EFFECTS OF BILINGUAL LANGUAGE UTILIZATION ON STUDENTS' PERFORMANCE

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ABSTRACT: This study examined the effects of using bilingualism as a medium of instruction in teaching mathematics. It employed a pretest-posttest equivalent group research design. The study participants consisted of two entire classes of Grade 8 students of Cantilan National High School, each section comprising 40 students. The researcher utilized 20-item multiple-choice test questions from the Mathematics 8 Learners' Module. Findings revealed an increase in the students' performance from the experimental and control groups; the two groups also differed in their mean scores regarding the pretest and post-test results. The pretest of the two groups was found not to be significantly different, and the posttest of the two groups was found to be significantly different when the mean gain score was tested. This study recommended that mathematics teachers may be encouraged by the administration to contribute their unique expertise to bilingual programs, and teachers could find means to have adequate knowledge of mathematics content and be able to create a classroom environment in which students can express themselves through their preferred language. Keywords: Monolingualism, Effect, Utilization, Performance

INTRODUCTION

It is essential to consider the choice of language as the medium of instruction in the teaching-learning process. Teachers communicate subject content and instructions through language, and students also listen and interact through it. Hence, language is an integral feature of educational practice in the classroom, and its choice varies from country to country. Likewise, some countries use English as a medium of instruction because it is an international language; some use their national language, and others use bilingualism. The Philippines is one of the countries that have implemented bilingualism, which has become the foundation of bilingual education and Filipinos are considered as non-native English speakers. Thus, mathematics teaching and learning require both the teacher and the learner to communicate effectively. This study investigated the effect of bilingualism as a medium of instruction in teaching mathematics lessons.

In the study conducted by Durga [1], she emphasizes the bilingual method for Indian students. This method allows the teacher and pupils to use two languages: the target language to be learned and the mother tongue used to achieve the target language, English. The teacher frequently reads and transforms the text into the pupil's mother tongue. The vital contribution of this method is that it has made it possible for the students to acquire both quantitative and qualitative language skills. According to Dixon [2], when a student interprets what an educator teaches, his interpretation is influenced by his language knowledge. However, it would be a challenge to classroom mathematics teachers considering the "technical/mathematical terms" used in content learning. Mathematics has been taught in English. Textbooks are also written and published in the said language. Moreover, Filipinos are non-native English speakers. Mathematics teaching and learning require the teacher and the learner to communicate effectively. According to Riordan and McCluskey (2015) [3], investigating bilingual mathematics learners is complex, and research has demonstrated that language-switching practices are also complex and involve not only social and cultural aspects but also cognitive aspects. Moreover, local studies show there is an increase

in student comprehension, interest, performance, and faster learning in using a bilingual medium of instruction for Hiligaynon [4] and English-Meranaw [5].

Many problems still exist when it comes to the teachinglearning process in mathematics. Despite the importance of mathematics nowadays, it is unfortunate that many students have erroneous impressions about mathematics and dislike Mathematics lessons. These scenarios might be attributed to the medium of instruction used to deliver lessons in mathematics. The relation between instruction and its medium is an indispensable one. Learner's performance is greatly affected by the medium of instruction being implemented. Also, the Department of Education's approach continues to rely on an analysis of Filipino students' English proficiency to understand the shortcomings in mathematics performance. Culturally, the diversity of the different languages in the Philippines may present a challenge in implementing only mono-linguistic national-scale blanket education policies. The challenge for educators is to continue learning more about the possible effectiveness of a diverse Bilingual Education. Moreover, implementing MTB-MLE is still a comprehensive experiment among teachers and researchers. Thus, this study will bridge the gap to support the students' full performance in mathematics.

In response to the pressing need to uplift and enhance the performance of the students in mathematics, the researcher aimed to contribute to finding effective ways of developing and molding our students to be knowledgeable in the field of mathematics and become better citizens using bilingual as a medium of instruction in teaching mathematics. This study investigated students' performance in mathematics learning using pure English compared with English supplemented with Mother Tongue as a medium of instruction. In which, this study sought to answer the following questions:

- 1. What are the respondents' pretest and posttest mean performance in the control and experimental groups?
- 2. Is there a significant difference between the pretest and posttest mean performance of the control and experimental group?

3. Is there a significant difference between the mean gain scores of the control and experimental groups?

Hypothesis

The following hypotheses were tested at a 0.05 level of significance:

Ho₁: There is no significant difference between the pretest and posttest mean performance of the control and experimental group.

 Ho_2 : There is no significant difference in the mean gain scores of the control and the experimental group.

MATERIALS AND METHODS

This study employed an Experimental design, specifically the pretest-posttest equivalent group design. The design was the same as the classic controlled experimental design. Below is the design, which involved one treatment group being modeled.

Groups	Pre-test	Treatment	Post-test
Using Bilingual	O ₁	T ₁	O ₂
Using Monolingual	O ₁		O ₂

This study was conducted at Cantilan National High School along the highway in the northern part of Surigao del Sur. The school mentioned above is a public secondary school offering three curricula in high school: Regular K-12 Curriculum, Science Technology Engineering Curriculum (STE), and Special Program in the Arts Curriculum (SPA). In the study, the researcher used the purposive sampling method. Two Grade 8 sections comprised of 40 students in every section were utilized. With this, one section (Grade 8-Molave) was assigned as the controlled group exposed to English only as a medium of instruction. Another section (Grade 8-Yakal) was assigned as an experimental group, and the group was exposed to English supplemented by the mother tongue as a medium of instruction.

