

Numeracy Achievement of Learners: An Aftermath of Mother Tongue- Based Multilingual Education

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ABSTRACT

Although there are obvious advantages in having a multilingual education system, it remains a challenge to Mathematics educators. This study determined the numeracy achievement of Grade IV pupils as an aftermath of the use of Mother Tongue as the Language 1 and English as the Language 3 in San Juan District, Schools Division of Ilocos Sur during the School Year 2017-2018. The pupils' numeracy achievement was measured by means of an achievement test using the Mother Tongue and English. The descriptive method of research was utilized in this study with a questionnaire and two sets of achievement tests as main tools for data gathering. The respondents involved 223 pupils from the selected schools in San Juan District, Schools Division of Ilocos Sur. Ethical principles and considerations were strictly observed. The gathered data were analyzed using frequency and percentage, mean and simple linear correlation analysis. Based on the results, it was found out that there is no significant relationship between the level of usage of Mother Tongue and English on the Numeracy Achievement of Learners. Therefore, the level of pupils' performance may be improved by encouraging learners to be involved more in Mathematics-related activities to further enhance their knowledge and improve their performance like the following: think-pair share, quick-writes, anticipatory charts, peer-teaching, manipulative and gamification.

Keywords: descriptive-correlation design, medium of instruction, pupil-related factors

INTRODUCTION

Mathematics provides one of the most essential foundations in the learning process. It is an indispensable tool in learning the concepts in the fields of science and commerce. Mathematics includes all features of human life. It is undeniably and unquestionably significant in education to help learners and all people from all walks of life to perform their daily tasks organized and skillful, well-acquainted, functional and independent individuals and members of the society.

Teaching and learning Mathematics are complex tasks. According to Tabbuac (2014) because of the concurrent effects of both the teaching activities and the context of teaching in which Mathematics takes place. It may be difficult to perceive the unfavorable effects on the student learning especially when changing a single teaching practice.

Today, Mathematics in the K to 12 basic education curriculum is considered advanced. Its contents evolve due to the advancement of science and technology. For this reason, pupils at present are hardly capable of grasping the concepts on Mathematics. Pupils' performance is affected with the use of mother tongue as language of instruction in the primary level and stepping to intermediate level. For this reason, Mathematics learners have had and they continue to have undesirable experiences with the subject but they are still studying the subject because of irresistible pressure from the whole school system and from their teachers. As a consequence, negative attitude towards Mathematics prevails and it affects learning of mathematical concepts in the implementation of the Mother Tongue-Based Multilingual Education in the primary grades.

Language is one of the most valued gifts which has been passed from one generation to another. The first language is very important and builds the basis for all communication improvement. Members of the family and early childhood professionals have very significant role in the development and maintenance of the first language.

The Department of Education (DepEd) recognized the benefits of teaching children using their first language, the mother tongue. Local, regional, national and international researches have found that children learn to calculate, speak, read, and write more quickly in their first language, and can pick up a second and third language more easily if taught in their first language. In the same way, they acquire other academic competencies more quickly, particularly in Math and Science. Dep Ed through Department Order number 94 instituted Mother Tongue-Based Multilingual Education (MTB-MLE), with the following major languages as medium of instruction in 2012-2013: Ilocano, Tagalog, Kapampangan, Pangasinense, Bikol, Cebuano, Hiligaynon, Waray, Tausug, Maguindanaoan, Maranao, Chabacano, Ivatan, Sambal, Akianon, Kinaray-a, Yakan, and Sinurigaonon. Aside from their mother tongues or first languages, the pupils are taught English and Filipino as subjects focusing on oral fluency, starting in the first grade. From the fourth grade onward, Filipino and English are introduced as languages of instruction (Llaneta, 2018).

Mother Tongue-Based Multilingual Education's purpose is believed to improve the quality of education not only mentioned in local research but also in international level. These had shown that children learn more efficiently and effectively through the language that they habitually speak at home (UNESCO, 2011).

Pupils whose mother tongue language is different from their national language are often at a considerable disadvantage in the educational system. This is especially true for children living in rural areas especially from far-flung places.

In view of the above mentioned scenarios, the Mathematics Department is doing all it can to create an environment where all the people involved commit to cater and improve, quality and liberating education under the program. While the K to 12 program with the use of the Language 1 which is the mother tongue has been implemented and claimed effective, the researcher feels there is a dire need to identify whether the Language 1 or the mother tongue used as the medium of instruction in Mathematics has an impact on the numeracy-literacy and achievement of learners in the different elementary schools in San Juan District of Ilocos Sur.

