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Project MBO (Mastery of Basic Operations) In Improving the Numeracy Level of the K-3 Elementary Learners

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ABSTRACT

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The Department of Education prioritizes improving literacy and numeracy in early learners, according to a joint research center funded by the Australian government and tasked with advising the government on improving the basic education system amid a pandemic. The rationale of the study is to improve the academic performance of the Key Stage 1 learners, encourage them to strive for excellence, and help them appreciate the application of different mathematical concepts in real-life situations. Furthermore, this integration of a new pedagogical approach reinforces the implementation of interactive approaches in classroom mathematics and other learning areas so learners' performance in mathematics will increase and improve to above mastery level. The study used a descriptive quantitative design. Instruments such as the EGMA tool and teachers' self-made supplementary material were employed to assess the efficacy of the inquiry-based learning strategy

as measured by the mathematical achievement of K-3 Learners. The data showed significant differences between the learners' performance before and after Project MBO implementation through the different interventions of the K-3 teachers, such as the validated instructional materials and interactive lessons. Based on the findings of the study, a compendium plan served as the output of the study.

INTRODUCTION

Early childhood is a period of rapid learning and development for children. Young children can recognize numbers, patterns, and forms. They relate mathematical ideas to their surroundings and daily activities to make sense of the world around them. Children might, for instance, sort or select toys based on size, shape, weight, or color when they are playing (Jonas, 2018). While most of the concepts and skills needed to support numeracy are taught in the mathematics learning area, students' understanding is reinforced when they participate in activities that place what they learn in the mathematics classroom within the framework of other subject areas.

According to Yang (2022), the Department of Education prioritizes improving literacy and numeracy in early learners, according to a joint research center funded by the Australian government and tasked with advising the government on how to improve the basic education system amid a pandemic. Assessment, Curriculum, and Technology Research Centre has been working with the Department of Education to review the K to 12 curriculum. It gives technical support to the agency in large-scale assessments, including the Programme for International Student Assessment (PISA) and Trends in International Mathematics and Science Study (TIMSS). In addition, According to the Trends in International Mathematics and Science Study (TIMMS) (2019), Filipino students fell behind other countries in the international assessment for Mathematics. The country scored 297 points, which appeared to be the lowest among the 58 participating countries. In the Program for International Student Assessment (PISA) assessment 2018, the Philippines placed second to the lowest in Mathematics among 79 participating countries. This was validated by the statement of the Department of Education that they expected the outcome of the said assessment because learners were also not performing well in the National Achievement Test.

Improving the reading and math skills of K to 3 students, citing examinations conducted internationally that revealed Filipino students are falling behind their counterparts abroad. Issues related to their poor performance started early on when they were young. Learning math early on improves chances

of success in school and life. Meanwhile, the education department considers learning to read early as one of the most important outcomes of primary education. Reading is crucial to developing broad literary skills that will help the child successfully participate in society, the DepEd said in a 2019 memorandum.

In alignment with this, Nelson and McMaster (2019) found out that students who suffer in their first years of schooling with arithmetic and numeracy continue to struggle in later years, which may account for the student's poor performance on numeracy tests in later years of school. One of the key concerns of teachers who want to improve their student's academic performance is the development of numeracy skills. Without question, teachers and parents play a significant role in laying the groundwork for a strong foundation in learning so that children have the right tools for the job. They are responsible for ensuring that learning continues and that no students fall behind. They should consider and provide a range of solutions on how to keep studying and improve learners' numeracy skills despite the difficulties in our educational system. This is proof of the importance of enhancing the numeracy skills that are the basis of basic school.

Tallud and Caballes (2023) mentioned that the primary learners showed low performance in terms of numeracy skills. After eight weeks of the intervention program, it was shown that there was no significant difference in their numeracy skills. This implies a need to revisit intervention programs. Schools may apply other strategies to ensure the attainment of better numeracy skills of learners. Drills may be done, materials may be revised, and activities that cater to individual differences may be considered.

