

Effectiveness of Mother Tongue-Based Instruction on Grade 1 Pupil's Performance in Mathematics

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Abstract—DepEd Order No. 16, s. 2012 emphasize Mother Tongue-Based Multilingual Education (MTB-MLE) to be taught in the Key Stage 1 classes as a subject and as a medium of instruction except for the English and Filipino subjects. Thus, teaching Mathematics uses mother tongue as medium of instruction. With this premise, the researcher decided to come up with a study to determine the effectiveness of mother tongue-based as medium of instruction in teaching Mathematics in Grade 1 classes. Utilizing the quasi-experimental research design for an in-depth analysis of the study, the researcher used a researcher-made Mathematics test questions in the 1st quarter Most Essential Learning Competencies (MELCs). Simple percentage and t-test of mean difference were the statistical tools used. Results of the study revealed a significant difference in the performance of the Grade 1 pupils in Mathematics before and after the exposure of mother tongue-based instruction in teaching the subject. Exposing the pupils to their mother tongue and providing activities which can be understood by the pupils greatly influence for an improved performance. Thus, mother tongue-based is an effective medium of instruction in teaching and learning Mathematics.

Keywords — *Effectiveness, Mother Tongue-Based Instruction, Grade 1 Pupil's Performance, Mathematics*

I. Introduction

One of the recent changes in the Philippine Basic Education Curriculum brought about by the K to12 program is the introduction of Mother Tongue-Based Multilingual Education (MTB-MLE) in Kindergarten and Grades 1-3 to support the goal of — Every Child - A- Reader and A – Writer by Grade 1. In school year 2012-2013, the Department of Education (DepEd) mandated all public schools to implement mother tongue-based multilingual education as part of the K to 12 curriculums. This is due to the difficulty of learners in understanding the language of education being used as a medium of instruction in the classroom (DepEd, 2011). The department believes that through mother tongue instruction it will develop a strong educational foundation and strengthen the cognitive development of learners (DepEd Order No. 74, s. 2009).

DepEd Order No. 16, series 2012 emphasize MTB-MLE to be implemented in two (2) modes: as a learning/subject area and as a medium of instruction. The Mother Tongue as a subject will focus on the development of beginning reading and fluency from Grades 1 to 3. The learner's Mother Tongue (L1) shall be used as the medium of instruction (MOI) in all domains/learning areas from Kindergarten through Grade 3 except for Filipino (L2) and English (L3). The L1 will continuously be used as MOI in a transition or bridging process (L1-L2-L1 or L2-L1-L2) through Grade 3. The L2 will be introduced in the first semester of Grade 1 for oral fluency and reading and writing will be introduced in the 2nd semester of Grade 1. The four (4) macro skills, namely: listening, speaking, reading and writing will continuously be developed from Grades 2-6.

In the Philippine educational system, mother tongue is used as a Medium of Instruction (MOI) to teach all the learning areas for literacy like Mathematics, Araling Panlipunan (AP), Music, Arts, Physical Education and Health (MAPEH) and Edukasyon sa Pagpapakatao (EsP) for Grades 1-3. These are the subjects most often cited by teachers as naturally suitable for the mother tongue, as the content lends itself to localization (Pillos, et al., 2020). However, the picture becomes rather complicated when the subject is Mathematics where learners today find difficulties in acquiring the concepts and skills essential to the subject. Moreso when learners are confronted with problem solving which is considered as the heart of Mathematics that highlights the role of language in the comprehension of mathematical word problems.

Mother tongue-based multilingual education program have been established in many minority language communities around the world. Most teachers, principals and parents of children in that program have found that students who begin learning in their home language have more confidence in themselves as learners, participate more actively in classroom discussions, ask more questions, demonstrate a deeper understanding of the subjects, learn to read more easily and understand what they read, learn to write more easily and express themselves better in written form and learn the school language – oral and written – more easily and with greater comprehension (Pillos, et al., 2020). Through a language a child is familiar with, the child is able to access the power of education, to develop the self-esteem and pride and his potentials (Id21 Insights, 2006). Children who read and write in the mother tongue before learning another language not only are more successful second language learners but also excel more quickly than their peers who did not become literate in their first language (UNESCO, 2006).

