

**Exploring the Use of Local Languages on Non-Technical Words in
Science Education in the Bicol Region, Philippines**

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Abstract

This study explored the use of three languages, in which two languages are local, Bicol, the mother language of the respondents, and Filipino, the official and national language of the country, and English, another official language and the instructional language of science in primary level. This study focused on using Bicol and Filipino words that have similar content and meaning in English. The non-technical terms using the local languages were then incorporated into vocabulary tests in three languages to determine the primary students' comprehension.

To achieve the objectives, the researcher administered science tests using the three languages to determine in which language students had better scores and in which they obtained the least. The findings show that most students attained better scores in the tests using Filipino than in their mother language. Most of the students obtained the lowest mean scores in tests in the English language.

Keywords: Science Education, Mother tongue-based instruction, Non-technical words in science, Primary science in the Bicol region

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I Introduction

In the Philippines, a multilingual country, Filipino students experience an unfamiliar language while learning science at school. Primary science education is formally taught in English from grade 3, which is a foreign language to them, thus, limiting their learning at the beginning. It is more appropriate for primary students to learn at school in their mother language which they can understand and use to express their ideas best. As Malone (2004) stated on the rationale for mother tongue-based multilingual education, students' language skills do not serve them because their language has no place in the classroom. Furthermore, the words needed to learn science represent the ideas foreign to the experiences they have already acquired by the time they go to school (WELS, 1983). Theories on the use of mother language in education (Brock-Utne, 2001; Cummins, 2000; Thomas & Collier, 1999) state that students who had a strong foundation in their first language tend to gain high academic achievement at school. Studies in some regions in the Philippines conducted to students who used their mother language learning at school (Bingayen, et al., 2008; Dekker, & Dumatog, 2003; Oyzon, et al., 2012; Espada, et al., 2012) have revealed that they are more active and confident in class, are able to express themselves and obtained better scores in exams.

Recognizing the researches on mother tongue-based education done in many provinces of the country in 2012, the Department of Education through the Department Order No. 16s, mandated the use of 12 mother languages in public schools in the country. These languages are to be used depending on the region and the province where it is spoken and understood by the students.

However, in the provinces of Region 5 or the Bicol region, there are no studies that attempted to translate commonly used non-technical terms to the local language in primary science education. A study conducted by Vela in 2010 showed that the respondents obtained better scores in the tests using the students' mother language (Bicol), and the national language of the country (Filipino) compared to English.

However, the study focused on determining in which language primary students perform better in reading comprehension tests. Other research conducted focused only on developing dictionary for native and non-native speakers in the province (Tariman, 2009). Hence, based on the statements above, this study was conducted.

II Research Questions

This study aimed to answer the following research questions:

1. What commonly used non-technical words in English in elementary science can be adapted into the Bicol and Filipino languages?
2. In what language do students comprehend better and in which language do they comprehend the least?

2.1 Objectives of the Study

The study aimed to achieve the following:

1. To identify non-technical words/terms commonly used in primary science education.
2. To develop equivalent words/terms in three languages, Bicol, Filipino and English.
3. To administer the test materials to grades 3 and 4 students and determine the language which they comprehend better.

III Methodology

3.1 The Research Locale and Respondents

Grades 3 and 4 students from four public elementary schools in four towns in the north and south of the province of Catanduanes were chosen for the study.

The students belonged to three class sections called section 1, section 2 and section 3. It is common in the Philippine public schools to group students according to their academic ability, achievement or performance. Normally academically high achieving students are sent to the highest section, often referred to as section 1, while the average achieving students are sent to section 2 and the lowest achieving students are sent to section 3 or the lowest possible sections which is dependent on the number of students.

The grade 3 students' age ranges between 8 and 13 while the age range for grade 4 students are between 9 and 14. Of the 279 grade 3 student respondents, 146 are female and 133 are male. Among the 272 grade 4 students, 131 are female and 141 were male.

3.2 Research Design and Instruments

The study utilized the descriptive research approach by developing comprehension tests intended for the student respondents. The tests were administered to the student respondents in order to determine their comprehension of the commonly used non-technical words in science related activities.

The study was conducted in several stages. First, science textbooks and the science curriculum were analyzed to identify non-technical words commonly used in science class. Second, non-technical words were collected from the science textbooks, syllabus and from a survey conducted to primary teachers regarding non-technical words which they often encounter in teaching science classes. Furthermore, several of the words were adapted from the list developed by the study, Words in Elementary School Science and Mathematics (WELS, 1983). Third, the collected and collated words were further narrowed down to at least 10-15 items for a more manageable test that were then administered to student respondents at a later part of the research. The final list (Table 2) was then consulted with the professors, the principals of the 4 participating schools and the teachers of the respondents. Fourth, a 15-item test (Appendix A & Appendix B) was developed in which collected words were the focal point in the questions that were anchored to some lessons in the science curriculum for primary education. Then the questions were translated to Bicol and Filipino.

Table 2 Final list of non-technical words or terms extracted from primary science textbooks which are also found from the list of WELS (1983).

Grade 3 Textbook				WELS Study 1983	
dispose	vibrate	injure	swab	remove	observe
scoops	plow	rub / rubbing		compare	dip
transmit	loosen	swallow		leave /leaves	
Grade 4 Textbook				WELS Study 1983	
rotate	transform	emit	disperse	compare	describe
dissolve	differentiate	classify	fertilize	produce	release
predict	undergo				

To ensure the validity of the content of the research instruments, the researcher consulted two science specialists, three college and university professors as well as the principals and teachers of the schools involved in the research. After consultations, the final test material was developed and pre-tested on a separate group of students.