Basic mathematical skills during the early grades are important for future success in mathematics, which is instrumental for adults to function effectively in their work, profession, and everyday life. The "Mathematics Resources in the "Framework for Philippine Basic Education" can assist curriculum designers, educators, administrators, and legislators in creating and implementing mathematical curricula that enable students to "learn to learn" and improve their comprehension and application of mathematics in their everyday lives. The strategies consider only Grades 1-10. However, curriculum development could easily be extended to cover K 12 because of the progressive nature of the concepts.

In alignment with this, Bunggo Elementary School embraces Project DREAM of the Division of Calamba City. One of the goals of Project DREAM is to assess literacy and numeracy levels on the overall situation of learners, especially the marginalized. Project MBO focused on has always used various methods to uplift the quality of education and provide functional learning experiences to the pupils. PROJECT MBO (Mastery of Basic Operations) is one of the projects under the K-3 numeracy level. Its goals and objectives are

to decrease the number of learners who fall to non-numerates in mathematics, to track learners who have difficulty in mathematics, to improve learners' performance in mathematics, to provide appropriate instructional materials to help learners in mathematics, to differentiate activities suited to the ability of the learners and to monitor learner's performance in Mathematics. The Early Grades Mathematics Assessment (EGMA) is used as an assessment tool for numeracy. EGMA is an individually administered oral test that measures children's primary numeracy and mathematics skills in the early grades.

The researchers look forward to implementing PROJECT MBO in the classroom, which will improve the academic performance of the Key Stage 1 learners, encourage them to strive for excellence, and help them appreciate applying different mathematical concepts in real-life situations. Furthermore, integrating a new pedagogical approach reinforces implementing interactive approaches in classroom mathematics. It may be in other learning areas so that the learner's performance in mathematics will increase and improve to above mastery level.

OBJECTIVES OF THE STUDY

This study aimed to determine the effectiveness of Project MBO in improving the numeracy level of K-3 Learners of Bunggo Elementary School for the school year 2022-2023. Specifically, the study aimed to (1) determine the numeracy level of the respondents before and after the implementation of Project MBO, (2) identify the significant difference between the numeracy level of the respondents before and after the implementation of Project MBO, and (3) determine the compendium plan to be proposed.

FRAMEWORK

As shown in Figure 1, the independent variables comprised the Early Grades Mathematics Assessment (EGMA) Tool and the Instructional Materials used by the K-3 Teachers in conducting the Project MBO. At the same time, the dependent variable was the numeracy level of the K-3 learners. The proposed compendium plan was the crafted output of the Project MBO.

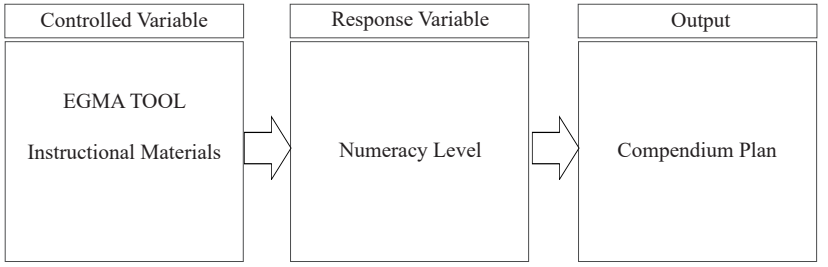

Figure 1. The Controlled-Response- Output Model

METHODOLOGY

Research Design

The study used a descriptive quantitative research design. To determine the effectiveness of Project MBO in improving the numeracy level of K-3 Learners of Bunggo Elementary School for the school year 2022-2023. The data, such as the before and after implementation of PROJECT MBO, was obtained. The use of the EGMA (Early Grades Mathematics Assessment) Tool and the self-made supplementary materials was validated in terms of specific objectives, content, the language used, and evaluation activities.

