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Mother Tongue Based Instruction and Grade 3 Pupils' Performance in Mathematics

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***Abstract*: The study aimed to determine the relationship between the teacher-respondents' perceived implementation of mother tongue-based instruction and grade 3 pupils' performance in Mathematics, school year 2021-2022. The respondents were all grade 3 teachers in the District of Masinloc totaling forty-one (41). The descriptive method of research was used. Checklist and pupils' performance in Mathematics were the tools to gather data. Casual observations and interviews were also employed to validate data gathered. Statistical tools applied were the frequency count, percentage distribution, weighted mean. Pearson (r) Product Moment Coefficient and analysis of variance. Findings revealed that teacher-respondents agreed on the use of mother tongue-based instruction in Mathematics and grade 3 pupils' performance in Mathematics was measured by their grade weighted average in Mathematics in grade 1, grade 2 and third quarter, school year 2021-2022 as reflected in their permanent records. Likewise, findings revealed the acceptance of the null hypothesis of no significant relationship between the teacher-respondents' perceived implementation of mother tongue instruction in Mathematics and pupils' performance, Likewise, significant difference was noted on teacher-respondents' perceived implementation of mother tongue-based instruction in Mathematics, hence, the hypothesis was rejected. To support the mother tongue-based policy as one of the mandates of the K to 12 curriculum, the study recommends provision and continuous in service trainings of teachers in MTB-MLE and provision of instructional materials in Mathematics which have been transcribed to the mother tongue of the learners.**

***Keywords*: mother tongue based-instruction, mother tongue based-multilingual education, grade 3 performance in mathematics, intervention plan.**

1. Introduction

According to a UNESCO report as cited by Giron (2019), learning in the 21st century is at the heart of the modern world's endeavors to become a knowledge economy. It is the key to empowering individuals to be today's world producers and consumers of knowledge. It is essential in enabling people to become critical thinkers who make wise and informed decisions. This can be attained if children begin to learn in their mother tongue and expand their perspectives using their first language and other languages.

The UNESCO report resonates with urgency the printed role of languages in achieving such learning. Researches conducted revealed that when academic language in the mother tongue is sufficiently developed among the learners, and when Language 1 (L1) is used, students learn how to read and write quickly and acquire other academic skills. They also learn a second language more quickly than those initially taught to read in an unfamiliar language.

Clearly, when the heritage language or mother tongue is accepted as the language of learning and used in school as the language of instruction, children are motivated to learn and stay in school. However, when a foreign language is used as language of instruction in the early years of schooling cognitive skills are not fully developed, self-confidence is not built, creativity is not nurtured, and worse, the learners are "pushed out" of the school.

In response to these challenges, the Department of Education (DepEd) implemented the Mother Tongue Based (MTB) instruction specifically in the Kindergarten, and Grades 1, 1 and 3 as one of the academic features of the K to 12 Curriculum. The mother tongue will be the main vehicle to teach understanding and mastery of all subjects such as Mathematics, Science, Araling Panlipunan, Edukasyon sa Pagpapakatao, Music, Arts, Physical Education and Health (MAPEH), Filipino and English. (SEAMEO INNOTECH K to 12 Toolkit, 2012).

In order to keep pace with the linguistic demands of the curriculum, the Mother Tongue Based-Multilingual Education (MTB-MLE) teachers should possess the disposition of being a polyglots that that is. This matter points out to the burden of educating the heterogenous learners considering their dialect variations with different cultural background.

Against this background, the researcher, a public elementary teacher in the early grades was motivated to conduct this study, to determine teachers' perceptions on mother tongue-based instruction in Mathematics and its relationship to the learners' performance in Mathematics in the early grades. Findings of the study would serve as reference to school heads as well as early grades Mathematics teachers on how to improve the delivery of the mother tongue-based instruction in Mathematics for improved pupils' performance in the said learning area.

By the passing of Republic Act (RA) 10533 otherwise known as the "Enhanced Basic Education Act of 2013" the Mother Tongue Based Multilingual Education (MTB-MLE) was introduced as one of the educational mandates of the K to 12 Curriculum. MTB-MLE as a salient part of the implementation of the K to 12 Basic Education Program is considered as the government's banner program for education.

