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Primary Science Teaching to Bicolano Students: In Bicol, English or Filipino?

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ABSTRACT

This study aimed to determine the effects of using the local and mother languages on primary students' academic performance in science, which is officially taught in English. Usingthe official language, English, and the two local languages- Filipino, the national and official language, and Bicol, the mother language of the respondents- science lessons were developed and administered to three randomly grouped students. After each science lesson, the researcher administered tests in three languages to the three groups of students to determine their comprehension of science lessons in the three languages. The findings indicated that students who were taught using the Filipino language obtained better mean scores in the test compared to students who were taught using their mother language. On the other hand, students who were taught using the English language obtained the lowest mean scores. Furthermore, the results revealed that the Bicol speaking students prefer the Filipino language during class discussions, recitations, in following their teacher's instructions during science related classroom activities, and in doing their homework.

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1. INTRODUCTION

Language is indispensable in all aspects of our social environment. It is the medium where we express our beliefs, our emotions, our strong desires to answer and understand nature and the world we live in. We establish and maintain strong relationship with other people in and outside our home and we educate young learners at school through language. Walter [1] indicated that language is an integral feature of educational practice in the classroom. Teachers communicate content and instructions via language. Learners listen and interact via language in the process of learning.

In science education, comprehension skills and other science skills depend on language, which involves using audio, visual or verbal symbols in order to maximize the learning of students. According to Acuña [2], 'students develop science concepts based on their linguistic competence and experience'. However, Filipino primary students, especially in the multilingual provinces face a dilemma in the area of science as it is taught in English, which is foreign to most of them, thus affecting their comprehension of science concepts taught by their teachers.

Theories and studieshave posited that mother language-based learning offers students unconstrained learning environment, andrelatable and familiar concepts in the classroom. Mother language is defined as a

person's first language, home, community or heritage language. In 1953, UNESCO [3] stated that, 'it is axiomatic that the best medium for teaching a child is his mother tongue'.

> UNESCO [3] further explained that:
> 'Psychologically, it is a system of meaningful signs that in his mind works automatically for expression and understanding. Sociologically, it is a means of identification among the members of the community to which he belongs. Educationally, he learns more quickly through it than through an unfamiliar linguistic medium.'

Cummins stated that, 'children who come to school with a solid foundation in their mother tongue develop stronger literacy abilities in the school language'. Similarly, Thomas and Collier recognized that the deeper a students' level of the first language cognitive and academic development, the faster students progress in the second language.Furthermore, according to Dekker, 'the mother tongue-based mutilingual education (MTBMLE) provides a strong foundation in the learners' first language (L1), enabling them to build knowledge and experiences they bring to the classroom'. Lastly, mother tongue-based instruction provides the means for students to comprehend concepts better and helps them to be more critical and rational thinkers [4]-[8].

In the Philippines, studies have provided much evidence of the advantages of using the students' mother language in education. One of the most notable studies on mother tongue-based learning in the country is the Lubuagan Experiment. The results of the study show that the students' achievements are higher compared to other students who were taught in the regular or common classroom instruction mostly seen in many public schools in the country. Other studies include the use of the Waray language in teaching geometry in the province of Leyte which is located in Region 8. The researcher noted that students who participated in the study showed that using the mother tongue as medium of instruction is as effective as the use of borrowed terms in English and other languages. Furthermore, a study on using Filipino in teaching science showed that the students posted above average scores after the module was administered. Lastly, a study was conducted focusingon using Waray language in teaching kindergarten mathematics, which resulted in better performance of kindergarten students in mathematics [9]-[12].

Citing the empirical studies on the use of mother language in education, the Department of Education implemented the Department Order No. 16s in February 2012 mandating the use of one of 12 initial languages in the schools where the said language is/are widely used by the students [13]. A number of conferences and trainings were conducted in several regions of the country. Nonetheless, only a few teachers got the opportunity of attending the said trainings.

However, almost two years since the implementation of the department order, many public primary schools in the Philippines particularly in the provinces located in the Bicol region do not yet have any materials and methodologies on teaching science to primary students using the mother language. In the province of Catanduanes where this research was conducted, it remains to be seen if the use of the mother language in teaching science will result in better academic performance of the primary students as shown in the results of researches conducted to other provinces and regions in the country. Furthermore, there has not been any concrete study on the use of the mother language in primary science education. Studies that were previously conducted in the province focused on testing the reading comprehension of students [14], investigating the vocabulary abilities of primary students [15], and collecting vocabularies and essays and developing a dictionary on Bicol words and their equivalent meanings to English and other foreign languages [16].

There has not been any study administered on developing lesson plans and instructional materials using the mother language and utilizing them in actual science classroom instruction. Hence, this study was conducted. The study used two locallanguages in developing and administering instructional materials in science for primary students in an actual classroom instruction. The study was concluded through tests to evaluate the students' comprehension.