The researcher's self-made supplementary material in implementing Project MBO was based on the Inquiry-Based Learning Approach. Likewise, the design and the implementation of the instruction for each topic/lesson in the supplementary material were guided by the 5E inquiry-based learning cycle: engage, explore, explain, elaborate, and evaluate. The 5E Instructional Model gives coherence to various teaching approaches, establishes links between educational activities, and assists teachers in making judgments on student interactions (BSCS 2019). Compared to conventional teaching paradigms, the 5E learning cycle benefits students' scientific inquiry skills (Bybee, 2009).

Respondents

The respondents of the study were determined through a pretest administered to all Kindergarten to grade 3 learners in Bunggo Elementary School for the 2022-2023 school year. The three sections under Kindergarten have 80 learners: Grade 1 learners with two sections total 72 students, Grade 2 with 89 students, and Grade 3 with 74 students. The study used purposive

sampling and, according to Creswell (2014), suggests being purposeful in identifying participants that might provide insight into your research question. Purposeful sampling involves selecting participants because you believe that they might contribute something to your analysis.

Instrumentation

The data collected in the study was calculated and examined using descriptive statistics, including the minimum and maximum scores, mean, and standard deviation in the post-test and formative tests.

Data Gathering

Instruments, such as the EGMA tool and teachers' self-made supplementary material, was employed to assess the efficacy of the inquiry-based learning strategy as measured by the mathematical achievement of K-3 Learners.

After collecting the instruments, the results were tallied, analyzed, and interpreted using the appropriate statistical treatment.

The compendium plan as an output of the study was formulated based on the findings of the research study. The action plan used and will be used for future study, the collection of instructional materials, and e-learning and presentations.

Research Ethics Protocol

Permission was obtained from the office of the Schools Division Superintendent of Calamba City and the Principal of Bunggo Elementary School to conduct this study. Upon approval, the researchers administered the assessment to Kindergarten through Grade 3 learners using the EGMA tool.

Instruments such as the EGMA tool and teachers' self-made supplementary material, were employed to assess the efficacy of the inquiry-based learning strategy as measured by the mathematical achievement of the K-3 Learners.

After collecting the instruments' results, the results were tallied, analyzed, and interpreted using the appropriate statistical treatment and became the basis of the formulation of this study's conclusion and recommendations.

Statistical Treatment

The formula for the t-test for independent means was utilized in determining the significant difference between the post-test scores and formative test results. This measures the two groups of students' mathematics achievement

taught with the Conventional and Inquiry-Based Learning approaches.

Cohen's effect size estimation determined the magnitude of the mean difference before and after the implementation of the comparison and experimental groups. The following interpretation was considered in this study to determine the effect size of the magnitude of the mean difference.

The data collected in the study were tabulated and analyzed using mean, standard deviation, and minimum and maximum scores in the post-test and formative tests.

Table 1
Cohen's d Effect Size Standard/Interpretation

Cohen's Standard/Interpretation	Effect Size
Small	0.0 – 0.2
Medium	0.3 - 0.5

RESULTS AND DISCUSSION

A strong foundation in mathematics during the early grades is the key to future success in mathematics, which is instrumental in developing workplace skills and knowledge. It is often known that numeracy is essential as the cornerstone of lifetime learning, which needs to be embraced from a young age to assist children's accomplishments in extracurricular activities and the broader curriculum (Ofsted, 2017).

In addition, Aunio et al. (2021) investigated whether an intervention program could improve early numeracy in South African first graders at risk of mathematics learning difficulties. The participants were 267 children from 17 classrooms in Greater Johannesburg. The outcome measure was early computational skills in this small-group, quasi-experimental intervention study (15 sessions over 5 weeks). Based on initial pre-test numeracy scores, children were divided into an intervention group (n = 40), a low-performance control group (n = 32), and an average-performance control group (n = 195). The main finding was that the numerical relational skills of the intervention group improved more than those of the weak control group. The result of the PROJECT MBO showed a significant improvement in the numeracy level of the K-3 learners. Developing numerical skills- for young individuals, numeracy is a crucial subject to acquire in addition to the core part of mathematics and a life skill that allows kids a foundation to excel in learning and access the larger curriculum (Education Scotland, 2017).