In the study of Setati et. al. (2008) which aimed at helping learners with this problem of comprehension of word problems by using the learners 'home languages as resources in the classroom offers versions of word problems in the learners 'home languages. They concluded that this strategy improves learners 'comprehension of the word problems and so makes the mathematics accessible to all the learners because they focus on the mathematics and not the language as is the case when comprehension is a problem. The problem for learners when working with English word problems is not only with terminology but comprehension of the entire problem.

Public Elementary Schools in the Philippines which are mandated to use mother tongue as a medium of instruction in teaching Mathematics in primary levels face the challenge of the department to provide a good quality of education. And despite the various teachers' trainings and workshops on the use of Mother Tongue as a medium of instruction and new sets of learners' materials provided by the Department, there are still problems regarding the implementation of the use of mother tongue in teaching Mathematics and learners are seem to have problems understanding the terms used (Tupas & Martin, 2017; Aliñab, Aguja, & Prudente, 2018; Cruz & Mahboob, 2018; Mendezabal & Tindowen, 2018).

As envisioned by the Department of Education (2010), the basic mathematical competencies shown by the pupils prepare them to understand better and demonstrate accurately the succeeding mathematics competencies which require putting together a group of competencies to solve a task. Such competencies include: (a) giving place value of each digit, (b) expressing the relationship of numbers, (c) rounding off numbers, (d) reading and writing money in symbols through 1 000, (e) compare value of the different denominations of coins and bills through 1 000, (f) adding whole numbers without regrouping, (g) adding whole numbers with regrouping; and (h) solving word problems involving addition. Moreover, the pupils exhibited mathematics competencies that are not stated in the list of competencies for elementary mathematics III but are listed in the other grade level mathematics competencies. Competencies found within the list of previous grade levels include the following: (a) associating zero with its value; (b) zero as an identity element of addition which are in elementary mathematics I; and (c) illustrating commutative property of addition which is in elementary mathematics II. The spiral nature of the competencies in mathematics may account for the possible demonstration of the pre-requisite competencies.

Using the mother tongue (Waray) to teach the basic concepts of numbers and operations helps build a strong foundation for the understanding and learning of higher mathematics. This approach is effective not only in getting the interest of students in the lesson but as a springboard in teaching new mathematical concepts and principles and in deepening student understanding on why mathematical operations or processes work (Toquero,2010). Thus, this study was conducted to evaluate the effectiveness of mother tongue-based (MTB) instruction on pupil's performance in Mathematics. A proposed training plan was formulated based on the findings of the study.

It is in the above premise that the researcher who is currently a Grade 1 teacher in the Astorga Elementary School, would like to delve worthy research undertaking that will benefit the school she is currently teaching and that of her Graduate Program she is enrolled at.

This study evaluates the effectiveness of mother tongue-based instruction on Grade 1 pupil's performance in Mathematics in Astorga Elementary School, Tunga District, Leyte Division for School Year 2021-2022. The findings of the study were bases for the proposed training plan.

Specifically, this study sought to answer the following questions:

1. What is the pupil's level of performance in Mathematics before exposure to mother tongue-based instruction?
2. What is the pupil's level of performance in Mathematics after exposure to mother tongue-based instruction?
3. Is there a significant difference in the pupil's performances in Mathematics before and after the exposure to mother tongue-based instruction?
4. What training plan can be proposed based on the findings of this study?

II. Methodology

Design. This study employed the quasi-experimental research design utilizing the pre-test and post-test to evaluate the effectiveness of mother tongue-based instruction on Grade 1 pupil's performance in Mathematics for School Year 2022-2023. Astorga Elementary School, Tunga District, Leyte Division is the main locale of the study. The 19 Grade 1 pupils enrolled in the said locale for School Year 2022-2023 are the main respondents of the study and a researcher-made Mathematics test questions in the 1st quarter Most Essential Learning Competencies (MELCs) in Mathematics was used. This research is focused in evaluating the pupil's level of performance before and after exposure to mother tongue-based instruction and its significant difference. A Proposed Training Plan based on the findings of the study is the output.

Sampling. There are 19 Grade 1 pupils involved in this study. The research questions were distributed and administered personally and in person during their Mathematics period with consent from the Local IATF and strictly following the prescribed Health Protocol.