This study aimed to determine the numeracy achievement of learners with the use of Mother Tongue and English in teaching the Grade IV pupils in San Juan District, Schools Division of Ilocos Sur during the School Year 2017-2018. Specifically, it sought to determine the profile of the respondents including sex, parents' educational attainment and occupation, exposure to different Math activities and number of Math books or references at home ; the level of the learners' numeracy achievement with Mother Tongue and English as mediums of instructions; the significant relationship between the profile of the respondents and the numeracy achievement of learners using the Mother Tongue and English as mediums of instructions and the significant relationship between the usage of Mother Tongue and English in teaching on the numeracy achievement of the learners.

The result of this study will serve as an eye opener for the teachers, administrators and curriculum developers in improving the numeracy achievement of learners and the outcome of this research will provide additional empirical data which may provide bases for the future researches regarding MTB-MLE as a separate subject and as a medium of instruction.

The researcher included some related studies that have bearing to the current investigation.

Benzon (2010) revealed in her study that the overall level of performance in College Algebra of the College of Business Administration and Accountancy students was on the "Satisfactory" level. In addition, students were found weak in all areas except in operations in algebraic expressions and polynomials.

Similarly, Reotutar (2011) found out that the second year students of the College of Technology had "Poor" performance in almost all of the content learning areas in solving worded problems. The findings of Fuller (2009) is similar to Reotutar's who found out that her respondents in non – worded problems is "Satisfactory" but "Poor" along the different learning areas on worded problems.

On the study of Capate and Lapinid (2015), outcomes of the formative tests and the Mathematics Achievement Test (MAT) showed that students' achievement

is in the beginning and in the developing level for the three content areas of the Grade 8 Mathematics curriculum. These imply that they struggle with their understanding or possess only the minimum knowledge and skills and core understandings; pre-requisite and fundamental knowledge and/or skills have not been sufficiently obtained, established and developed to aid understanding.

Sangcap (2010) who made a study on Filipino college students' Mathematics-related beliefs as factors affecting mathematics performance and problem solving capacity arrived at the following: Filipino students considered Mathematics as useful in their daily lives and exert valued effort in developing one's mathematical ability. On the contrary, Filipino students believed that all worded problems in Mathematics can be solved by simple step by step procedure. Statistical tests showed that gender difference exists in positive beliefs that exerting effort in understanding the concepts is deemed necessary in increasing mathematical ability and the significance of the usefulness of Mathematics in human lives. This mentioned gender difference in their belief was also reflected in all year levels and in various philosophies and fields of specialization.

The findings of Paguirigan (2011) showed high relationship between the children's mathematical achievement and their parents' educational attainment. In contrast, De la Cruz (1987) revealed in her study that academic achievement is not significantly related to both parents' educational attainment because most of the parents are not high school graduates such that the influence they make on academic achievement could not be seen. In addition, Paguirigan (2011) cited Pinol (1995) who found out that parents' educational attainment did not influence the academic performance of intermediate pupils. According to Del Castillo (2010) as cited by Gabriel (2012), the number of pupils and location of school had a light correlation with the pupils' performance. Furthermore, a comparative study by Pinol (1995) as cited by Del Castillo (2010) revealed that the central school performs better in Mathematics than the schools in the rural areas.

Evans (2010) found that the size of a home library has a very substantial effect on educational attainment of any individual. He found out that books at home have a positive reward which improved test scores especially in Mathematics and Science subjects. He also concluded that a home with books as an integral part of the way of life gives encouragement to children to read for pleasure and encourage discussion among family members about what they have read. Reading for oneself and discussing what have been read—is the sort of positive spiral that can lead to greater academic achievement years down the line. Also, Wang (2013) found out that through the learners' exposure to Math and Science, they have room for developing their interests and experiencing the wonders and joys of Math and Science.

METHODOLOGY

This study used the descriptive-correlation design. It described the performance of pupils in two achievement tests in Mathematics that used the Mother Tongue and English as mediums of instruction. The performance of pupils were correlated with the different pupil-related factors in selected schools in San Juan District, Schools Division of Ilocos Sur. The respondents involved 223 pupils from the selected schools in San Juan District, Schools Division of Ilocos Sur.

A set of questionnaire was used in this study. The questionnaire/checklist on pupil-related factors were adapted from Tabbuac (2014). It is composed of two parts as follows: Part I which deals with the profile of the pupils includes sex, parents' educational attainment, parents' occupation, exposure to different Mathematics activities and number of Mathematics books/references at home. Two sets of validated teacher-made achievement tests in Mathematics were administered to the learners. The achievement tests used Mother Tongue and English as mediums composed of topics which were discussed from first quarter to third quarter.