3.3 Reliability of the Test Instruments

The test instruments in three languages administered to the three groups of Grade 3 respondents had an internal reliability of Cronbach's $\alpha=.721$, $\alpha=.713$, and $\alpha=.703$ respectively,

while the test instruments administered to Grade 4 respondents had an internal reliability of Cronbach's $\alpha=.731$, $\alpha=.704$, and $\alpha=.711$ for test in Filipino language, test in English language, and test in Bicol language.

3.5 Data Analysis

The data collected from the study was analyzed by using mean scores, frequency count and the percentages. To know whether there are significant differences between the scores in the tests in three languages obtained by the respondents, the research employed the one-way analysis of variance (ANOVA).

3.6 Administering of the Tests

The tests were conducted three times to the same student respondents with a three week to one month interval between tests which depended on the schedules of each participating school. The purpose of administering the test three times to students was to find out if there would be changes in the students' mean scores and comprehension of the test items. Prior to the first test, the grades 3 and 4 student-participants in each of the three sections were randomly grouped to assign them to their permanent grouping. Test materials in a particular language was assigned to each group. However, in the second and third tests, the respondents were administered with test in different languages. During the administration of the tests, the researcher with the help of the homeroom teachers explained the procedure of the tests.

IV Findings

The results showing the mean scores of the tests in the English, Filipino and Bicol languages in grades 3 and 4 are in Table 3.

4.1 Grade 3 First Test Results

Overall, students from section 1 (high achieving) obtained the highest mean scores from among the three sections, while section 3 (low achieving) students got the lowest mean scores. Section 1 students had better mean scores in the test using the Filipino language (8.23). They acquired lower mean scores in the Bicol language (7.39), and the lowest in the test using the English language (6.35). Section 2 (average) students also performed better in the test using the Filipino language (7.16) compared to the tests in the Bicol language (6.25) and English (5.13) languages. They obtained the lowest mean scores in the tests in English. Similarly, section 3 students also obtained better mean scores in the tests in the Filipino language (6.83) compared to

the test in Bicol (6.17). They also scored the lowest in the test using English (4.57). Most of the students had difficulty in writing their own answers in the open-ended items of the tests.

Using the one-way analysis of variance (ANOVA) shown in Table 4, the mean difference in the scores of section 1 students is only significant between the tests in Filipino and English languages ($p=.000$). On the other hand, the mean scores of section 2 students showed a significant difference between the tests in English and Filipino ($p=.000$), and between the tests in English and Bicol languages ($p=.031$). Lastly, the mean scores of section 3 students have significant difference between the tests in English and Filipino ($p=.000$) and also between the tests in English and Bicol ($p=.002$).

4.2 Grade 3 Second Test Results

Similar to the results in the first tests, section 1 students acquired higher mean scores in the test in the Filipino language (8.90) and obtained the lowest mean scores in both the test in English (6.25). Section 2 students performed better in the test using the Filipino language (7.41), resulting to a higher mean score as compared to their mean scores in Bicol (6.18). They obtained the lowest mean scores in the tests in English (5.34). Section 3 students similarly obtained better mean scores in the tests in Filipino language (7.07), lower mean score in the test using the Bicol language (6.03) and performed the lowest in the test using the English language (4.83). However, section 2 and section 3 students have almost similar average mean scores in the Filipino and Bicol languages, they have almost similar average mean scores. Most of the students did not answer the test questions in the open-ended items of the tests.

The results of one-way analysis of variance shown in Table 3 reveal that there is a significant difference between the mean scores of section 1 students' tests in English and Filipino ($p=.001$) and between the tests in English and Bicol ($p=.032$). No significant difference was found in the tests between Filipino and Bicol languages. The mean scores of section 2 students have significant difference between the tests in English and Filipino ($p=.000$), and between the tests in Bicol and Filipino languages ($p=.019$). There is a significant difference in the section 3 students' mean scores in the tests in three languages, English and Filipino ($p=.000$), English and Bicol ($p=.004$) and between Filipino and Bicol languages ($p=.015$).

Table 3 Grade 3 respondents' mean scores in the test in three languages.

Class Sections	Groups	First Test			Second Test			Third Test		
		Test	N=27 9	Mean Scores SD	Test	N=27 9	Mean Scores SD	Test	N=279	Mean Scores SD
Section 1 Above average performing students	Group 1	English Test	31	6.35± 2.04	Filipino Test	31	8.35±1.85	Bicol Test	31	7.39±1.60
	Group 2	Filipino Test	31	8.23± 1.64	Bicol Test	31	7.61±2.53	English Test	31	6.22±2.39
	Group 3	Bicol Test	31	7.39± 1.54	English Test	31	6.26±1.75	Filipino Test	31	8.19± .91
Section 2 Average performing students	Group 1	English Test	32	5.13±1.99	Filipino Test	32	7.41±1.70	Bicol Test	32	6.91 ±1.44
	Group 2	Filipino Test	32	7.16 ±1.79	Bicol Test	32	6.18±1.45	English Test	32	4.59±1.70
	Group 3	Bicol Test	32	6.25±2.03	English Test	32	5.34±2.10	Filipino Test	32	7.31± .99
Section 3 Low performing students	Group 1	English Test	30	4.57± 2.07	Filipino Test	30	7.07±1.44	Bicol Test	30	6.10±1.18
	Group 2	Filipino Test	30	6.83± 1.72	Bicol Test	30	6.03±1.45	English Test	30	4.93±1.63
	Group 3	Bicol Test	30	6.17±1.74	English Test	30	4.83±1.34	Filipino Test	30	7.07±1.38

