

Influence of English and Filipino as Assessment Languages in Word-Problem Performance

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ABSTRACT

Second-language learners frequently encounter challenges when solving word problems that are not written in their first language. This study compares the mathematics word-problem performance of 5th-grade learners using English and Filipino as the languages of assessment. The study consists of 32 5th-grade students from a public elementary school in the Philippines. The lesson delivery focused on problem-solving learning competencies, delivered by an experienced teacher using English-language instruction. Employing a quasi-experimental design, the researchers utilized a researcher-made 30-item test comprising questions expressed in English and 15 questions expressed in Filipino. Each student responds to questions in both languages. It was administered at the beginning and the end of a week-long lesson. Analyses of test scores yielded no significant difference between learners' performance in English and Filipino items; however, results reveal students' very low competency in solving word problems. Nonetheless, this study supports the utilization of bilingual instruction and the inclusion of Filipino translations in assessments aside from offering research points for further explorations.

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1. INTRODUCTION

The nature of context of the language used in assessing mathematics word-problem performance is critical, to which the language of assessment contributes. Language of assessment is critical for learning as it aids in comprehension of learners. However, Filipino learners often find solving word problems difficult as it involves words and texts expressed in English. That said, an incongruity between language of assessment and language proficiency may negatively affect word-problem performance. At a national level, the K-12 basic education curriculum has implemented the use of Mother Tongue-Based (MTB) instruction and assessment from K-3, and the use of English from grades 4-6, in order to

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bridge this gap. At the field scale, schools fulfill their mandates by strategizing initiatives in assessing mathematical abilities. These actions include considering the language of assessment in improving mathematics word-problem performance.

In relation to this, the language of assessment plays a crucial role in accurately reflecting students' knowledge and skills. As per the Sustainable Development Goal (SDG) 4, signed by 193 countries, children should have an access to quality education which involves equitable learning for all (United Nations, 2015). Equity is closely related to the language used in educational environments (Benson, 2016). It is crucial to determine if the learner is being instructed and assessed in a language that matches their comprehension and proficiency. Thus, if the students are assessed through a language they are barely proficient in, the result of the assessment may not accurately reflect learners' word-problem performance.

The difference becomes apparent due to the impact of students' mathematical vocabulary and their proficiency in providing a mathematical argument, explanation, or proof, which is heavily influenced by the quality and range of language they utilize and are exposed to (Cabot Learning Federation, 2022). Students must therefore acquire a comprehensive understanding of language in order to be successful when solving mathematical word problems. It is not just about comprehending the mathematical concepts but also about effectively navigating through language-based problems to find the solution (Powell, Stevens, & Berry, 2019). It establishes the notion that language comprehension is fundamental to the achievement of students in mathematics word problems (De Koning, Boonen, & Van Der Schoot, 2017; Decker & Roberts, 2015; Fuchs, Gilbert, Fuchs, Seethaler, & Martin, 2018).

For several decades, English has been widely used in the Philippine education system for teaching and evaluating mathematics. This is also true for some countries such as in the United Arab Emirates where English is used as a medium of instruction for Science and Mathematics in the fifth grade (Alshamsi & Alsheikh, 2020). In Malaysia, English is also used in certain public and private universities for higher education (Rahman & Singh, 2022). The implementation of English as the universal language, spanning from elementary to tertiary education, is considered to be a significant response to the challenges posed by globalization (Astrid, Hasanah, & Syafryadin, 2022). In line with this, the Department of Education mandates that all elementary and secondary public schools use English as the primary language of instruction (Department of Education (DepEd) Memorandum No. 31, s. 2013), which affects mathematics assessment. However, elementary school students' performance on mathematics word problems written in English has been a persistent issue (Bautista, Samonte, Improgo, & Gutierrez, 2020). Although English has been extensively utilized as the language of assessment in the field of mathematics, the ongoing issue of subpar performance exhibited by elementary school students when solving word problems in mathematics implies that this strategy might not effectively engage their critical thinking and problem-solving capabilities (Yonson, 2017). This may be due to the fact that students are not only expected to acquire new academic knowledge and skills, but also to do so in a potentially foreign language (Bühmann & Trudell, 2007; Pinnock, 2009). As a result, students with low language comprehension show poorer word-problem performance (Fuchs et al., 2006; Fuchs et al., 2008).