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Mother Tongue-Based Multilingual Education refers to "first-language-first" education that is, schooling which begins in the mother tongue and transitions to additional languages. It starts from where the learners are, and from what they already know. This means learning to read, write and count in their first language or L1. Research shows that children whose early education is in the language of their home tend to do better in the later years of their education.

In MTB-MLE, teaching is done in more than one language beginning with the mother tongue. The mother tongue is used as a medium of instruction from Kindergarten to Grade 3 Mathematics. The use of the mother tongue eliminates the problem on language barrier in the early grades. With the use of the mother tongue as a medium of instruction it has been observed that classes in Mathematics have become more interactive. Children are now asking questions, reciting and actively participating in class activities. As RA 10533 states, MTB-MLE starts from where the learners are and from what they already know proceeding from the known to the unknown (Corpuz, et al 2015). This language policy supports that of the UNESCO which bear out its sprouting interest in promoting mother tongue-based education and to develop learning programs in Mathematics using the mother tongue (Valerio, 2015).

The study titled "Mother Tongue-Based Instruction in Teaching Elementary Mathematics" was conducted by Englis et. al (2021) to examine the implementation of teaching Mother Tongue-Based instruction in teaching elementary Mathematics in Balamban, Cebu Philippines. This study utilized quantitative method of determining the effectiveness of the use of mother-tongue in teaching Mathematics. The results revealed that the entry and exit performances of the learner-respondents on the implementation of Mother Tongue-Based Mathematics instruction are both above average. After the intervention which is the introduction of Mother Tongue-Based Mathematics training, there is a substantial increase in the performance of learners. It is concluded that when Mathematics is taught in mother-tongue, the retention skills and performance of the learners increases. Thus, it is effective and beneficial to the students' learning

The purpose of the study of Mohammed et al. (2016) is twofold. First, the aim is to prove the effectiveness of using children's home language and cultural tools in teaching and learning mathematics at primary school level in Fiji. For privacy reasons, the actual name of the participating school is not mentioned in the study. Secondly, the study also demonstrates how practicing teachers can use the problem-solving approach and selective analytics to do research in order to improve their own teaching and learning in the classroom. We believe that the new findings and methods demonstrated in this study will help improve mathematics teaching & learning processes and motivate teachers to collaborate with fellow teachers and do more researches in their classrooms and to publish their works.

However, despite the advantages associated with Mother Tongue, teachers generally felt Mother Tongue is not appropriate as a medium of instruction. A look at the catalogue of disadvantages raised against Mother Tongue is a pointer at the little value of worth placed on Mother Tongue as a subject and a language or instruction. Among the recurrent points raised was that Mother Tongue has limited vocabulary. This notion was in line with information obtained from observation and tape recordings where some teachers could not access the appropriate Mother Tongue Vocabulary during instruction. This was evident in a creative Arts lessons and a Mathematics lesson.

In addition to the limited vocabulary, the dominant item raised was Mother Tongue is not used by Kenya National Examination Council to test candidates nor is tested as a subject. Passing of a examination is a dream of every pupil and parent. It is regarded as very important because the pupils' prospect for further education and employment are dependent on their performance in the examination. Therefore, given the importance attached to the passing of examinations in English not in Mother Tongue, affects the market value of Mother Tongue. This is in relation to the reasons given in favor of English against Mother Tongue.

Summing up, the readings and studies both local and foreign reviewed by the researcher specifically the study of Abordo (2018) gave the researcher insights on how to conduct her study until its completion.

2. Methodology

A. Research Design

The descriptive research method was employed in the study. As the term implies, it proceeds to describe certain phenomena. Calmorin (2010) defines it as a purposive process of gathering, analyzing, classifying and tabulating data about prevailing conditions, practice, processes, trends and cause an effect relationships and then making adequate and accurate interpretation about such data. In this study, the researcher made use of the descriptive method of research. Documentary analysis was also employed.

B. Respondents of the Study

The teacher-respondents of this study were all the Grade 3 Mathematics teachers totaling forty-one (41) in Masinloc District, Schools Division of Zambales during the school year 2021-2022.