I J M R A

Table 4 Multiple comparisons of student mean scores per language in the first, second and third tests

Class Sections	(I) Language	(J) Language	FIRST TESTS			SECOND TESTS			THIRD TESTS		
			Mean Difference (I-J)	Std. Error	Sig.	Mean Difference (I-J)	Std. Error	Sig.	Mean Difference (I-J)	Std. Error	Sig.
Section 1	English	Filipino	-1.870*	.446	.000	-2.096 *	.527	.001	-1.967*	.442	.000
		Bicol	-1.032	.446	.059	-1.354*	.527	.032	-1.161*	.442	.027
	Filipino	English	1.870*	.446	.000	2.096 *	.527	.000	1.967*	.442	.000
		Bicol	.838	.446	.151	.741	.527	.342	.806	.442	.169
	Bicol	English	1.032	.446	.059	1.354*	.527	.032	1.161*	.442	.027
		Filipino	-.838	.446	.151	-.741	.527	.042	-.806	.442	.169
Section 2	English	Filipino	-2.062*	.486	.000	-2.156*	.441	.000	-2.086*	.370	.000
		Bicol	-1.250*	.486	.031	-.937	.441	.091	-1.650*	.370	.000
	Filipino	English	2.062*	.486	.000	2.156*	.441	.000	-2.086*	.370	.000
		Bicol	.812	.486	.222	1.218*	.441	.019	.435	.370	.475
	Bicol	English	1.250*	.486	.031	.937	.441	.091	1.650*	.370	.000
		Filipino	-.812	.486	.222	-1.218*	.441	.019	-.435	.370	.475
Section 3	English	Filipino	-2.400*	.470	.000	-2.233*	.364	.000	-2.133*	.365	.000
		Bicol	-1.633*	.470	.002	-1.200*	.364	.004	-1.166*	.365	.006
	Filipino	English	2.400*	.470	.000	2.233*	.364	.000	2.133*	.365	.000
		Bicol	.767	.470	.239	1.033*	.364	.015	.967*	.365	.026
	Bicol	English	1.633*	.470	.002	1.200*	.364	.004	1.166*	.365	.006
		Filipino	-.767	.470	.239	-1.033*	.364	.015	-.967*	.365	.026

*. The mean difference is significant at the 0.05 level (one-way analysis of variance).

4.3 Grade 3 Third Test Results

Similar to the results of the first and second tests, students from section 1 obtained better mean scores among the three sections (Table 3). Their mean scores in the tests in Bicol (7.39) are lower compared to the results in Filipino (8.19). On the other hand, they had the lowest mean scores in the tests in English (6.22) even though they belong to the high achieving section.

Section 2 students performed better in the test using the Filipino language (7.31) obtaining slightly higher mean scores than the tests in the Bicol language (6.91). They received the lowest mean scores in the tests in English (4.59). Section 3 students also earned better mean scores in the tests in the Filipino language (7.07) compared to the mean scores in the tests in the Bicol language (6.10), and the lowest mean scores in the test using the English language (4.93).

Comparing the mean scores of section 1 students using the one-way analysis of variance (ANOVA) shown in Table 3, the mean scores between the tests in English and Filipino ($p=.000$) and the tests in English and Bicol ($p=.027$) showed a significant difference. A significant difference in the mean scores of section 2 students were found between the tests in English and Filipino ($p=.000$), and in English and Bicol ($p=.000$). There is no significant difference between the mean scores of the test in Filipino and Bicol ($p=.475$). The mean scores of section 3 students are significant between the tests in English and Filipino ($p=.000$), the tests in English and Bicol ($p=.006$), and the tests in Filipino and Bicol ($p=.026$).

4.4 Grade 4 First Test Results

Results of the first tests in three languages administered on three sections of grade 4 students are shown in Table 5. Among the three sections, students who belong to section 1 gained better mean scores in all three languages compared to students from sections 2 and 3.

Section 1 students had higher mean scores in the Filipino tests (8.71). The same section acquired lower mean scores in English (7.97), and the lowest in the Bicol language (7.45).

Section 2 students had better average scores in the test using the Filipino language, which had the highest mean scores from among the three languages (7.53). The students obtained a lower mean score in the Bicol language (6.17) and had the lowest in the test using the English language (5.20). Students from section 3 had the lowest mean scores in all languages compared to section 1 and 2 students. They obtained better mean scores in the test using the Filipino language (7.10), lower mean scores in the Bicol language (6.21) and the lowest mean scores in

English (4.86). The respondents had difficulty in the open-ended items of the test, in which most of them did not write any answers, while some attempted to write one or two words that were incorrect.

In analyzing the difference in the mean scores of section 1 students using one-way analysis of variance (ANOVA) shown in Table 6, it was found that there is a significant difference between the tests in Bicol and Filipino languages ($p=.029$), while there is no significant difference when the mean scores in English was compared with Bicol and Filipino.

After comparing the mean scores of section 2 students, the results show that there is a significant difference in their mean scores between the tests in English and Filipino ($p=.000$) and the tests in Filipino and Bicol ($p=.008$). Lastly, the mean scores of section 3 students have significant difference between the tests in English and Filipino ($p=.000$), and the tests in English and Bicol ($p=.041$). There is no significant difference between the mean scores of the tests in Filipino and Bicol languages.

4.4 Grade 4 Second Test Results

Shown in Table 5, the students from section 1 have better mean scores in all languages compared to the students from sections 2 and 3.