Moreover, learners have consistently performed poorly in national and international mathematics assessments delivered in English. The Department of Education (DepEd) stated that English language is one of the identified factors contributing to poor performance

of students in the Program for International Student Assessment (Department of Education, 2019). Four years after the first participation of the Philippines in PISA, Filipino learners only scored two points better than their previous score in Mathematics, which is said to be insignificant, obtaining the 77th place out of 81 countries (OECD, 2022). In relation to this, the Philippines ranked lowest in the Trends in International Mathematics and Science Study (TIMSS) 2019, with notably lower scores of participating grade 4 learners among 64 countries (Orbeta & Paqueo, 2022). In the same year, South East Asia Primary Learning Metrics (SEA-PLM) showed that the mean score in mathematics of Filipino 5th-grade pupils is lower than the regional average.

In the various international assessments in which the Philippines participated for consecutive years, the majority of the top participating countries utilized their national languages as their preferred language of assessment (Department of Education (DepEd), 2021; UNICEF & SEAMEO, 2020). Specifically, during the SEA-PLM 2019, the Philippines was the only participating country that utilized English as the test language, which can be the major factor for the adverse results, while the other countries chose to administer the tests in their official languages (Department of Education, 2021; UNICEF & SEAMEO, 2020). Furthermore, the National Achievement Test (NAT) 2018 results showed that only 0.17% of the examinees are highly proficient in mathematics, which is considerably lower than the 2.29% of proficient examinees. The learners' performance with 36.66 mean percentage score is also below the 75 percent target of the Department of Education (Department of Education Memorandum No. 72, s. 2011). The national assessment results also showed that learners perform better in Filipino among other subjects (Fuente, 2022). The disappointing outcomes of these evaluations might be due to the tests being administered in English, a language in which the participants may not be proficient.

Another factor linked to students' word-problem performance in mathematics assessments is the language of instruction. The alignment between instruction and assessment is crucial as they complement one another (Genon & Torres, 2020). The linguistic competence becomes essentially significant as studies have shown a clear link between the language used in instruction and how well students perform academically (Soh, Carpio, & Wang, 2021). Although DepEd imposed the use of English as the medium of instruction and assessment in grades 4 to 6, most of the teachers still use bilingual instruction during mathematics classroom discussions (Canilao, 2018). It could be to enhance student understanding of the mathematics concepts and with the expectation that their assessments will lead to better performance.

In relation to this, studies suggest the use of MTB instruction among elementary students in mathematics as various researches revealed that learners comprehend effectively in their mother tongue (Englis & Boholano, 2021; Magsombol, 2021). It is because maximizing learning outcomes is found to be best achieved when children are taught using their mother tongue (Falguera, 2020; United Nations Educational, Scientific and Cultural Organization (UNESCO), 2023). On the other hand, when there is a difference in the languages spoken at home and at school, it can have a negative impact on test results, as indicated by evidence from international and regional assessments (DepEd, 2021; UNICEF & SEAMEO, 2020; UNESCO, 2016; Zhao & Shuting, 2019).

The issues mentioned earlier regarding the formation of barriers in language pose a significant challenge to the assessment process in mathematics among elementary students, specifically in dealing with word problems. Hence, it is recommended to teach and assess the learners in a language they can understand (Zhao & Shuting, 2019). It is also

recommended to review and develop the language policy enabling the utilization of more than a single language to be used in instruction where children are taught both their native language and a second language (Bautista et al., 2020; Cacho & Cacho, 2015; Morales-Obod, RamiRez, Satria, & Indriani, 2020; Perez & Alieto, 2018). In addition, a validated model is created and suggested for enhancing and contextualizing the implementation of MTB instruction (Englis & Boholano, 2021). Contextualized instructional and learning materials should also be provided using MTB as the medium of instruction (Falguera, 2020; Morales-Obod et al., 2020).