The researcher asked permission from the Schools Division Superintendent, Public Schools District Supervisor and School Heads in San Juan District, Schools Division of Ilocos Sur. After getting permission, the researcher distributed the questionnaire to the respondents and administered the two achievement tests to the Grade IV pupils of selected schools in San Juan District. Lastly, the researcher retrieved the questionnaires personally. Responses were checked, tallied and treated statistically.

Ethical principles and considerations were followed. Adequate information were provided to the respondents. Informed consent, voluntary participation, anonymity of data was considered in the conduct of the study. No risk was involved. Benefits of the respondents were fully explained to them. All the answers given by the respondents were treated with utmost confidentiality.

The following statistical tools were utilized in the study: frequency count and percentage to describe the respondents' profile; mean to determine the level of performance of the pupils in their achievement test using English and mother tongue as mediums; and simple linear correlation to determine the relationship between the performance of the pupils and the and pupil-related factors and the relationship between the performances of the pupils of selected schools in San Juan District, Schools Division of Ilocos Sur in their achievement test using Mother Tongue and English.

Table 1
Summary level of the pupils' numeracy performance

LEVEL	MTB USAGE		ENGLISH USAGE	
	<i>f</i>	%	<i>f</i>	%
Outstanding	6	2.69	13	5.83
Very Satisfactory	44	19.73	54	24.22
Satisfactory	100	44.84	84	37.67
Poor	66	29.60	66	29.60
Needs Improvement	7	3.14	6	2.69
TOTAL	223	100	223	100
Overall Mean (DR)	13.93 (Satisfactory)		14.38 (Satisfactory)	
Standard Deviation	5.09		5.48	

RESULTS AND DISCUSSION

The study reveals that the majority (113 or 50.67 %) of the pupils are females and 110 or 49.33 percent of the pupils are male. A great percentage (84 or 37.67 %) of the respondents' fathers are college graduates and the least (1 or 0.45 %) of the fathers is a bachelor's degree holder with master's units and another one (1 or 0.45 %) is a Master's degree holder. A great number (101 or 45.29%) of the mothers finished graduated college and only one each (1 or 0.45%) has doctoral units and one (1 or 0.45%) is a bachelor's degree holder Master's units. A great number (86 or 38.57%) of the fathers are self-employed and the least (19 or 8.52 %) of the fathers are working abroad. A great number (98 or 39.46%) of the mothers are not employed and the least (37 or 16.59%) of the mothers have their jobs. The majority (223 or 77.70 %) of the pupils have participated in class/homeroom activities and 1 (0.35%) participated in the Math Quiz Regional Level. A big number (144 or 64.57%) of the pupils have five (5) books and below and the least 4 (1.79%) have 12-14 books as references at home.

Table 1 presents the summary level of the numeracy performance of the pupils.

The level of pupils' numeracy achievement along the use of Mother Tongue or Language 1 as medium of instruction is "Satisfactory". This is supported by the obtained mean score of 13.93. A great number (100 or 44.845) of the pupils got a score of 11-15 points. The level of pupils' numeracy achievement along English usage is "Satisfactory". It is supported by the acquired mean score of 14.38. A great number (84 or 37.67%) of the pupils got a score of 12-17 points.

Table 2 below shows that there is no significant relationship between the numeracy achievement of pupils along Mother Tongue and English as mediums of instruction and the aforementioned pupil-related factors. It is supported by the *r*-values of -0.173 along Mother Tongue and -0.106 along English usage.

Table 2
Correlation coefficients between the profile of the respondents and numeracy achievement of learners with the use of mother tongue and english as mediums of instructions

Profile	MTB Usage	English Usage
Sex	-0.163	-0.091
Fathers’ Educational Attainment	-0.296	-0.250
Mothers’ Educational Attainment	-0.245	*-0.283
Parent’s Occupation (Father)	-0.247	-0.223
Parent’s Occupation (Mother)	-0.152	-0.190
Exposure to Different Math Activities	0.067	0.222
Number of books/references at home	*-0.110	*-0.133
TOTAL	-0.173	-0.106

Norm: * significant at .05 prob. Level

Similar findings were found out by Tabbuac (2014) in his study that there is no significant relationship between the performance of Grade V pupils and the pupil-related factors. On the other hand, mothers’ educational attainment bears a significant relationship with the numeracy achievement of pupils along English usage as supported by the computed r-value of -0.283. The computed r-value of -0.283 surpassed the r-probability value at .05 level of significance. Therefore, the null hypothesis stating that there is no significant relationship between the profile of the respondents and their numeracy achievement of along English usage is rejected. Thus, numeracy achievement of pupils along English usage is affected by the educational attainment of their mothers. This implies that the higher the educational attainment of the mother the higher is the numeracy achievement of the learner.