C. Research Locale

Masinloc a first class municipality, is the third northernmost town in Zambales and its approximately 27 kilometers from the capital of Iba. The municipality is politically subdivided into 13 barangays, as follows. Taltal, Bani, Baloganon, Collat, North Poblacion, San Salvador, Sta. Rita, Tapuac, Inhobol, Sto. Rosario and San Lorenzo. Its office is located at Barangay Inhobol.

D. Instruments

The researcher prepared a questionnaire survey check.

The following instruments were used to gather data:

1. *Information Sheet.* This instrument consists of item to draw significant information about the teacher-

respondents' profile in terms of educational attainment.

2. *Teacher-Respondents' Perceived Implementation of Mother Tongue-Based Instruction in Mathematics*. This instrument of the Likert type consists of fourteen (14) items on the use of mother tongue-based instruction in Mathematics was adopted from Abordo's study (2018). Five (5) options were offered to the teacher-respondents for a response which include the following: 5- strongly agree; 4 – agree; 3 – undecided; 2 – disagree; 1 – strongly disagree. To arrive at a verbal rating of each statement, the following arbitrary numerical guide was followed: 4.21–5.00 - strongly agree; 3.41-4.20 – agree; 2.61-3.40 – undecided; 1.81-2.60 – disagree; and 1.00-1.80 - strongly disagree.

E. Validity and Reliability of the Instrument

The researcher sought the assistance of her school head and colleague who is a master teacher and are knowledgeable in the preparation of the checklist. To establish the content validity of the checklist, the initial draft was shown to the principal in-charge of Multi Based-Multilingual Education (MTB-MLE) in the district and to her thesis adviser for their comments and suggestions. Items which were ambiguous were discarded while the weak ones were reconstructed and strengthened.

For reliability, the researcher employed the test-retest technique with an interval of two (2) weeks in the administration of the final form of the instrument to the Grade 3 teachers who were not respondents in this study. Employing the Pearson Product Moment Correlation Coefficient formula, the computed r of .79 which denotes high relationship indicates that the instrument was reliable. Garret as cited by Zulueta (2003) stressed that when the computed coefficient correlation is high, it follows that the research instrument is considered both valid and reliable.

F. Data Collection

The researcher sought the permission of the Schools Division Superintendent, Schools Division of Zambales through the Dean of Graduate School, Dr. Gloria D. Lacson Foundation Colleges, Inc. to allow her to administer her instrument to her target teacher-respondents. Upon approval, the researcher likewise, sought the assistance and support of her Public Schools District Supervisor and her School Head to permit her to administer the instruments to her teacher-respondents personally to ensure 100 percent retrieval of the instruments. Moreover, the researcher conducted observations and informal interviews with her teacher-respondents after the administration of the checklist to validate and confirm findings.

G. Data Analysis

1) Procedure of Analysis

The data gathered were statistically treated, analyzed and interpreted according to the specific questions raised in the study. Frequency and percentage to describe the profile of the teacher-respondents.

Weighted mean was employed to determine the teacher-respondents' perceived implementation of MTB-MLE in terms of the use of mother tongue as medium of instruction in Mathematics and on the needed instructional materials in Mathematics. Pearson Product Correlation (Pearson r) was used to determine the significant relationship between the teacher-respondents' perceived implementation of mother tongue-based instruction in Mathematics and grade 3 pupils' performance in Mathematics. The Analysis of Variance was employed to determine whether the teacher-respondents across educational attainment differ in their perceived level of implementation of mother tongue-based instruction in Mathematics.

3. Presentation, Analysis and Interpretation of Data

A. Teacher-Respondents' Demographic Profile

The profile of teacher-respondents in terms of educational attainment is presented in Table 1.

1) Educational Attainment

It can be gleaned from Table 2 that thirty (30) or 73.17 percent were holders of Bachelors' degree with Master of Arts (M.A) units; eight (8) or 19.51 percent were Bachelor's degree holder, while two (2) or 4.88 percent of them have obtained their Master's degree and one (1) or 2.44 percent obtained their Doctoral degree. This implies that majority of the respondents have earned some units in Master's degree.

B. Perceived Implementation of Mother Tongue-Based Instruction in Mathematics

Tables 2 to 3 present the degree and frequency distribution and weighted mean of teacher-respondents' perceived implementation of mother tongue-based instruction in Mathematics.