With these identified downsides of using English in assessments, the studies show the possibility of better performance in mathematics using Filipino as the test language for its edge as the official language of the country. While these recommendations favor the utilization of the mother tongue, the language used in teaching mathematics and assessing student performance also depends on proposed bill and existing laws that the government imposes. However, in a review of 40 countries' education plans, it is found that only less than half of them prioritize teaching children in their home language, overlooking the crucial 6-8 years period during which children should be ideally learning in their mother tongue (UNESCO, 2016).

The disregard for mother tongue-based instruction (MTBI) in this context is especially pertinent regarding the Philippines. Contrary to advocating for the expansion of mother tongue-based instruction (MTBI) in public schools, the Philippine House of Representatives put forth House Bill (HB) No. 6717, which seeks to repeal Section 4 of the Enhanced Basic Education Act of 2013 (Philippines House of Representative, 2020). The resolution proposes that English be designated as the primary language of instruction and that mother-based teaching be discontinued from kindergarten to grade 3, with implications for assessment and language of instruction. This measure presents a contradiction to the existing body of evidence, which strongly advocates for the initial six years of primary school instruction in a child's native language, followed by a transition to a second language (Soh et al., 2021).

Given the alarming performance of Filipino learners in national and international mathematics assessments which are expressed in the English language as well as the pressing issues in language policies, it is relevant and timely to compare elementary students' performances using English and Filipino as the language of assessment which would determine whether assessments expressed in English or Filipino would be more beneficial to student understanding and performance. In addition, the results could provide initial baseline information in proposing which language is more effective as the test language at the classroom level for national and international mathematics assessment for the subsequent years.

While there are similar studies examining the relationship between language and mathematics (Morales-Obod, 2020; Perez & Alieto, 2018; Yonson, 2017), they each exhibit various gaps and limitations, prompting the need for this current study. Morales-Obod (2020) evaluated the effectiveness of the use of Mother Tongue-Based instruction in teaching fraction concepts to Grade 2 students. Meanwhile, Perez and Alieto (2018) examined the correlation between Mother Tongue proficiency and mathematics achievement of Grade 2 learners. A study by Yonson (2017) closely aligns with this current research, focusing on the difference in the performance of Grade 4 pupils in mathematics word problems presented in Mother Tongue and English. However, Yonson (2017) targeted a different grade level with only a day of implementation and lacked instruction prior to

assessment. These limitations including insufficient exploration in language of assessment, inadequate implementation, and a lack of actionable data on mathematics word-problem performance, motivated the researchers to delve into providing a contextualized study that would serve as a relevant baseline on the local policy review of Mathematics assessment and reformulation of its guidelines. Moreover, aside from this crucial issue in mathematics assessment, the majority of the existing studies are not contextualized to Filipino learners as these literature focus on foreign countries (Cheuk, Daro, & Daro, 2018; Jourdain & Sharma, 2016). Contextualization in research is necessary as it provides credibility and support to the study (Shehadeh, 2020). Thus, there is a need to provide a study focusing on Filipino learners' mathematics word-problem performance and language of assessment.

With the challenges in mathematics word-problem performance of Filipino learners, this study aims to compare elementary 5th-grade students' word-problem performances in mathematics assessment expressed in English and Filipino assessment. This study also seeks to determine the level of competency in solving mathematics word problems using English and Filipino as the language of assessment.

2. METHOD

2.1 Research Design

The researchers employed a quantitative research method to collect numerical data. It employed a quasi-experimental design involving manipulation of an independent variable, such as an intervention or treatment, to observe its impact on a dependent variable (Creswell & Creswell, 2018). This approach was used to manipulate the language of assessment and assess its effects on mathematics word-problem performance. Similar studies have also used this approach in assessing the role of language in students' performance (Falguera, 2020; Morales-Obod et al., 2020). The study utilized one section of students who were taught with English instruction. The objective is to analyze if there is a significant difference in the performance of students in mathematics word problems when they are presented in English and Filipino language. The study follows a quantitative research methodology to gather numerical data, enabling comparisons between the mathematics word-problem performances in English and Filipino versions of assessment.