Similar to the first tests, the section 1 students who took the test in Filipino language attained a better mean score (7.90), while the students who took the tests in the Bicol and English languages almost got similar mean scores, 6.81 and 6.83 respectively. The students in section 2 also performed better in the test using the Filipino language (6.57), than those who took the tests in Bicol (5.86) and English (4.83). Students from section 3 on the other hand obtained better mean scores in the tests using the Filipino (6.38) and Bicol (6.10) languages. In this section, the students who took the tests in English scored (4.62) the lowest from among the three groups. Lastly, students from all sections found the open-ended items in all the tests, challenging.

A one-way analysis of variance (ANOVA) shown in Table 6 reveal that the mean scores of section 1 students have significant differences between the tests in English and Filipino languages ($p=.047$), and between the tests in Filipino and Bicol ($p=.039$). The mean scores of section 2 students between English and Filipino ($p=.014$) had significant difference. Lastly, the mean scores of section 3 students have significant difference between the tests in English and Filipino ($p=.005$), and in English and Bicol ($p=.026$).

Table 5 Grade 4 respondents' mean scores in the test in three language

Class Sections	Groups	First Test			Second Test			Third Test		
		Test	N=270	Mean Scores SD	Test	N=270	Mean Scores SD	Test	N=270	Mean Scores SD
Section 1 Above average performing students	Group 1	English Test	31	7.97 ± 2.08	Filipino Test	31	7.90 ± 1.64	Bicol Test	31	7.52 ± 1.91
	Group 2	Filipino Test	31	8.71 ± 1.86	Bicol Test	31	6.81 ± 2.07	English Test	31	6.61 ± 1.89
	Group 3	Bicol Test	31	7.45 ± 1.72	English Test	31	6.83 ± 1.43	Filipino Test	31	8.61 ± 1.33
Section 2 Average performing students	Group 1	English Test	30	5.20 ± 2.27	Filipino Test	30	6.57 ± 1.38	Bicol Test	30	5.70 ± 1.84
	Group 2	Filipino Test	30	7.53 ± 1.50	Bicol Test	30	5.86 ± 2.22	English Test	30	4.77 ± 2.37
	Group 3	Bicol Test	30	6.17 ± 1.54	English Test	30	4.83 ± 1.83	Filipino Test	30	6.63 ± 2.12
Section 3 Low performing students	Group 1	English Test	29	4.86 ± 2.17	Filipino Test	29	6.38 ± 1.37	Bicol Test	29	5.45 ± 1.74
	Group 2	Filipino Test	29	7.10 ± 2.01	Bicol Test	29	6.10 ± 2.17	English Test	29	4.69 ± 1.94
	Group 3	Bicol Test	29	6.21 ± 1.52	English Test	29	4.62 ± 2.04	Filipino Test	29	5.86 ± 1.74

Table 6 Comparison of student mean scores per language in the first, second and third tests

Class Sections	(I) Language	(J) Language	FIRST TESTS			SECOND TESTS			THIRD TESTS		
			Mean Difference (I-J)	Std. Error	Sig.	Mean Difference (I-J)	Std. Error	Sig.	Mean Difference (I-J)	Std. Error	Sig.
Section 1	English	Filipino	-.741	.482	.279	-1.065*	.441	.047	-1.669*	.457	.001
		Bicol	.516	.482	.536	.032	.441	.997	-.766	.457	.220
	Filipino	English	.741	.482	.279	1.065*	.441	.047	1.669*	.457	.001
		Bicol	1.258*	.482	.029	1.096*	.441	.039	.903	.460	.128
	Bicol	English	-.516	.482	.536	-.032	.441	.997	.766	.457	.220
		Filipino	-1.258*	.482	.029	-1.096*	.441	.039	.903	.460	.128
Section 2	English	Filipino	-2.339*	.442	.000	-1.340*	.465	.014	-1.910*	.524	.001
		Bicol	-.973	.442	.077	-.641	.465	.357	-.933	.528	.187
	Filipino	English	2.339*	.442	.000	1.340*	.465	.014	1.910*	.524	.001
		Bicol	1.367*	.442	.008	.700	.468	.299	.977	.524	.155
	Bicol	English	.973	.442	.077	-.641	.465	.357	.933	.528	.187
		Filipino	1.367*	.442	.008	-.700	.468	.299	-.977	.524	.155
Section 3	English	Filipino	-2.172*	.517	.000	-1.620*	.506	.005	-1.172	.491	.050
		Bicol	-1.275*	.517	.041	-1.344*	.506	.026	-.758	.491	.277
	Filipino	English	2.172*	.517	.000	1.620*	.506	.005	1.172	.491	.050
		Bicol	.897	.517	.198	.275	.506	.850	.413	.491	.679
	Bicol	English	1.275*	.517	.041	1.344*	.506	.026	.758	.491	.277
		Filipino	.897	.517	.198	-.275	.506	.850	-.413	.491	.679

*. The mean difference is significant at the 0.05 level (one-way analysis of variance).

4.7 Grade 4 Third Test Result

The third test presented in Table 5 shows that section 1 students are consistently performing better in all the tests compared to sections 2 and 3 students which indicate their above average academic characteristics. Section 1 students got the highest mean scores in the tests using the Filipino language (8.61) however, the students in this section who took the tests in Bicol got lower mean scores (7.52). On the other hand, the students who had the test in English obtained the lowest mean scores (6.61).