Table 2
Degree and frequency distribution of the teacher-respondents' perceived implementation of mother tongue-based instruction in mathematics

Limits	Frequency	Percentage	Cum. %	Degree
1-10	0	0	0	Very Low
11-26	0	0	0	Low
27-42	2	4.48	4.88	Moderate
43-58	26	63.41	68.29	High
59-70	13	31.71	100.00	Very High
Total	**41**	**100**		

Table 1
Frequency and percentage distribution of respondents in terms of educational attainment

Educational Attainment	Frequency	Percentage
Bachelor's Degree	8	19.51
Bachelor's Degree with MA Units	30	73.17
Master of Arts/ Master of Science (MA/MS) Graduate	2	4.88
MA/MS units with Doctoral Units	0	0
Ph.D/EdD Graduate	1	2.44
Total	**41**	**100**

Table 3
Weighted means and verbal description of the teacher-respondents' perceived implementation of mother tongue-based instruction in mathematics

Item Statements	Weighted Mean	Verbal Description
A pupil learns better through the use of Mother tongue	4.32	Strongly Agree
The use of mother tongue along instruction in the subject of Mathematics denotes easier, better learning among grades 3 pupils.	4.05	Agree
Pupils benefit much on the policy of MTB-MLE.	4.07	Agree
The use of mother tongue during class discussion creates a friendly atmosphere in the classroom between teachers and pupils	4.22	Strongly Agree
The Use of mother tongue encourages a relaxing learning atmosphere among learners.	4.17	Agree
The policy of MTB-MLE gives positive contributions to the bilingual children.	4.17	Agree
The use of mother tongue assures quality learning among learners.	4.05	Agree
Pupils agree mother tongue language can be used in translating the unknown words and difficulty.	4.24	Strongly Agree
Children whose primary language is not the language instruction in school are more likely to drop out of school, or fail in early grades.	3.49	Agree
Children who struggle to understand lessons in an unfamiliar language are more likely to skip school, drop out of school than those taught in mother tongue.	3.63	Agree
MTB-MLE cultivates critical thinking through talking about ideas in mother tongue.	4.17	Agree
Pupils lose interest in learning when mother tongue is disregarded in favor of an unfamiliar language.	3.83	Agree
A bilingual teacher requires specialized knowledge on the local dialect to assure teaching effectiveness for the learners.	4.17	Agree
The use of mother tongue encourages children to talk about their home and community experiences; motivates them to share their ideas and feelings, thereby building their self-confidence	4.29	Strongly Agree
Average Weighted Mean	**4.06**	**Agree**

Table 4
Grade 3 pupils' performance in mathematics in grade 1, grade 2, and third quarter in grade 3 school year 2021-2022

School	Grade 1	Grade 2	GRADE 3 (third quarter) 2021-2022	AVERAGE	Description
Bamban Elementary School	85	84	84	84.33	Satisfactory (S)
Bani Elementary School	86	85	85	85.33	Very Satisfactory (VS)
Bani Relocation Elementary School	85	86	85	85.33	Very Satisfactory (VS)
Bunga Elementary School	85	86	85	85.33	Very Satisfactory (VS)
Collat Integrated School	84	85	83	84.00	Satisfactory (S)
Coto Elementary School	85	84	83	84.00	Satisfactory (VS)
Felipe E. Estella Elementary School	85	85	84	84.67	Satisfactory (S)
Gregorio Ella Bautista Elementary School	85	84	84	84.33	Satisfactory (S)
Inhobol Elementary School	85	84	84	84.33	Satisfactory (S)
Mandaloy Elementary School	87	86	87	86.67	Very Satisfactory (VS)
Masinloc Central Elementary School	85	86	85	85.33	Very Satisfactory (VS)
Panglit Elementary school	85	85	84	84.67	Satisfactory (S)
San Lorenzo Elementary School	86	85	85	85.33	Very Satisfactory (VS)
San Salvador Elementary School	86	87	87	86.67	Very Satisfactory (VS)
Sta Rita Elementary School	86	85	84	85.00	Very Satisfactory (VS)
Sto.Rosario Integrated School	86	86	86	86.00	Very Satisfactory (VS)
Taltal Elementary School	85	84	84	84.33	Satisfactory (S)
Ubat Elementary School	86	86	87	86.33	Very Satisfactory (VS)
Average	**85.39**	**85.17**	**84.78**	**85.11**	**Very Satisfactory (VS)**