2.2 Participants

This study was conducted at Don Emilio Salumbides Elementary School in Lopez, Quezon, Philippines. With the guidance of the school head, a senior expert teacher volunteered to implement a week-long instruction involving mathematics word-problem performance. The instructional group comprised 32 students and utilized a well-planned teacher or researcher-validated daily lesson log and assessment tool. English instruction was employed in adherence to the DepEd policy, supervised by an adviser holding the position of Master Teacher 1 with 31 years of teaching experience. The decision to involve only 5th-grade learners was prompted by the subpar performance of Filipino fifth graders in the South East Asia Primary Learning Metrics (SEA-PLM) 2019, particularly in core subjects like mathematics. The study used a heterogeneous class to reduce the possible factors affecting the overall results.

2.3 Data Collection Procedures

During this study, the researchers identified the topic and crafted the title based on recognized issues in mathematics assessment. Subsequently, a design aligning with the study's objectives was employed, facilitating the creation of researcher-made tests. These instruments underwent a thorough validation process involving scrutiny by three subject matter experts, three grammarians, one statistician, and one master researcher.

Table 1
Demographic Profile of Validators

No	Roles	Gender	Experience
1	Subject Matter Expert	Male	Faculty member at Philippine Normal University
2.	Subject Matter Expert	Female	Teacher II at the Department of Education
3.	Subject Matter Expert	Male	Teacher I at the Department of Education
4.	Grammarian	Female	Master Teacher I at the Department of Education
5.	Grammarian	Male	Teacher III at the Department of Education
6.	Grammarian	Female	Elementary School Teacher at Prince George's County Public School, USA
7.	Statistician	Male	Faculty member at Philippine Normal University
8.	Master Researcher	Female	Master Teacher I at the Department of Education

Permission was sought from the school principal, the involved teacher, students, and parents, and once granted, the implementation spanned one week. One day was allotted for the pretest, four days for the delivery of lessons, and one day was allotted for the posttest. The researchers collected the test papers, checked them, and performed the necessary statistical treatment for the data.

For the instrument, the study used a validated researcher-made 30-item test aligned with the specifications table. This test comprised 15 questions in English and 15 questions in Filipino, assessing identical competencies. The Filipino language in the assessment stems from the respondents' predominant use of Filipino in their households, while English questions are included as it serves as the primary instructional language for fifth-grade mathematics. A daily lesson log in English was also employed. Both the test and lesson log underwent validation using the 4Rs technique. Questions in both languages were mixed to prevent bias. Each student responded to both languages. The test focused on word problems relevant to the current topic. The instrument also underwent reliability testing through test-retest reliability, which measures the correlation of scores from different periods obtained by the same set of individuals (Pallant, 2016). The instrument demonstrated reliability with a significance level of $p = <.001$ and a Pearson correlation coefficient of 0.738. The data-gathering instrument only contained quantitative entries suitable for the study's purpose.

2.4 Data Analysis

Analyzing the data, each student's scores in both languages of assessment were computed. The data were tested for outliers and normality of the distribution using the Shapiro-Wilk test while Levene's test was used to test the homogeneity of the variance. Based on the results of both tests, the data have no outliers, were normally distributed, and have an equal variance. The mean percentage score from both versions of assessment in

their pretest and posttest were also obtained. The study used the proficiency scale issued by the Department of Education (DepEd) (DepEd Order No. 31 s. 2013) to assess the word-problem performance of 5th-grade learners and identify their competence levels.

