. Out of the 15 perception items, 7 obtained mean scores from 2.61 to 3.40, which showed neutrality, while 8 items obtained mean scores from 3.41 to 4.20, which showed positive perception. This means that although almost half of the items were answered with neutral responses, the learners' perception of the innovated module leaned toward the positive side. The lowest mean scores were related to seeking help from the teacher and doing many class activities, while learners were more willing to work with classmates. The findings also showed that learners liked the activities, the problem-solving part, and the examples in the module.

Learners' attitude toward the Math-KABASA innovated module. Out of the 10 attitude items, 3 obtained mean scores from 4.21 to 5.00, showing the most positive attitude; 5 items obtained

mean scores from 3.41 to 4.20, showing positive attitude; 1 item fell under neutral attitude; and 1 item showed negative attitude. Learners liked the Math-KABASA module, found Mathematics useful in daily life, saw Mathematics as interesting, believed that Mathematics would help in their future career, and recognized that understanding Mathematics is important. At the same time, they also expressed that modular learning in Mathematics was not easy. Overall, their positive attitude toward the subject and the innovation outweighed the lower responses.

CONCLUSION AND RECOMMENDATION

The study found an increase in the learning output of learners after exposure to Math-KABASA. The p-value of 0.008 established a significant difference between the pretest and posttest scores, which shows that the innovation helped improve the overall learning output of the learners in the third quarter. Even if improvements are still needed in the module, it helped in the teaching-learning process as an additional material during the third quarter.

The study also showed that although learners still see Mathematics as a difficult subject, they recognize its benefits in daily life. With the learning loss brought by the pandemic, the use of localized learning resources improved the learning experience of struggling learners through simplified activities. For this reason, the results of the study should be integrated in the crafting of the School Improvement Plan, Learning Continuity Plan, and School-Based Management. The findings may also help teachers identify the interventions needed in Mathematics to improve learners' performance.

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