As presented in Table 2, majority of the teacher-respondents twenty-six (26) or 63.41 percent have high level of perception in terms of mother tongue-based instruction in Mathematics; thirteen (13) or 31.71 percent have very high level; two (2) or 4.88 percent were found to be moderate and no teacher-respondent scored low and very low in this aspect.

Table 4 presents the weighted means and verbal description of the teacher-respondents' perceived implementation of mother tongue-based instruction in Mathematics.

Range	Descriptive Rating
4.21 – 5.00	Strongly Agree
3.41 – 4.20	Agree
2.61 – 3.40	Slightly Agree
1.81 – 2.60	Disagree
1.0- 1.80	Strongly Disagree

The computed average weighted mean of 4.06 showed that the teacher- respondents agreed that a bilingual teacher requires specialized knowledge on the local dialect to assure academic effectiveness for the learners. They also agreed that children whose primary language is not the language of instruction in school are more likely to skip school, drop out of school, or fail in early grades. However, strongly agreed on the following: the use of mother tongue encourages a relaxing learning atmosphere among the learners; the use of mother tongue encourages children to talk about their home and community experiences; motivates them to share their ideas and feelings, thereby building their self-confidence; the use of mother tongue a relaxing learning atmosphere among the learners; a pupil learns better through the use of Mother tongue.

The overall teacher-respondents' perceived implementation of mother tongue-based instruction in Mathematics described as agree implies that the respondents as teachers of bilingual learners agreed with all the verbal statements on the use of mother tongue-based instruction in Mathematics which redound to improved pupils' performance in Mathematics.

Table 6
Observed r-coefficient to establish significant relationship between teacher-respondents' perceived implementation of mother-tongue based instruction and grade 3 pupils' performance in mathematics

Variable	r-value	Interpretation	Decision
Teacher-Respondents' Perceived Implementation of Mother Tongue-Based Instruction and Grade 3 Pupils' Performance in Mathematics	+0.2043	Negligible Correlation	Not Significant (Accept the null hypothesis)

Table 7
F-ratio for the analysis of variance of the teacher-respondents on the use of the mother tongue-based instruction in Mathematics across educational attainment

Source	SS	df	MS	F	Decision
Between -Treatments	10.23	3	3.41	47.99	Rejected(significant)
Within- treatments	3.70	52	0.07		
Total	**13.93**	**55**			

1) Grade 3 Pupils' Performance in Mathematics (in Grade 1; Grade 2; and third Quarter in Grade 3 school year 2021-2022)

Table 4 shows grade 3 pupils' Mathematics performance in terms of their grade weighted average in Mathematics in grade 1; grade 2; and third quarter in grade 3 school year 2021 – 2022.

Table 5
Descriptive rating

Rating	Description
90 – 100	Outstanding (O)
85 – 89	Very Satisfactory (VS)
80 – 84	Satisfactory (S)
75 – 79	Fairly Satisfactory (FS)
Below 74	Did Not Meet Expectations (DNME)

It could be gleaned from the table that the grade 3 pupils' performance in grade 1 was 85.39 described as very satisfactory; in grade 2 was 85.17 described as very satisfactory and during the 3rd quarter of school year 2021 – 2022 was 84.78 described as Satisfactory.

The data further indicate that generally grade 3 pupils were very satisfactorily equipped with the competencies expected from Grades 1 to 3 learners. They passed the standards set by the Department of Education (DepEd) which is 75 percent as stipulated in DepEd Order No. 8, s. 2015 "Policy on Classroom Assessment for the K to 12 Basic Education Program".

Apparently, a great number of schools (7 out of 18) massed under satisfactory descriptor. In an informal interview with some of the teacher-respondents, they said that the reason behind such performance was that they found difficulty in some topics which required translation of basic concepts to mother tongue. They also cited inadequate supply of teaching and learning materials specifically evaluation materials in some learning areas. They recommended that trainings/seminars on the effective implementation of mother tongue-based instruction be conducted to effect better learning outcomes in the early grades (grades 1 to 3).