Table 2
Department of Education (DepEd) Proficiency Scale

Proficiency Level	Numerical Value
Beginning	74% and below
Developing	75-79%
Approaching Proficiency	80-84%
Proficient	85-89%
Advanced	90% and above

Meanwhile, the researchers used the paired t-test to compare the differences in mean percentage scores between the pretest and posttest results. In contrast, the independent t-test was used to compare the differences in mean percentage scores of the students on assessments expressed in English and Filipino. All the data analyses were conducted using Statistical Package for the Social Sciences (SPSS).

3. RESULTS

This section covers the results from the analysis of data, specifically the mathematics word-problem performance of students, and the difference between their pretest and posttest results using English and Filipino as the language of assessment. Prior to the t-test, the researchers tested the data for outliers and the normality of the distribution using the Shapiro-Wilk test. It showed that there were no outliers and the data were normally distributed for pretest in English ($p = .173$, w statistic = .953, $df = 32$), pretest in Filipino ($p = .101$, w statistic = .945, $df = 32$), posttest in English ($p = .117$, w statistic = .947, $df = 32$), and posttest in Filipino ($p = .657$, w statistic = .971, $df = 32$). This means that there are no significantly extreme scores, making this analysis's results more reliable and stable (Gupta et al., 2019). Meanwhile, Levene's test was used to test the homogeneity of variance of the pretest scores ($p = .484$) and posttest scores ($p = .274$). This showed that the variances are equal, and as a result, the scores are not significantly different across samples (Garson, 2012; Starkweather, 2010). This result also allows for the use of a t-test (Starkweather, 2010).

Table 3
Tests of Normality of Pretest Scores

	Shapiro- Wilk Test			
	Language	Statistic	df	Sig.
Pretest Scores	English	.953	32	.173
	Filipino	.945	32	.101

Table 3 shows the normality test conducted on the pretest scores for both and English and Filipino languages using the Shapiro-Wilk test. The English pretest scores with a p-value of 0.173 is greater than the commonly used significance level of 0.05, which shows a statistically significant evidence of a normal data distribution. While the p-value of Filipino

pretest scores is closer to 0.05 significance level, it cannot definitively reject normality. Thus, the pretest scores in both the English and Filipino languages reveal a normal distribution of data. These results allow the use of a t-test in comparing the pretest scores of each language group.

Table 4
Tests of Normality of Posttest Scores

Shapiro- Wilk Test				
	Language	Statistic	df	Sig.
Posttest Scores	English	.947	32	.117
	Filipino	.975	32	.657

Table 4 displays the normality test results of posttest scores for both English and Filipino languages using the Shapiro-Wilk test. In this case, the p-value for English (0.117) is greater than the common significance level of 0.05, suggesting that the null hypothesis for normality cannot be rejected. Similarly, the Filipino posttest scores with a much higher p-value of 0.657 are well above the significance level, indicating strong evidence in favor of normality. These p-values suggest normality for both English and Filipino posttest scores, which strengthens the case for using a t-test to compare the scores in the two languages.

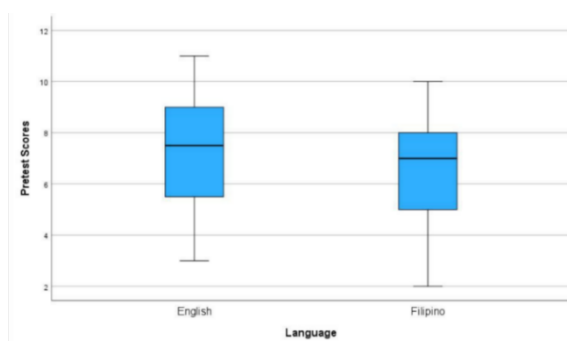


Fig 1. Tests for Outliers of Pretest Scores

Figure 1 presents the results of the outlier test for pretest scores for English and Filipino languages. Since no data point falls outside the whiskers, the results show that there are no outliers for the pretest scores. It suggests that there are no extreme values that deviate significantly from the majority of the data, which could skew the analysis. This result strengthens the further statistical tests performed on the pretest scores.

