

EXAMINING THE EFFECTIVENESS OF THE MOTHER TONGUE-BASED INSTRUCTION IN TEACHING SCIENCE AT THE PRIMARY LEVEL

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ABSTRACT

The Philippines' bilingual status offers a unique opportunity for the adoption of the Mother Tongue Based-Multilingual Education (MTB-MLE) policy in elementary schools. This research aims to evaluate the effectiveness of using MTB in teaching Science to grade 3 students in Opol, Misamis Oriental. Thus, the study determines the level of proficiency of students in using non-MTB and MTB as teaching-learning strategies. The study involved 120 grade 3 students, and a standardized test questionnaire was used to assess the level of competency in MTB instruction than non-MTB. A quantitative experimental research design was employed to compare the test scores in non-MTB with MTB. The study found that the use of MTB instructions significantly improved students' comprehension of Science concepts, as evidenced by higher test scores compared to test scores in non-MTB classes. The research recommends the integration of MTBI into the classroom setting as a crucial medium of instruction to enhance learners' prior knowledge and skills at the primary level. The results of this study support the effectiveness of MTBI in teaching Science to grade 3 students and highlight the importance of using MTBI in primary education.

Keywords: Science Class, Level of Effectiveness, Mother-Tongue Based Instruction, Primary Education

1. INTRODUCTION

The Philippines, as a bilingual nation, presents a distinctive scenario in implementing mother tongue-based multilingual education (MTB-MLE) as a national policy during the elementary school years (Burton, 2013). While several studies have advocated for the use of the mother tongue as the medium of instruction in this context, it is noteworthy that most of these studies have focused on local rather than international contexts. The use of appropriate language in instructing students significantly affects their academic achievement and school success. For primary school students, the learning process heavily depends on language. It is essential for teachers to use the language that students first encounter at home in each subject area, as noted by Benson (2004).

In addition, according to Besa (2014), the implementation of Mother Tongue Based Language (MTBL) Education in the Philippine education system is driven by the advantages of promoting multilingualism among students. Former Secretary Jesli Lapus defines mother tongue-based multilingual education (MLE) as the proficient utilization of multiple languages for literacy and instructional purposes (Oyzon & Fullmer, 2009). This approach is now incorporated into the educational policies and programs of the Department for formal education. Learning in one's native language is crucial for preparing for English language learning since regional languages in the Philippines have different grammatical rules from English. The National Policy on Education (NPE) recognizes language as a tool for social interaction, national cohesion, and cultural preservation (Obod et al., 2019), and requires that every child learns their immediate environment's language (Indriani et al., 2019).

The adoption of Mother Tongue-Based Multilingual Education (MTB-MLE) in educational settings faces challenges in provincial regions, where a significant number of teachers, students, and parents hold reservations regarding its

impact on students' English language skills. According to certain academics, English and Filipino already enjoy official recognition as languages of instruction within academic contexts. Introducing additional languages, such as the mother tongue, as mediums of instruction may contribute to heightened linguistic confusion for students who regularly transition between language mindsets and attend multiple classes. Furthermore, concerns have been raised by educators regarding the use of students' mother tongues as instructional mediums for various academic subjects, particularly as many regional mother tongues lack intellectualization. Even Filipino, the country's primary language, poses intellectual challenges and has limited application in conveying scientific information, except in certain regional languages spoken in the Philippines.

The primary objective of this study was to evaluate the effectiveness of incorporating mother tongue-based instruction as a pedagogical approach in the teaching of the Science subject. Some parents prioritize their children's English fluency, causing some to have limited knowledge of their native language, such as Cebuano. With the K-12 program, the curriculum shifted to using mother tongue-based instruction for most lessons or topics, leading to difficulties for some learners in understanding the lesson due to language use. The most common problem of learners in the K-12 program is that some understand mother tongue-based instruction while others understand English instruction. The reason for using mother tongue-based instruction is to preserve language and culture. Due to technology, many 21st-century learners forget their native language, and the K-12 curriculum aims to develop children who are bilingual, bi-literate, and bicultural and provide quality education, especially for those who do not understand the official language used in school.

2. LITERATURE REVIEW

Mother-tongue-based programs in developing nations are generally effective in promoting second-language literacy through the mother tongue (Akinaso, 1991). However, simply speaking in the mother tongue is not enough to guarantee success. It is crucial to consider how the policy is implemented both at the national and local levels. Anthropological scholars argue that top-down language policy decisions prioritize expert knowledge over local knowledge (Canagarajah, 2018). Although quantitative evidence supports the use of mother-tongue-based education, it does not consider regional views on language acquisition. People on the ground have their own knowledge of what methods are effective or not, even if it is not recognized in the scientific literature (Canagarajah, 2017). While it is important to value local expertise, it is also necessary to be cautious about solely relying on it. It is important to bridge the gap between these two sources of information to ensure effective comprehension, without segregating minority communities or forcing them to abandon their own intellectual pursuits.