In section 2, the students also had better mean scores in Filipino (6.63), placing it in the top among the tests. However, it is only slightly higher than the mean scores in the Bicol language (5.70). The students who had the test in English attained the lowest (4.77). The students from section 3 obtained better mean scores in the tests using the Bicol (5.45) and Filipino (5.86) languages and the lowest mean score in English (4.69). Similar to the results of the first and second tests, most of the students were not able to answer the open-ended items of the tests.

When the mean scores of the students were compared using the one-way analysis of variance (ANOVA) shown in Table 6, the results reveal that the mean scores of section 1 students acquired in the tests in English and Filipino ($p=.001$) have significant difference. Similarly, the mean scores of section 2 students in the tests in English and Filipino languages ($p=.001$) were found to have significant difference. On the other hand, no significant difference was seen in the mean scores of section 3 students in the tests in English, Filipino and Bicol languages.

VI Discussion

Research Question 1

What commonly used non-technical words in English in elementary science can be adapted into the Bicol and Filipino languages?

The study was able to collect and list non-technical words or terms extracted from primary science textbooks (Table 2) and from the list of Words in Elementary Science (WELS, 1983) which were found to be difficult in the English language. In the course of the research, it was discovered that not all non-technical terms or words commonly used in science classes can have equivalent terms in the Filipino and Bicol languages. However, the final list of words

developed, translated and utilized in the test materials for the study could serve as bridge in explaining difficult science concepts which are in English.

Research Question 2

In what language do students comprehend better and in which language do they comprehend the least?

Based on the data obtained from the research, the findings indicate that the language in which student respondents comprehend better is Filipino. The results also show that students who are in section 1 consistently perform better in the tests compared to the students in sections 2 and 3.

It is also revealed that the average and below-average performing grade three and four students have the lowest comprehension in the English language. Furthermore, most of the students in both grade levels were not able to answer the open-ended question items in all three languages, which could indicate difficulty in expressing their own ideas in writing or understanding instructions. Further studies could clarify if several factors affected the students' ability to answer the items in their own words.

The results indicate that the Filipino language could be a suitable medium of instruction in science education especially for average and low-achieving, Bicol speaking students, and that Filipino could be particularly beneficial to students in understanding difficult science concepts in class. The students' better comprehension of the Filipino language in the test could partly be due to the fact that Filipino is an official language of the country and one of the subjects in primary education. Additionally, Social Studies is also taught using the Filipino language. Hence it has a strong hold as an academic language. On the other hand, Bicol, despite being the mother tongue of the students, had lesser effect in the students' comprehension as compared to Filipino.

VII Limitations of the Study

As the study was conducted, several concerns were encountered. First, the study only focused on one of the six provinces of the Bicol region (Region 5). Other provinces could have different or similar results. Second, due to time constraint and availability, the translation of the materials in Bicol and Filipino languages were done by professors from the province, and professors and primary school teachers who are teachers of the Filipino subject. Furthermore,

the selection of difficult non-technical words taken from the science textbooks for grades 3 and 4 were only given to teachers within the province. Third, the participating students from 4 schools had limited time for the research. Fourth, the weather (i.e., typhoons and storms), school activities, teacher seminars and trainings forced some cancellations and postponement of scheduled tests for the study.

VIII Conclusion, Implications and Recommendations

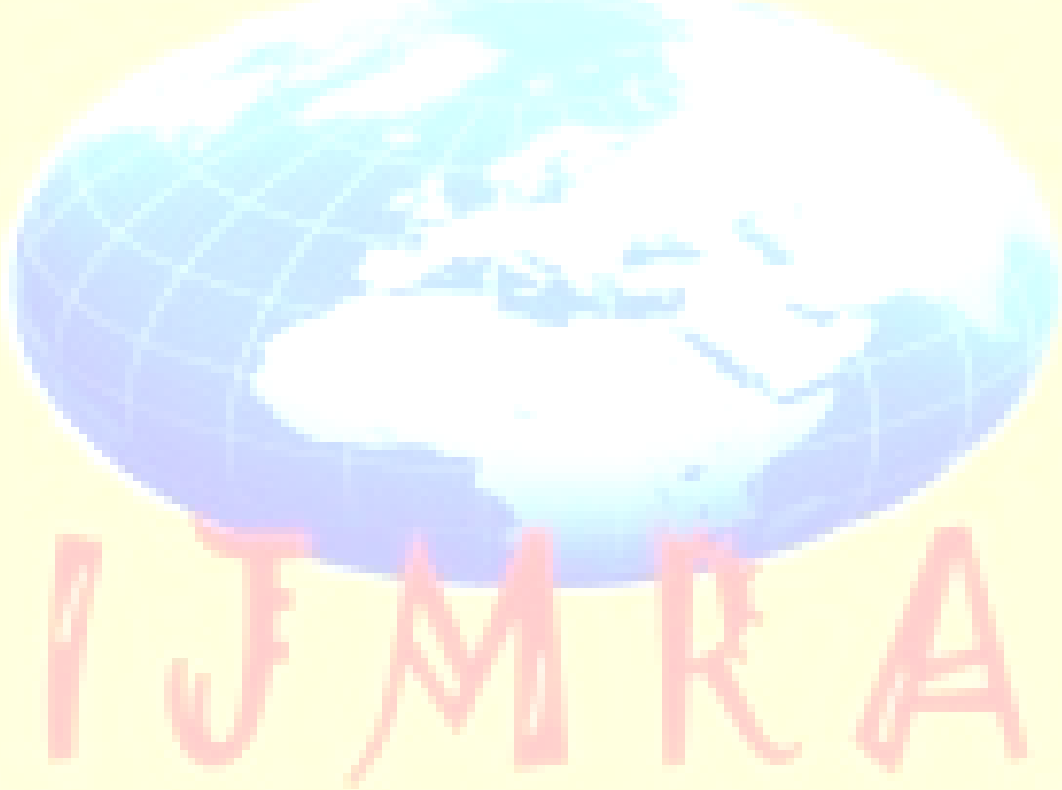
The study revealed that grades 3 and 4 students performed well in the science test conducted in Filipino in comparison to their mother language, Bicol, and the English language. Although limited in scope, the findings of the study indicated that the Filipino language could also be a suitable language for teaching and learning science in the Bicol region. The language could also be used especially during the transition period wherein science education will gradually shift to the mother language based multilingual education as mandated in the Department of Education Order No. 16 s.