Because early mathematics achievement affects later academic ability, Ofsted (2017) has emphasized the need to develop young children's numeracy skills. According to earlier studies, early mathematical proficiency is a reliable indicator of subsequent academic performance. This finding is consistent with those findings. According to current research and important education agencies, it is imperative to establish a solid foundation in math as early as possible.

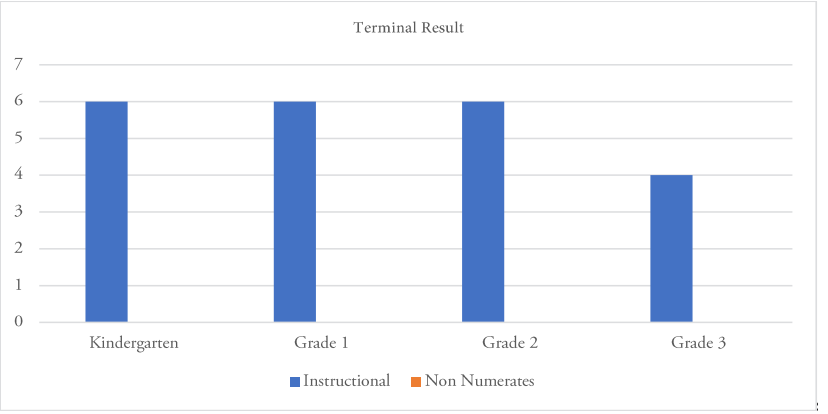

Figure 2. PROJECT MBO improvement in the numeracy level of the K-3 learners

From the GAP Analysis during the first quarterly assessment, 71 non-numerate learners cannot grasp the competencies needed in Mathematics and under the task part of the EGMA tool. The K-3 teachers, together with the supervision of the Master Teachers and School Head, used validated instructional materials to address the learning GAP in K-3. They also used different approaches, such as interactive lessons using CANVA and PowerPoint presentations.

According to Umugiraneza (2018), teaching aids, sometimes instructional resources, are tools educators use to illustrate and clarify concepts, methods, and phenomena they study. Instructional materials are any kind of aids that assist in teaching and learning activities, including reference books, counting equipment like blocks, stones, or beads, natural display models, charts, pictures, play materials, games, and audiovisual equipment. For any subject to be taught and learned successfully, instructional resources are required for both teachers and students. In keeping with this, educational resources make it easier for teachers to meet learning objectives and for students to comprehend the material in useful ways. In addition, The Early Grades Mathematics Assessment (EGMA) was used as a tool to assess the clientele.

From the results after implementing the Project MBO, the 71 non-numerates clientele of K-3 were improved to Instructional. It can be seen that 100% of the clientele improved their numeracy level because of Project MBO. In addition, it is feasible to alter the mathematics curriculum in schools. Resources are available to help educators enhance their abilities while assisting their students in developing their numeracy skills. Students must have solid numeracy skills, especially problem-solving, to seamlessly transition to fourth grade with higher-stakes testing. According to Vygotsky's sociocultural theory (1978), children develop into the intellectual society in which they are raised. Education must be centered on teaching students how to study in order to acquire knowledge, create, innovate, communicate, and discern. This will help students become lifelong learners. For educators, this entails helping their pupils develop strong learning habits.

CONCLUSION

From the results and findings of the study, Project MBO should be monitored by giving appropriate materials to ensure that the incoming K-3 learners will develop their mathematics skills. It is also effective to provide progress reports to parents regarding the status of their child, provide appropriate strategies suited to the learners' ability, and conduct meetings with the K-3 teachers regarding the implementation of Project MBO.

TRANSLATIONAL RESEARCH

The findings of this research could be translated into a compendium plan wherein an action plan for the next school year's implementation, validated instructional materials, interactive lessons, and daily lesson logs should be incorporated.

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