The adoption of the K-12 curriculum in the Philippines, as mandated by the Basic Education Act of 2013 (Republic Act 10533), introduced the practice of incorporating the mother tongue as a medium of instruction from Pre-Elementary to Grade III. This approach, known as Mother Tongue-Based - Multi-Lingual Education (MTB-MLE), involves the use of multiple languages for literacy and instruction in subjects like Mathematics, Science, Health, and Social Studies. To assess the impact of MTB-MLE on the English literacy development of Filipino children, an experimental study was conducted in Silang, Philippines. The study comprised two groups of 68 students from a public elementary school who underwent pre- and post-tests as part of the investigation. While both groups were assessed using the same tests, one group received instruction in their mother tongue, while the other group received instruction in English (Namanya, 2017). The findings revealed a decline in English literacy among students who received instruction in their mother tongue, thus highlighting the concerns raised by certain academics regarding language learning. The report concludes by proposing the need for further research in this area and providing recommendations for policymakers to consider.

During the academic year 2017-2018, De Vera and De Guzman (2018) conducted an extensive study utilizing descriptive and inferential research methods. The purpose of the study was to examine the English proficiency levels of elementary grade pupils, specifically those in Grades 1, 2, and 3, who were exposed to subjects taught in both their Mother Tongue and English. The research was conducted at Don Amadeo Perez Sr. Memorial Central School-Main, providing valuable insights into the English proficiency status of the students in the given setting. The study findings revealed a diverse range of academic performance in English across the three grade levels, spanning from "Outstanding" to "Fairly Satisfactory," with a majority of pupils falling within the lower proficiency levels. Conversely, students exhibited relatively stronger academic performance in their Mother Tongue, with proficiency levels varying from "Outstanding" to "Fairly Satisfactory." English proficiency levels exhibited variability, spanning from "High" to "Low." The association between the profile variables and English proficiency was found to be

dependent on the grade level. Specifically, for Grade 2 pupils, none of the profile variables demonstrated a statistically significant relationship with English proficiency levels. However, academic performance in the Mother Tongue displayed a significant association with English proficiency levels among Grade 1 pupils, whereas, in Grade 3, English proficiency levels were significantly linked to variables such as "sex," "academic performance in the Mother Tongue," and "academic performance in English."

3. METHODOLOGY

3.1 Research Design

This study utilized a quantitative approach for both data collection and analysis. This approach emphasizes objectivity, precision, and generalizability, as it aims to provide objective and reliable results that can be applied to a larger population. In this study, quantitative research involves experiments, and statistical analyses to generate numerical data that can be statistically analyzed to draw conclusions and make inferences about a population.

3.2 Respondents

In this study, the research participants were third-grade learners from Opol, Misamis Oriental. The researchers collected data from three sections of students with diverse backgrounds and abilities. The science teachers involved in the study were provided with a comprehensive lesson plan that included detailed instructions for the teacher's activities. The lesson plan was designed to be accessible to both English and mother tongue-based (MTB) instruction, ensuring that the teachers could effectively deliver the lessons using either language.

3.3 Research Instrument

The survey questionnaire in this study was conducted using post-test methods. In the post-test, the standardized test questionnaire from the pre-elementary Science modules of the Department of Education (DepEd), Division of Misamis Oriental, specifically on the topic of Position and Reference Points, was utilized as the research instrument. The same questionnaire was administered again to the same participants after a week of teacher intervention in the post-test as the learners' received mother-tongue instructions. The tests were conducted twice within a 1-week interval. The test was conducted to assess student achievement after administering the non-MTB instructions, and the same test was employed to assess student achievement after administering the MTB.

The assessment consisted of six tests, each containing a different number and type of questions. Test 1 consisted of 5 multiple-choice questions with 4 illustrations to choose from. Test 2 comprised 3 questions for identifying illustrations. Test 3 contained an illustration to analyze a situation with 2 questions. Test 4 had 3 multiple-choice questions with 4 choices of picture descriptions. Test 5 included 4 questions to determine the object's placement, while Test 6 had 3 questions for identifying the location. Each item was assigned 1 point, and the total score was 20 points.