The study could be useful as a reference in educational research focusing on creating, developing, and designing instructional materials for science teaching which in turn could sustain public school students' learning of science concepts by particularly in the Bicol speaking provinces.

The insights gained from this study revealed possible areas of concern on languages in science education. Hence, it is recommending further studies which includes the following: a) the use of the three languages in actual science classroom instruction in order to obtain overall knowledge on student achievement in science related activities or instruction, b) developing instructional materials using the students' mother language and the Filipino language, c) administering surveys to students to have a better understanding of the factors of students' preference of a particular language in learning science.

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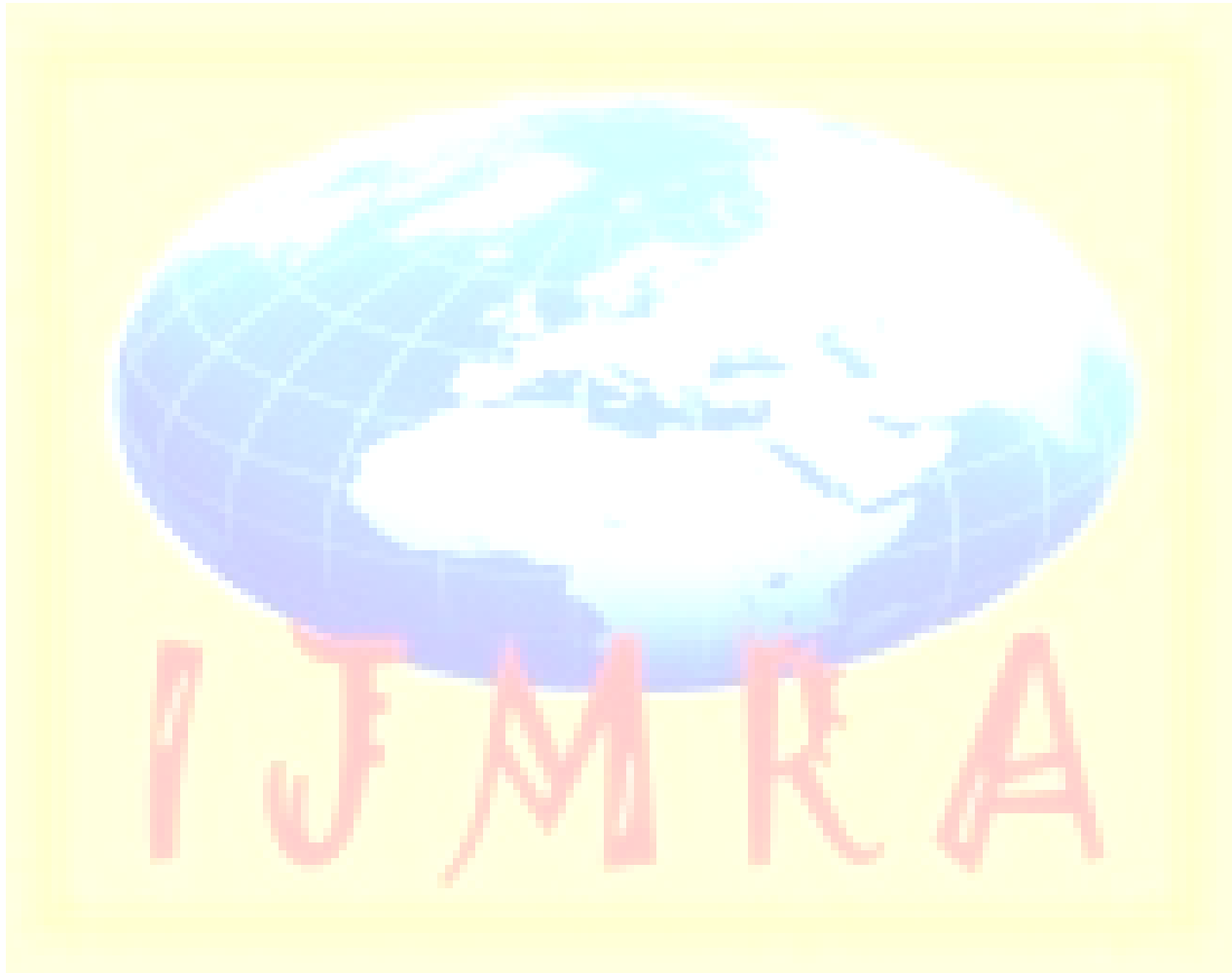


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APPENDIX A Grade 3 Test Items

Name: _____ Date: _____

Age: _____ Sex: Male: _____ Female: _____

School: _____

Grade III Section: _____ Group: _____

Test A. Directions: Read carefully each given sentence. Pay attention to the underlined word. Then, find and encircle the letter of the sentence that gives the equivalent or the same meaning.