The result is similar to the findings of Paguirigan (2011) which showed a high relationship between parents’ educational attainment and their children’s Mathematical achievement.

Significant relationship was also established between the number of books or references at home and their numeracy achievement along Mother Tongue and English use as mediums of instruction. The computed r-values of -0.110 and -0.133 surpassed the r-probability value at .05 level of significance. This implies that the numeracy achievement along Mother Tongue and English use is affected by the capability of the family to purchase and provide references or books to their children. Children focus on and master more the topics if they have more references at home.

This finding has a similarity to the study of Berhanu (2011) as cited by Rafanan (2018) which revealed a significant effect of the Socio-combined salaries

Table 3
Result of the t-test for significant difference between the use of mother tongue and english as mediums of instruction on the numeracy achievement of learners

	MTB Usage	English Usage
Mean	13.93	14.38
SD	5.09	5.48
No. of Respondents	223	
<i>df</i>	222	
t-comp	0.045	
t-tab	1.652	
Decision	Accept H ₀	

and parents' education on the students' overall academic achievement as well as achievement in the subjects of Mathematics and English.

Table 3 presents the significant difference between the use of mother tongue and English as mediums of instruction on the numeracy achievement of the learners.

There is no significant relationship between the effectiveness of the use of Mother Tongue or the Language 1 and English on the Numeracy Achievement of Learners in selected schools in San Juan District, Schools Division of Ilocos Sur as revealed by the obtained t-critical value of 1.652 at 0.05 level of significance. This is in contrast with the study of Perez and Alieto (2018) who revealed that there is a very strong positive correlation between the respondents' achievement in mathematics and proficiency in the use of Mother Tongue.

Moreover, in the study of Nolasco (2009), he affirmed that Multilingual Education aims to produce learners who are multi-literate, multilingual and multicultural. This implies that MTB-MLE builds on and continues the development of the learner's Language 1 (L1) as an initial medium of instruction.

CONCLUSIONS

Based on the findings of the study, the following conclusions are drawn: majority of the pupils are female, their parents graduated from college, their fathers are self-employed and their mothers are not-employed, have participated in class/homeroom activities and a great number of pupils have five books and below at home; the levels of pupils' numeracy achievement with Mother Tongue and English used as mediums of instruction are both "Satisfactory"; there is no significant relationship between the pupil-related factors and the numeracy achievement of learners along Mother Tongue and English use as mediums of instruction; there is no significant relationship between the usage of Mother Tongue and English on the Numeracy Achievement of Learners.

RECOMMENDATIONS

Based on the conclusions drawn in this study, the following recommendations are forwarded: the parents may consider acquiring more reference materials at home which will be used by the pupils to gain more knowledge and to make their homework; the “Satisfactory” level of performance of pupils may be improved to “Very Satisfactory” or to “Outstanding” level by involving the pupils in Mathematics-related activities to enhance their knowledge and improve their performance like: think-pair share, quick-writes, anticipatory charts, peer-teaching, manipulative and gamification; underachievers in Mathematics may be encouraged to attend remedial classes in Mathematics to further improve their numeracy performance; teachers in the intermediate level should use both the Mother Tongue and English in their discussions in Mathematics so that the delivery of lessons is given in all opportunities and to obtain best results on the numeracy achievement of learners; similar studies should be undertaken in other Districts in Ilocos Sur to further validate the findings of in this study.

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ACKNOWLEDGEMENTS

The researcher wishes to express his deepest gratitude, appreciation and give credit to all the generous people who have inspired, motivated, helped, and in one way or another contributed in the successful completion of this piece of work. The University of Northern Philippines URDO, for its review and publication of this research; the teaching staff of Malamin Elementary School, for their encouraging remarks that made the researcher confident to finish this research work; school heads and Grade 4 learners of selected schools in San Juan District, for letting him gather needed data; the research team and the panel of examiners, for their deep immeasurable assistance for the improvement of the study. Above all to the Almighty God, for his unending love and guidance that led to the realization of this wonderful achievement.