3.4 Data Collection

The researchers-initiated communication with the school administrator/principal by means of a formal letter to request permission to conduct the research study within the institution. Additionally, a consent letter was provided to the cooperating teacher and the students, enclosed with detailed terms and conditions that govern their participation in the study.

The data collection of the participants, who were grade three learners, was arranged to coincide with their class hours. An orientation was conducted for the respondents regarding the research study, and the consent letters were collected after they had been signed. Only those who had agreed to the terms and conditions stated in the letter were given the orientation and included as respondents in the study.

3.5 Statistical Treatment

The study employed various statistical tools to analyze and interpret the data, which included mean and standard deviation used to determine the effectiveness of the MTB, while the T-test was utilized to determine the statistical significance of students' proficiency level in Mother Tongue-Based instruction. The categorical responses used in the study were based on DepEd order no. 73, s. 2012, which is commonly known as 'General Guidelines for the Assessment and Rating of Learning Outcomes'.

Table 1. The Effectiveness Level Guide

Score Range	Equivalent	Level of Proficiency
0 – 4	75 – below	Beginning
5 - 8	76 – 81	Developing
9 - 12	82 – 87	Approaching Proficiency
13 - 16	88 – 94	Proficient
17 above	95 – above	Advance

4. RESULTS AND DISCUSSION

The study's findings were presented in a sequential manner, aligning with the specific research questions. To facilitate comprehension and analysis, the results were organized in a table format accompanied by a detailed discussion.

4.1 Test Scores in Non-MTB Instruction

Table 2 presents the test scores of grade 3 students in the Science subject who received non-MTB (Mother Tongue-Based) instruction. The results are displayed using frequency and percentage distributions.

Table 2. The Test Score in a Non-MTB Instruction

Scores Range	Frequency	Percentage	Level of Effectiveness
0 – 4	6	5.00	Beginner
5 – 8	6	5.00	Developing
9 – 12	50	41.67	Approaching Effective
13 – 16	38	31.66	Effective
17 and above	20	16.67	Advance Effective
TOTAL	N = 120	100 %	

Table 2 revealed that a substantial portion of the student population, specifically 50 students, obtained scores within the range of 9-12, representing approximately 41.67% of the total sample. This indicates that a significant number of students fall into the category of "Approaching Proficiency" based on their test scores. Bernardo et al., (2023) posit that the Philippines was identified as one of the countries with low performance in science, with an average score of 357. This score is considerably lower than the OECD average score of 489. Interestingly, both boys and girls performed similarly in science, with average scores of 355 and 359, respectively. Unfortunately, only approximately 22% of the students in the Philippines achieved Science Literacy scores at Level 2 or higher.

The inadequate academic achievement of Filipino students is evident in the fact that approximately 77% of them failed to meet the minimum proficiency level. At the lower levels of proficiency (1A and 1B), students possess limited skills in utilizing basic knowledge and procedures to explain familiar concepts. Their capacity to comprehend data and engage in scientific inquiry is greatly constrained (Bernardo et al., (2023). The use of a non-MTB (Mother Tongue-Based) approach in teaching may further hinder students' understanding as they need to translate from their second language (L2) to their first language (L1) when comprehending text and participating in discussions. This language barrier can negatively impact their academic performance and test results in the subject.

In general, the inadequate academic achievement of Filipino students is evident as a significant portion of them fail to reach the minimum proficiency level. Their limited skills in utilizing basic knowledge and procedures, as well as their constrained capacity to comprehend information and engage in scientific inquiry, contribute to their academic struggles. Additionally, the use of a non-MTB approach in teaching, which requires translation from L2 to L1, further hampers students' understanding and may negatively impact their overall performance in the subject.

4.2 Test Scores in an MTB Instructions

Table 3 illustrates the examination scores of grade 3 students in the Science subject who were instructed using the Mother Tongue-Based (MTB) approach. The outcomes are presented using frequency and percentage distributions, providing a comprehensive overview of the learner's performance.

Table 3. The Test Scores in an MTB Instruction

Scores Range	Frequency	Percentage	Level of Effectiveness
0 – 4	0	0	Beginning
5 – 8	0	0	Developing
9 – 12	8	6.67	Approaching Effective
13 – 16	84	70.0	Effective
17 and above	28	23.33	Advance Effective
TOTAL	N = 120	100 %	

The study findings suggest that the use of mother tongue-based instruction yielded positive results, with the majority of the students achieving scores ranging from "Approaching Effective" to "Effective". The students' test scores showed a higher level of similarity and improvement in competence levels was observed after the interventions were administered by the teacher prior to the post-test. Additionally, the implementation of DepEd's new curriculum was found to have a positive impact on the student's performance, as evidenced by their higher scores. The study's results are in line with UNESCO's (2022) research, which highlights the importance of education in one's mother tongue for inclusive and quality learning, leading to improved academic performance and learning outcomes.