2) Whether Teacher-Respondents' Perceived Implementation of Mother-Tongue Based Instruction in Mathematics is Significantly Related to Grade 3 Pupils' Performance in Mathematics

Table 6 presents the observed r-coefficient to establish significant relationship between teacher-respondents' perceived implementation of mother-tongue based instruction and grade 3 pupils' performance in Mathematics.

Legend:
±0.00 to ±0.20 Negligible Correlation (NC)
±0.21 to ±0.40 Low Correlation (LC)
±0.41 to ±0.70 Moderate Correlation (MC)
±0.71 to ±0.90 High Correlation (HC)
±0.91 to ±0.99 Very High Correlation (VHC)
±1.00 Perfect Correlation (PC)

The computed r of +0.2043 on the teacher-respondents' perceived implementation of mother tongue-based instruction and grade 3 pupils' performance in Mathematics is insignificant at .05 level which led to the acceptance of the null hypothesis of no significant relationship. This implies that the perception of the teacher-respondents on mother tongue-based instruction and the grade 3 pupils' performance in Mathematics are not dependent to each other in its pedagogical aspect meaning the language factor is not solely the factor in determining the pupils' performance in Mathematics.

3) Difference in the Teacher-Respondents' Perceived Implementation of Mother Tongue-Based Instruction in Mathematics Across Educational Attainment

Table 7 presents the observed f-ratio for the analysis of variance on teacher-respondents' perceived implementation of mother tongue-based instruction in Mathematics across educational attainment.

The teacher-respondents' perceived implementation of mother tongue-based instruction in Mathematics across educational attainment with an observed F-ratio of 47.99 is statistically significant at .05 level. Data disclosed that teacher-respondents who are Bachelor's degree with MA units tend to be more vocal in their views relative to the implementation of mother tongue-based instruction in Mathematics. Hence, the hypothesis that teacher-respondents' perceived level of implementation on the use of mother tongue instruction across educational attainment was rejected.

4. Conclusions and Recommendations

A. Conclusions

From the given findings, the following conclusions are hereby drawn, generally the teacher respondents were educationally qualified to teach in the public elementary schools. The teacher-respondents' agreed on the use of mother tongue-based instruction in Mathematics. The grade 3 pupils' performance in Mathematics in terms of their grade weighted average was very satisfactory.

The test of the relationship between the teacher respondents' perceived implementation of mother tongue-based instruction in Mathematics and grade 3 pupils' performance in Mathematics indicated no significant relationship. Teacher-respondents across educational attainment differ in their perceived implementation of mother tongue-based instruction

in Mathematics. Educational attainment is a factor that endows difference in the teacher-respondents perception on mother tongue-based instruction in Mathematics. The proposed school-based intervention plan for effective implementation of mother tongue-based instruction in Mathematics to enhance teachers' efficiency and effectiveness for improved pupils' performance in Mathematics was crafted by the researcher which school heads can implement in their school-based learning action cell sessions.

1) Recommendations

Based on the findings and conclusions the following recommendations were offered:

Teacher-respondents should pursue their graduate education so as to sustain/enhance their knowledge, skills and competencies in teaching Mathematics to improve pupils' performance in Mathematics. Continuous in-service trainings and further studies in the mother tongue-based education, monitoring and support must be provided to ensure that the Grade 3 teachers have the necessary skills needed to effectively teach Mathematics through mother tongue-based instruction, regardless of their educational attainment. Teacher-respondents should exert more efforts to enhance their classroom management skills to lessen or get rid of pupils' disruptive behavior so as not to disrupt the teaching-learning process in the classroom. To support the mother-tongue based policy as one of the mandates of the K to 12 curriculum, school heads should enhance teachers knowledge, skills and competencies in using Mother Tongue as a language of instruction in Mathematics through provision of enough textbooks or learning materials to pupils and teachers' guide manuals and the needed instructional materials in Mathematics which have been transcribed to the mother tongue to teachers. Capacitate teachers on the effective use of mother tongue along instruction or localized instructional materials needed in teaching Mathematics.

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