Research Procedure. The researcher prepared the research design and tools to be utilized in the study. Approval and recommendation from the Panel of Examiner of the Graduate Studies was sought. A letter request to conduct this study was forwarded to the Office of the Schools Division Superintendent. Upon approval, permission from the District Supervisor and School Head was secured before the actual gathering of data. Orientation of the participants and administration of the pre-test was done through face-to-face after the approval of the permit from the parents of the respondents. After accomplishing the pre-test, intervention was given within four weeks. The exposure of Grade 1 pupils to mother tongue-based teaching in Mathematics follows as intervention in this study. Lesson plans were prepared, checked and utilized during the data gathering process. Matrix of activities was prepared to track the activities. The competencies listed for the quarter was utilized. All tools used were submitted to the School Heads and District Mathematics Coordinator for validation. After the four-week of intervention, post-test was administered. Results of the tests were collected. Data were tallied and submitted for statistical treatment. Analysis and Interpretation of Data. Making of Proposed Training Plan followed.

Ethical Issues. The right to conduct the study was strictly adhered through the approval of the Schools Division Superintendent of the Division, District Supervisor, and School Head.

Orientation of the respondents was done using face to face modality. In the orientation, issues and concerns were addressed and consent to be included in the study were signed.

Treatment of Data. The Simple Percentage was employed to evaluate the pre-test and post-test of the Grade 1 pupils in Mathematics. **t-Test of Mean Difference** was used to determine the significant difference in the pre-test and post-test performances of the Grade 1 pupils in Mathematics.

III. Results and Discussion

Table 1
Pre-Test Performance of Grade 1 Pupils in Mathematics

Score Range	Description	PRETEST	
		Frequency	%
17-20	Excellent	0	0
13-16	Very Good	0	0
9-12	Good	3	16
5-8	Fair	14	73
1-4	Poor	2	11
Total		19	100
Weighted Mean		6.84	Fair

Table 1 presents the pre-test performance of Grade 1 pupils in Mathematics. It was revealed on the table that among the 19 Grade 1 pupils tested, 3 or 16% got the score between 9-12 which is interpreted as good. This means that these pupils attain at least 50% of the number of items. This implies that these pupils need enrichment activities to improve their performance in Mathematics. They have little understanding with the terms in Mathematics.

Moreover, this table also shows that among the 19 Grade 1 pupils tested, 14 or 73% got the scores between 5-8 which is interpreted as fair. This means that these composed the greatest number of pupils tested. They are the pupils who need to review the fundamental lessons in Mathematics. This implies that these pupils are those with little understanding of the lessons taught. The fact that these pupils have less in person classes during their kindergarten class, yet some of them were able to achieve fair performance.

Lastly, this table shows that among the 19 Grade 1 pupils tested, 2 or 11% got the score between 1-4 which is interpreted as poor. This means that these two pupils experience hardship in answering the test. This implies that they need more activities and attention in order for them to be able to understand the lesson convey.

Further, the Grade 1 pupil's performance in Mathematics before the exposure to Mother Tongue-Based teaching has a weighted mean of 6.84 which is interpreted as fair. This means that the background knowledge of the pupils in terms of numeracy learning is limited. The fact that only the last quarter of their previous grade had they experience learning with teachers discussing the lessons but still they fairly perform in their Mathematics test. This implies that they need intervention to improve their performance and one of the interventions is to use their first language as medium of instruction in teaching the subject. MTB-MLE refers to —first-language-first education, that is schooling which begins in the mother tongue and transitions to additional languages particularly Filipino and English. It is meant to address high functional literacy of Filipinos where language plays a significant factor. Since the child 's own language enables her/him to express him/herself easily, then, there is no fear of making mistakes. It encourages active participation by children in the learning process because they understand what is being asked for them. They can immediately use their mother tongue to construct and explain their world, articulate their thoughts and add new concepts to what they already know (Capitol University, 2016).

Table 2
Post-Test Performance of Grade 1 Pupils in Math

Score Range	Description	POST-TEST	
		Frequency	%
17-20	Excellent	12	63
13-16	Very Good	7	37
9-12	Good	0	16
5-8	Fair	0	73
1-4	Poor	0	11
Total		19	100
Weighted Mean		17.26	Excellent

Table 2 presents the post-test performance of Grade 1 pupils in Mathematics. It was revealed on the table that among the 19 pupils tested, 12 or 63% got the scores of 17-20 which is interpreted as excellent. This means that after the exposure of the pupils to mother tongue-based in teaching Mathematics, their performance has improved. This implies that using the first language of the pupils as medium of instruction in teaching, surely that their performance will increase. This implies further that the pupils were able to understand what is being conveyed in the lessons. The activities provided which is MTB as medium of instruction helps the learners in mastering the concept in Mathematics.