Similarly, in the study of Kadtong (2017) on the non-MTB and MTB instruction it was found that upon comparing the test assessment results between the Non-Mother Tongue-Based (Non-MTB) class and the Mother Tongue-Based (MTB) class, it was observed that the MTB class achieved higher academic performance in the five subject areas, namely Reading, Mathematics, Filipino, English, and Social Studies. However, the improvement in the MTB class was relatively smaller compared to what is typically observed in MTB programs. Possible reasons for the smaller gain in academic performance in the MTB class compared to the Non-MTB class could include the program's newness and teachers' learning curve in teaching in the first language (L1), inadequate teacher training and preparation, limited reading practice and material availability, confusion caused by code-switching between languages, difficulties in accurately measuring progress, and higher levels of bilingualism among students.

4.3 Comparative Results of the non-MTAB and MTB Scores

The following table provides a summary of the examination outcomes for the students in the Science Class who were instructed using both non-MTB and MTB approaches.

Table 3. The Non-MTB test and MTB Test Scores

Post-Test Results	\bar{x}	SD	T-Results $\alpha = 0.05$	Decision
Non-MTB	12.61	4.046	-6.154	Reject Ho
MTB	15.17	2.096	t = -1.980	Significant

The performance evaluation was conducted on a cohort of pupils enrolled in the pre-elementary class who received instruction based on their mother tongue. The test results revealed a range of scores, with the lowest recorded score being 3 and the highest score reaching 19. The average score obtained on the non-Mother Tongue-Based (MTB) test was calculated to be 12.61, with a standard deviation of 4.046. These findings indicate that the overall performance of the group can be categorized as "Approaching Effective." In contrast, the MTB test scores exhibited a range from 12 to 20, with a mean score of 15.71 and a standard deviation of 2.096, indicating that the group's performance falls within the category of "Effective." These results suggest that the implementation of Mother Tongue-Based Instruction had a positive impact on the pupils' performance, as evidenced by the improvement from the "Approaching Effective" category in the pre-test to the "Effective" category in the post-test assessments.

Based on the results obtained from both the non-Mother Tongue-Based (MTB) test and MTB test, it is evident that the null hypothesis (Ho) can be rejected, as the findings demonstrate statistical significance. Furthermore, the data presented in Table 3 further support the rejection of Ho, indicating a significant disparity between the pre-test and post-test performance of the pupils enrolled in the Mother Tongue-Based Learning (MTBL) program. Consequently, the findings of the study provide support for the acceptance of the alternative hypothesis (Ha), suggesting a substantial distinction in the performance of MTBL pupils between the pre-test and post-test assessments.

The test results clearly indicate the effectiveness of mother-tongue-based instruction in the science education of pre-elementary students, highlighting their proficiency in utilizing this approach to grasp new concepts. Substantial improvement in competency is observed following the teacher's interventions during the period preceding the post-test. As Awopetu (2016) suggested, the positive impact of using the mother tongue in learning can be attributed to the absence of the need for mental translation of concepts presented in Yoruba, rather than English, enabling students to grasp the meaning of the concepts more effectively.

5. CONCLUSION AND RECOMMENDATIONS

Based on the study's findings, it can be concluded that mother tongue-based instruction is an effective and enjoyable approach for students to learn and retain lessons. The use of standardized test questionnaires allowed for assessing students' proficiency and monitoring their progress. The study's outcomes support the concept of anchored teaching, emphasizing the importance of learning in one's mother tongue to acquire essential concepts and intellectual abilities that are valuable throughout life. This approach proved effective across different proficiency levels among grade 3 students. Overall, the study's findings provide clear evidence of the success of mother tongue-based instruction in enhancing proficiency and deepening students' understanding of their mother tongue, making it a valuable tool for classroom instruction.

Based on the findings and conclusions of the study, it is recommended that teachers continue to utilize the mother tongue as an effective tool for instruction. Persistence in incorporating the mother tongue in teaching practices is encouraged. Additionally, it is suggested that students develop familiarity with their home language to enhance their academic success, particularly considering the inclusion of mother tongue-based education in the new curriculum. For future researchers, it is advised to explore similar studies across multiple grade levels and different subjects to assess the competency levels in various academic areas. Furthermore, conducting the study with a larger sample size of students/respondents is also recommended.

6. REFERENCES

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