 Table 1. Distribution of the Subjects of the Study

Classes/ Section	No. of Subjects
8- Molave (Control)	40
8- Yakal (Experimental)	40
TOTAL	80

A 20-item multiple choice test was used during the pretest, and the same test question was administered in the post-test taken from the Mathematics 8 Learners Module covering Introduction to Probability. The 4a's Lesson Plan covered the whole unit and was used to conduct the lessons.

Data Gathering Procedure

A letter requesting permission was presented to the Principal of Cantilan National High School, allowing the researcher to use the Grade 8 Regular K to 12 sections Molave and Yakal students as the research subjects. Upon approval, the letter was forwarded to the Grade 8 Level Coordinator of the said school. The researcher arranged the schedule for the pretest and posttest. Tossing a coin was done in assigning the control and the experimental group. The section that chose the head was the control group, and the section that chose the tail was the experimental group. It was ensured that the control group was exposed to English as the only medium of instruction. The section assigned to the experimental group was exposed to English supplemented by the mother tongue as a medium of instruction. The respondents of the two groups were given 40 minutes during the pretest. The topics covered were delivered and discussed for two (2) weeks. After all topics had been tackled, another 40 minutes was given during the posttest.

Statistical Treatment

After the data gathering, the data were subjected to statistical treatment. The mean and standard deviation were utilized to determine the mean performances of the control and experimental groups in the pretest and posttest. A t-test was utilized to determine the significant difference between the pretest and posttest performance of the control and experimental groups. It was also used to determine the significant difference between the control and experimental groups.

RESULTS AND DISCUSSION

 Table 2: The mean performance of the control and experimental

 group

Type of Group		Pretest		Posttest			
	Ν	Mean	SD	Ν	Mean	SD	
Control	40	5.55	1.72		11.15	2.36	
Experimental	40	5.8	1.83		14.37	2.06	

The table above presents the mean performance of the control and experimental groups on their pretest and post-test. As shown, the mean in the pretest of the experimental group was 5.8, and the control group's mean was 5.55. This implies that the two groups almost have the same level of performance during the pretest. Additionally, the two groups' post-test means are 14.37 for the experimental group and 11.15 for the control group. This implies that the experimental group performed better than the control group during the post-test. Moreover, standard deviation values (posttest) are shown in the table, with the experimental group having 2.06, which is lower than the 2.36 for the control group. This further implies that the scores of the experimental group are more clustered closer to the mean compared to the control group's scores. Lastly, these results imply that the students exposed to bilingualism performed better than those exposed to monolingualism.

This conforms to the result of the study by Launio [4] entitled, "Instructional Medium and its Effect on Students' Mathematics Achievement," where students' mathematics performance before the intervention was low but progressed to average after they were exposed to bilingual instruction. Thus, teaching mathematics in bilingual is better than teaching the subject.

 Table 3: Significant values on the difference between the pretest and posttest mean performance of the control and experimental group.

	Group	Mean	SD	t-value	p-value	Decision	Interpretation	
		Score						
Pretest	Control	5.55	1.72	0.02	0.000	Failed to	Not	
	Experimental	5.8	1.83	0.03	0.200	reject H₀	significant	
Posttest	Control	11.15	2.36	6.54	0.0001	Reject	Cian'f and	
	Experimental	14.37	2.06	1000.0 10.00		Ho	Significant	

The table shows the significant values of the difference between the pretest and posttest performance of the control and experimental groups. As shown, the t-test value during the pretest is 0.63 with a p-value of 0.266, greater than the 0.05 significance level. This implies that there is no significant difference between the pretest performance of the two groups. This further implies that the two groups at the start were comparable in understanding the subject matter.

However, the computed t-value of 6.51 with a p-value of 0.0001 during the post-test reveals a significant difference between the mean performance of the two groups. This implies that the two groups differ significantly in their scores. The effect of using bilinguals as a medium of instruction in teaching mathematics in the experimental group significantly differs from using English alone in the Control group. Hence, using the bilingual medium of instruction in teaching mathematics significantly increases their understanding of the subject matter of the experimental group.

The finding corroborates to the study of Cummins (2010) [6], which found that bilingual education promotes both language learning and academic achievement.

Table 4: Significant value on thedifference between the mean gain scores of thecontrol and experimental group

Group	Mean Gain Score	SD	t-value	p-value	Decision	Interpretation
Experimental	8.57	1.30	7.040	.00001	Reject H₀	Significant
Control	5.83	2.11	7.018			

As shown in Table 4, the experimental group had a higher mean gain score of 8.57 than the control group, which had a 5.83. It is also shown that the experimental group has a smaller standard deviation (1.30) than the control group (2.11). These results revealed that the experimental group performed better than the control group after exposure to bilingualism. Additionally, the computed t-value is 7.018 with a p-value of 0.00001, less than the 0.05 significance level. This implies that the null hypothesis is rejected and a significant difference exists between the control and experimental groups' gain scores. This further implies that both groups differ significantly in their understanding of the concept of the subject matter with the introduction of the bilingual medium of instruction in teaching mathematics. This result affirmed the study of Wolfaardt [7], which shows that those students exposed to bilinguals show better performance than traditional.

CONCLUSIONS

Based on the findings, the researchers concluded that bilingualism effectively increases students' performance in mathematics. It also boosts a significant increase in performance compared to teaching with monolingual (English language only). Moreover, the bilingual medium of instruction in teaching mathematics positively affected students' understanding and performance in mathematics.

RECOMMENDATIONS

Based on the conclusions, the following recommendations are given:

- 1. Mathematics teachers may be encouraged to contribute their unique expertise to bilingual programs that enhance students' learning opportunities.
- 2. Teachers could find means to have adequate mathematics content knowledge to create a classroom environment where students can express their understanding and misunderstanding through their preferred language without hesitation.
- 3. Parallel study may be conducted in other schools to support further and improve its effectiveness.

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