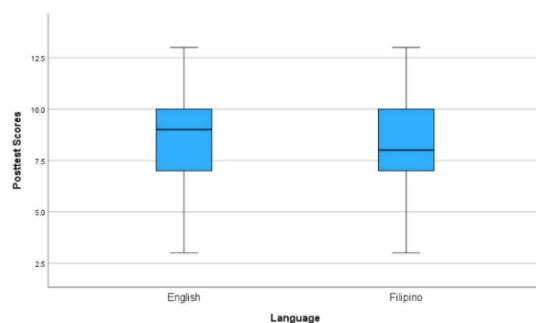


Fig 2. Tests for Outliers of Posttest Scores

Figure 2 presents the outlier test for posttest scores, revealing that there are no extreme values that could significantly skew the result. The absence of outliers in the posttest scores for both English and Filipino suggests a cleaner dataset for further analysis, as outliers can distort results and hinder drawing accurate conclusions.

Table 5
Test for Homogeneity of Variance of Pretest Scores

		Levene Statistic	df1	df2	Sig.
Pretest Scores	Based on Mean	.495	1	62	.484
	Based on Median	.653	1	62	.422
	Based on Median and with adjusted df	.653	1	61.615	.422
	Based on trimmed mean	.563	1	62	.456

Table 5 shows a test for homogeneity of variance, which analyzes the spread of scores between English and Filipino pretest scores. Using Levene's test, the key result is the p-value based on the mean of 0.484. This p-value suggests no evidence to conclude a significant difference between the pretest scores of both languages, indicating an equal variance. Thus, it is favorable to use t-tests to compare the pretest scores between the two languages.

Table 6
Test for Homogeneity of Variance of Posttest Scores

		Levene Statistic	df1	df2	Sig.
Posttest Scores	Based on Mean	1.220	1	62	.274
	Based on Median	.685	1	62	.411
	Based on Median and with adjusted df	.685	1	56.259	.411
	Based on trimmed mean	1.171	1	62	.283

Table 6 presents a test for homogeneity of variance, which assesses if the spread of posttest scores is similar between English and Filipino languages. The high p-value of 0.284 suggests that the null hypothesis of equal variances cannot be rejected, which indicates an equal variance. This result allows to proceed with t-test with more confidence.

Table 7
Pretest and Posttest Results in Assessments Expressed in English and Filipino

	M	SD	Percent	Interpretation
Pretest in English	7.28	2.26	48.53%	B
Posttest in English	8.31	2.85	55.40%	B
Pretest in Filipino	6.78	2.11	45.20%	B
Posttest in Filipino	8.09	2.32	53.93%	B

Notes:

- Below 74% = Beginning (B);
 75 to 79% = Developing (D);
 80-84% = Approaching Proficiency (AP);
 85 to 89% = Proficiency (P);
 90% and above = Advanced (A)

Table 7 shows the pretest and posttest results of 5th-grade learners' mathematics word-problem performance when assessed in English and Filipino. The mean (M), standard deviation (SD), and corresponding percentage scores are provided, with interpretations based on DepEd's proficiency scale.

Initially, learners displayed a basic level of competence in the pretest for English assessments. This competence was shown by a mean score (M) of 7.28, a standard deviation (SD) of 2.26, and a percentage of 48.53%. These results categorize their performance as beginning level. After the week-long instruction, there was an improvement in the posttest scores in English as their average score increased to 8.31, with a standard deviation of 2.85. This score corresponds to a percentage of 55.40%, which indicates that the students' competency level is at the beginning stage. Similarly, at the pretest expressed in Filipino, learners demonstrated a beginning level of competence, with an average score of 6.78, SD of 2.11, and a percentage score of 45.20%. Following the instruction, the posttest scores showed progress, with an average score of 8.09, SD of 2.32, and a percentage of 53.93%, which categorized the students' competence to the beginning level.

Noticeably, there is an increase in the mean scores in both test languages used from the pretest to posttest results. However, the mathematics word-problem performance of the respondents still falls on the beginning proficiency level which suggests that learners have very low competency in solving word problems expressed in English and Filipino.