Example: When reading a book, raise your eyes from the page once in a while.

- a. Wet your eyes once in a while when reading.
- b. Blink your eyes many times when reading.
- c. Look up or away from the page once in while when reading.
- d. Put your eyes up when reading.

Answer: C Look up or away from the page once in a while when reading.

START HERE:

1. Remove the tiny insects that live on the stems or leaves of the plant.

- a. Pluck the tiny insects off the plants.
- b. Cut the tiny insects from the plants.
- c. Wash out the tiny insects from the plants.
- d. Burn the tiny insects from the plants.

2. Each student scoops the eye of the fish to study its shape.

- a. Each student pours the eye into the fish.
- b. Each student washes the eye of the fish.
- c. Each student drains the eye from the fish.
- d. Each student takes the eye out of the fish.

3. **Rubbing your eyes with dirty fingers or handkerchief can cause infection.**
 - a. Patting your eyes with dirty fingers or handkerchief can cause infection.
 - b. Touching your eyes with dirty fingers or handkerchiefs can cause infection
 - c. Scratching your eyes with dirty fingers or handkerchiefs can cause infection.
 - d. Using rubbing alcohol in your eyes can cause infection.

4. **The sound of the drums vibrates inside the hall.**
 - a. It echoes inside the hall.
 - b. It bumps the hall.
 - c. It caused earthquake inside the hall.
 - d. It made the hall noisy.

5. **Sharp or pointed objects can injure your ears when you try to clean them.**
 - a. Your ears can be sensitive to sounds.
 - b. Your ears are okay when you use sharp or pointed objects.
 - c. Your ears can get hurt by sharp or pointed objects.
 - d. You will not hear anything when you use sharp objects.

6. **The students and teachers disposed the garbage properly by segregating it.**
 - a. They sealed the garbage in boxes by grouping them.
 - b. They threw the garbage by separating and grouping them.
 - c. They burned the garbage by separating them.
 - d. They buried the garbage by separating and grouping them.

7. **Earthworms make soil fertile by plowing through it.**
 - a. They help lay seeds on the soil and make the seeds grow.
 - b. They help by sprinkling water on the soil which the plants need.
 - c. They provide sunshine and shade to the soil.
 - d. They help the soil by tunneling through it.

8. **The typhoon leaves a large trail of destruction in the town.**
 - a. Leaves fell down after the strong typhoon.
 - b. The typhoon went away from the town.
 - c. The typhoon destroyed many things in the town.
 - d. The typhoon rolls away to another town.

9. Gently swab your tongue with a piece of cloth.

- a. Get your tongue wet with a piece of cloth.
- b. Swallow a piece of cloth.
- c. Feel your tongue with a piece of cloth.
- d. Wipe your tongue with a piece of cloth.

10. Dip the soap and wooden cube into the water and observe what happens.

- a. Immerse the soap and wooden cube into the water.
- b. Let the soap and wooden cube float in the water.
- c. Make the soap and wooden cube sink into the water.
- d. Raise the soap and wooden cube from the water.

Test B. *Directions:* Explain in your own words, the meaning of the underlined word or phrase in each item.

Example: Do a research on forest fires.

- Possible Answers:
- 1. Study something about forest fires.
 - 2. Read books about the cause of forest fires.

START HERE:

11. Farmers and gardeners like earthworms because they loosen and fertilize the soil.

Answer: _____

12. Go to the garden and observe the different kinds of plants.

Answer: _____

13. Swallow what is in your mouth before you begin to talk.

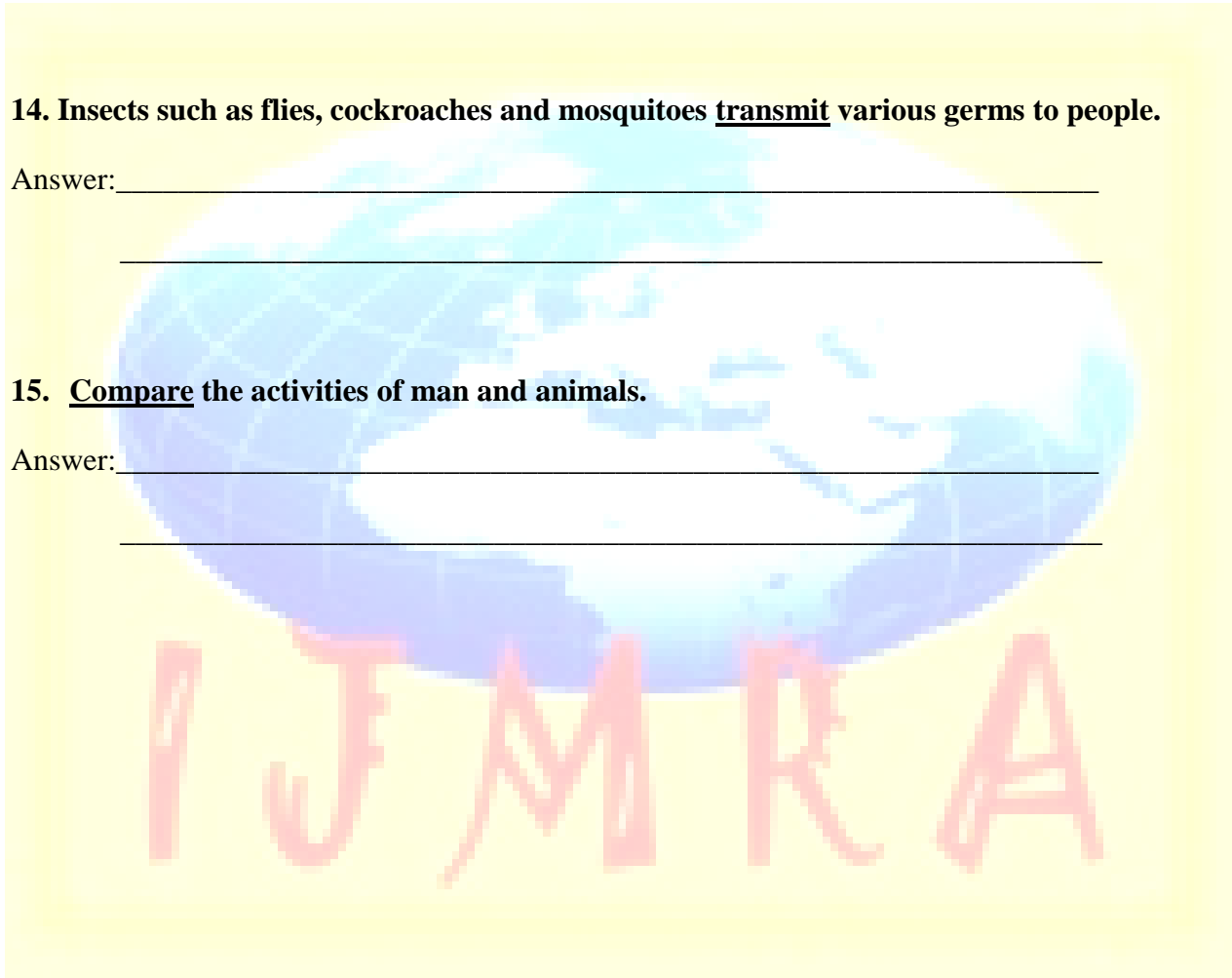
Answer: _____

14. Insects such as flies, cockroaches and mosquitoes transmit various germs to people.

Answer: _____

15. Compare the activities of man and animals.

Answer: _____



APPENDIX B Grade 4 Test Items

Name: _____ Date: _____

Age: _____ Sex: Male: _____ Female: _____

School: _____

Grade 4 Section: _____ Group: _____

Test A.

Directions: Carefully read each sentence. Pay attention to the underlined word.

Then, encircle the letter of the sentence that has the same meaning.

Example:

When reading a book, raise your eyes from the page once in a while.

- a. Wet your eyes once in a while when reading.
- b. Blink your eyes many times when reading.
- c. Look up or away from the page once in a while when reading.
- d. Put your eyes up when reading.

Answer: c. Look up or away from the page once in a while when reading.

START HERE:

1. Rotate the sheet of paper clockwise.

- a. Spin the paper in the same direction as the clock's hands .
- b. Pin the paper on the wall besides the old wall clock.
- c. Make the paper sway in the direction of the clock's hand.
- d. Slide the paper from the clock's hand towards the floor.

2. Sugar easily dissolves in water while oil does not.

- a. The sugar quickly disperses into the water.
- b. The sugar and oil quickly become solid in the water.
- c. The sugar quickly becomes water.
- d. The sugar goes down the bottom of the water.

3. Classify the various flowers on the table.

- a. Organize and group the flowers.
- b. Count and rank the flowers.
- c. Grind and pack the flowers.

d. Cut and display the flowers.

4. Farmers undergo hardships during dry seasons.

- a. Farmers work hard during rainy season.
- b. Farmers experience hard situation during dry season.
- c. Farmers harvest a lot during the dry season.
- d. Farmers learn how to catch fish during dry season.

5. Compare the sun and the moon.

- a. Write something about the sun and the moon.
- b. Check the sun and the moon every night and every day.
- c. Tell the difference and similarities of the sun and moon.
- d. Observe and measure the sun and the moon.

6. Describe the butterfly.

- a. Watch the butterfly fly away.
- b. Write the parts of the butterfly.
- c. Touch the structures of the butterfly.
- d. Explain the parts of the butterfly.

7. Thick smoke is released by a burning pile of wood.

- a. Thick smoke is produced by the burning wood..
- b. Thick smoke from the burning wood is great.
- c. There are no toxic chemicals coming from the factories.
- d. Toxic chemicals from factories are placed inside the drums.

8. Rubbing two sticks together produces fire.

- a. Rubbing two sticks creates fire.
- b. Rubbing two sticks shows fire.
- c. Rubbing two sticks puts out a fire.
- d. Rubbing two sticks stops a fire.

10. Predict what would happen if some vital parts of the human body were not protected by bones.

- a. See and hear what would happen if some vital parts of the human body were not protected by bones.
- b. Feel and touch what would happen if some vital parts of the human body were

- not protected by bones.
- c. Think and say what would happen if some vital parts of the human body were not protected by bones.
- d. Record and write what would happen if some vital parts of the human body were not protected by bones.

Test B. Directions: Explain in your own words, the meaning of the underlined word or phrase in each item.

Example: Do a research on forest fires.

- Possible Answers:**
1. Study something about forest fires.
 2. Read books about the cause of forest fires.

START HERE:

11. The enzymes transform the starch in the bread to glucose.

Answer: _____

12. Seeds dispersed by animals and man are equipped with barb that attach to the fur of the animals or clothes of man.

Answer: _____

13. Differentiate the structures of banana, mango, and pineapple.

Answer: _____

14. The piles of garbage emit bad odor.

Answer: _____

15. Worms fertilize soil.

Answer: _____