Moreover, the table also shows that among the 19 Grade 1 pupils tested, 7 or 37% got the scores of 13-16 which is interpreted as very good. This means that these pupils also able to master the skills because the language used by teachers in teaching Mathematics lesson is their first language. This implies more understanding and mastery of the lesson is attained.

Further, the Grade 1 pupil's performance in Mathematics after the exposure to mother tongue-based instruction in teaching the subject got a weighted mean of 17.26 which is interpreted as excellent. This means that mother tongue-based instruction in teaching Mathematics aided the pupils to accurately learn the concepts. This implies that the language used in teaching and learning contribute meaningfully in improving the performance of the pupils.

According to DepEd (2013), MTB-MLE is formal or non - formal, in which the learner 's mother tongue and additional languages are used in the classroom. Learners begin their education in the language they understand best - their mother tongue - and develop a strong foundation in their mother language before adding additional languages. Research stresses the fact that children with a solid foundation in their mother tongue develop stronger literacy abilities in the school language. Their knowledge and skills transfer across languages. This bridge enables the learners to use both or all their languages for success in school and for lifelong learning.

Table 3
Test of Difference Between the Scores in the Pre-Test and Post-Test
of Grade 1 Pupils in Math

Aspects	Test Scores		Computed T	Critical T	Decision	Interpretation
Grade 1 in Math	Pre	6.84	3.226	0.391	Reject H_0	Significant
	Post	17.26				

Table 3 presents the test of difference between the scores in the pre-test and post-test of Grade 1pupils in Mathematics. It was revealed on the table that the pupil's performance in Mathematics before and after the exposure to mother tongue-based instruction in teaching the subject has a computed value of t of 3.226 which is greater than the critical value of t of 0.391, so null hypothesis is rejected. This means that there is a significant difference in the performance of the Grade 1 pupils before and after the exposure to mother tongue-based instruction in teaching Mathematics. The pre-test performance of 6.84 has increased to 17.26 in the post-test. This implies that the use of first language of the pupils which is mother tongue greatly affect their performance in the tests given. This implies further that mother tongue-based instruction is an effective medium of instruction in teaching Mathematics. The contextualize learning materials and activities and the language used in teaching greatly influence in achieving positive learning outcomes. The use of the mother tongue along instruction mirrors the aspiration of learners to promote national and cultural distinctiveness. Keeping the Philippine local languages alive ensures that the local languages will continue to be appreciated by Filipinos. Amidst the trends of globalization, local

dialects can survive through the constant use of the native speaker (Luistro,2013). The recently implemented K to 12 curriculum in the Philippines introduces the use of mother tongue as tool for instruction for grades 1 to 3, considering the country's linguistic abundance with its 180 local languages (Wa-Mbaleka,2014; Parba, 2018).

IV. Conclusion

This study revealed a significant difference in the performance of the Grade 1 pupils in Mathematics before and after the exposure of mother tongue-based instruction in teaching the subject. Exposing the pupils to their mother tongue and providing activities which can be understood by the pupils greatly influence for an improved performance. Thus, mother tongue-based is an effective medium of instruction in teaching and learning Mathematics.

V. Recommendations

1. The proposed training plan formulated should be utilized;
2. Teachers should be equipped with the knowledge in the terminologies used in teaching Mathematics using mother tongue-based as medium of instruction;
3. Teachers should provide contextualize learning materials and activities using mother tongue as medium of instruction;
4. Teachers should ask for assistance from the master teachers if find difficulty in the use of mother tongue as medium of instruction in teaching Mathematics;
5. School Heads should monitor the teachers in their teaching-learning process especially to non-speakers of the mother tongue of the pupils;
6. School Heads should provide appropriate technical assistance to the teachers especially if teachers find difficulty in teaching the subject;
7. School Heads should provide materials for the utilization of the teachers in the teaching-learning process;
8. School Heads should encourage teachers to provide the appropriate materials and activities to the pupils which will help improve their performance; and
9. Future researchers should replicate this study to include different locale and include different variables aside from the mentioned in this study.

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She was teaching for almost 9 years. 5 years at Cambalading Elementary School Albuera North District as a Kindergarten Teacher and 4 years at Astorga Elementary School, Tunga District as Grade 1 adviser she also attended series of webinars/seminars and trainings to increase her professional growth as a teacher.