Table 8

Difference between the Mathematics Word-Problem Performance of 5th grade Learners in Assessments Expressed in English and Filipino

	t	df	p	Interpretation
Pretest Scores in English and Filipino	.92	62	.36	Not Significant
Pretest and Posttest Scores in English	-2.34	31	.03	Significant
Pretest and Posttest Scores in Filipino	-3.41	31	.01	Significant
Posttest Scores in English and Filipino	.34	62	.74	Not Significant

Significant at $p < 0.05$ alpha

Table 8 presents the difference in mathematics word-problem performance of 5th-grade learners in assessments expressed in English and Filipino. The table provides the t-value, degrees of freedom (df), p-value, and interpretation for each comparison. Based on the findings, it is evident that there is a significant difference between the pretest and posttest scores in English ($t = -2.34$, $df = 31$, $p = .03$) and Filipino ($t = -3.41$, $df = 31$, $p = .01$) assessments. However, when the pretest scores in English and Filipino ($t = .92$, $df = 62$, $p = .36$) are compared, as well as the posttest scores in English and Filipino ($t = .34$, $df = 62$, $p = .74$) assessments, they show no significant difference.

In conclusion, it can be gleaned that the week-long instruction had a significant impact on improving results in both English and Filipino assessments. However, there were no significant differences in pretest and posttest scores between English and Filipino tests, indicating that students' baseline performance and results following the intervention were similar in both languages.

4. DISCUSSION

Several prior studies have emphasized the role of language and mathematics word-problem performance (Bautista et al., 2020; Falguera, 2020; Morales-Obod et al., 2020; Perez & Alieto, 2018; Yonson, 2017). This study set out with the aim to compare the mathematics word-problem performance of 5th-grade learners using English and Filipino as the languages of assessment.

The results revealed a significant difference between the pretest and posttest results in the English version of the assessment. It can be gleaned that the mathematics word-problem performance of Grade 5 learners in assessment expressed in English improved after the lesson delivery, with the instruction process likely contributing to this improvement. Interestingly, the Grade 5 learners have shown improvement in the pretest and posttest expressed in Filipino despite the medium of instruction being in English. Contrary to expectation, there is no significant difference in the mathematics word-problem performance of 5th-grade learners using English and Filipino as the language of assessment, both in the pretest and posttest. Thus, the learners have a similar ability to comprehend the topic in both languages before and after the one-week-long implementation. Furthermore, the findings evidently revealed that 5th-grade learners have very low competency in solving mathematics word problems regardless of the language of assessment used.

While there is an improvement in the pretest and posttest results in the Filipino and English versions, the increase in the students' mean scores can be a result of the instruction process itself, as this phase enables learning (Wordu et al., 2018; MacLeod & Nápoles, 2015). Through the lesson delivery, students gain the necessary information to accurately respond to the test questions, resulting in an observable improvement in their results. In this case, it may be more beneficial to consider the results of their performances based on their proficiency level for a more comprehensive evaluation. Despite this improvement, it cannot be neglected that the 5th-grade learners performed poorly in the English and Filipino versions of the assessment as they fell to the beginning proficiency level on both the pretest and posttest (See Table 7).

This result is aligned with the findings of Bautista et al. (2020), emphasizing the persistent issue in mathematics word-problem performance in English assessments. This could be due to the English medium of instruction used by the teacher, which the students lack proficiency in. This finding is supported by the study of Graham (2010), who argued that general communication in mathematics, being in English, may add up to the difficulty in student comprehension.

Moreover, the absence of significant differences in the word-problem performance of learners in English and Filipino versions of assessments is supported by the study of Morales-Obod et al. (2020), which revealed that samples were in equal amounts of knowledge prior to the implementation, making them comparable. Additionally, it conforms to the study of Yonson (2017), which found that learners experienced difficulties in solving word problems regardless of the language of assessment used. Similar to the current study's results, both Bautista et al. (2020) and Yonson (2017) also support that English language competence does not ascertain a high mathematics proficiency level. It could also be due to other factors such as gender (Hurdle, Akbuga, & Schrader, 2022), language of instruction used, and language spoken at home as one of the reasons for the poor performance of students in solving mathematics word problems (Department of Education

(DepEd, 2021). Another possible explanation for this might be that the English language of instruction provided by the teacher should be modified into bilingual instruction (Bautista et al., 2020; Morales-Obod et al., 2020; Perez & Alieto, 2018).

This consideration gains further support when reflecting on the potential advantages of incorporating Filipino translations into the test language, which may yield higher assessment scores, especially if the medium of instruction used is a combination of English and Filipino instead of utilizing the second language alone. It is also revealed that even if the lessons are delivered in English, students still comprehend problems written in Filipino, which is one of the highlights of the findings. It may be a good indication that their performance in solving mathematics word problems could still be improved depending on the language of instruction used. In particular, the realities of language usage in the mathematics classroom discourse are not purely English, as teachers use bilingual instruction during discussions (Canilao, 2018). Thus, looking into the connection between language of instruction and language of assessment may inform language teachers to improve their classroom strategy. With enhanced learning and assessment practices, students may have a greater chance of improving their competencies in Mathematics word problem-solving activities.

5. CONCLUSION

The current study found no significant difference in 5th-grade learners' mathematics word-problem performance in assessments expressed in English and Filipino. However, learners have shown a very low level of competency in both versions of the assessment. The 5th-grade learners' dismal test scores prompt questions on the effectiveness of the English instruction delivered by the teacher. This case implies that the English medium of instruction should be modified, providing more room for teachers to practice bilingual instruction and assessment in mathematics word-problem lessons. Contrary to the expectation that language plays a decisive role, the findings indicate that students have similar levels of ability in both languages, which contradicts the idea that a single language has a substantial impact on their mathematics word-problem performance. The demonstrated ability of learners to perform at a comparable level in both languages indicates the potential effectiveness of bilingual assessments. These assessments may have the potential to provide a thorough evaluation of student's mathematical skills while enhancing their second language. It also underscores the need to reevaluate the classroom practice of using just one language in mathematics assessment. Utilizing bilingual assessments may improve students' learning experience by considering their language skills and ensuring objective and language-inclusive assessment. The empirical results provide initial evidence that may contribute to the growing body of research that recommends the utilization of more than a single language in instruction and the inclusion of Filipino translation in mathematics word-problem assessment.

The present study, however, was limited to one (1) section of 5th-grade learners in the participating school. Additional investigation of the advantages of bilingual assessments, including other competencies, may provide useful insights for improving the effectiveness and objectivity of assessment methods in mathematics education. The lesson is also proposed to be replicated in a parallel group using bilingual instruction. It would also be interesting to examine the relationship between their word-problem performance and relevant students' demographics, including their performances in other learning areas.

Another possible area of future research is instrument validation, comparing word-problem performance in a different learning competency, and exploring language discourse in the classroom setting. Finally, the current study underscores the intriguing link between languages of assessment and mathematical problem-solving abilities, highlighting the need for a more classroom-based understanding of the factors impacting students' performance in various linguistic contexts. However, extending the study with bilingual instruction and assessment on a large scale can still be explored.

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Availability of Data and Materials

The datasets used and/or analyzed are available from the corresponding author upon reasonable request.

Competing Interests

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Authors' Contribution:

Reynald Cacho and Stephanie Alyssa Lladonez conceptualized and led the project from planning to completion. Rejulios Villenes guided the implementation of data gathering and initial analysis of the results. Stephanie Alyssa Lladonez, Mary Rose Macabuhay, and Crizia Nicole Valerio collaborated to complete the field works, including classroom observations. Reynald Cacho and Stephanie Alyssa Lladonez analyzed the collected data, drafted the initial report, and revised/finalized the current form of the paper.

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