2. RESEARCH METHOD

2.1. The Research Area

The study was conducted between June and August of 2013 in the island province of Catanduanes, one of the six provinces that comprise the Bicol Region, also known as Region 5.The Bicol region is one of the 17 regions in the Philippines.In this region, Bicol is the spoken language and is one of the 8 major languages of the Philippines in terms of the number of speakers. However, the Bicol language varies in each of the 6 provinces. In Catanduanes, two distinct languages are spoken, the Northern Catanduanes Bicol, and the Southern Catanduanes Bicol.

Because of the limitations in time and availability of target respondents, the research was conducted primarily in one public elementary school located in a small village where Southern Catanduanes Bicol is widely spoken.

2.2. Respondents of the Study

Forty-five grade three students of Cavinitan Elementary School in the town of Viracparticipated in the study. The respondent-students' age ranges between 8 and 10. Of the forty-five student respondents, twenty-two are female and twenty-three are male.

The respondents' academic charateristics are similar to students who are in the below average section in the mainstream public elementary schools in the province. In the Bicol region and other regions and provinces of the Philippines, it is common in public schools to group students according to their academic ability, achievement or performance and depending on the numbers of enrolled students in a particular grade level.

Usually bright or high achieving students are sent to the highest section, often termed as section 1, while the rest of the students are sent to the corresponding sections below section 1. Students whose academic performance in the class is below the high achievers are sent to lower sections.

2.3. Research Design and Instruments

The study utilized the descriptive research approach by developing a lesson a plan taught in three languages to three randomly grouped students. After the lesson was done, tests were administered to the student respondents to evaluate their comprehension of the science lesson. Survey questionnaires were also given to the students to gain more knowledge on the extent of the language usedat home, in their community, and classroom and to provide additional information that could explain the result of their science comprehension tests. To ensure the validity 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. The Cronbach's Alpha for the test instruments administered to the three groups of respondents were .762, .715, and .721, for test in Filipino language, test in English language, and test in Bicol language, respectively.

2.4. Content, Materials and Implementation of the Study

After the local office of the Department of Eduction in the province permitted the researcher to do the study, the researcher coordinated with the school administrators and teachers for involving in the research. Several procedures were followed during the course of the research.

With permission from the provincial office of the Department of Education, the researcher developed a lesson plan based on the basic education curriculum and syllabus obtained from the teachers involved in the study. The content taught to the students were the actual topics included in the quarterly lessons in the first semester of the science curriculum. The topic chosen was about the proper ways of handling animals. The development of the lesson was based on the requirements in the "plan of lessons" stated in Philippine Elementary Learning Competencies (PELC) Science-Grade III.

The preparation of the lesson plan and instructional materials took at least one month with both the researcher and the teachers of the participating school involved in the revisions. The final revisions and preparations of the lesson and instructional materials were then administered to the selected respondents.

Prior to teaching the science lesson, each of the 45 student respondents was randomly grouped into three which served as the permanent group of the students. The students who were sent to the first group were taught in the Bicol language, while students sent to the second group were taught using the English language, and the third group of respondents were taught in the Filipino language.

Following the lesson plans, the classes were conducted for two class days totaling at least 90 minutes. Afterwards, a 15-item test was administered to the students after the classes. After the classes and tests, the students answered survey questionnaires. Because of the limited time, the planned homework that was supposed to be given to the students was not administered.

2.5. Data Analysis

Mean score, percentages and the frequency count was utilized in the research. The Analysis of Variance (ANOVA) served as the statistical tool in verifying whether there was significant difference in the result of the tests in three languages administered to the three groups of respondents.

3. RESULTS

3.1. Performance of Students in the Tests

The results of the science tests (Table 1) in three languages administered to three groups of students indicate that respondents who were taught science using the Filipino language achieved the highest mean score among the three groups, obtaining an average mean score of 13.93. The group of students taught in their mother language, Bicol, got an average mean score of 11.26. On the other hand, students who were taught using the English language got the lowest average mean score of 8.40. These indicate that respondents could comprehend better not only in their mother language, Bicol, but also in Filipino, the national language ascompared to English.

Table 1.Students' mean scores in the three tests

	N= 45	Tests	Mean Scores ± SD
Group 1	15	Test in Bicol language	11.26 ± 2.40
Group 2	15	Test in English language	8.40 ± 2.35
Group 3	15	Test in Filipino language	13.93 ± 1.03

Of the 15 students in the group that were taught and tested in the Filipino language, 8 obtained perfect scores (15 out 15). These students were able to complete the test items which require them to write and explain their answers in their own words. Five respondents scored 13 while two respondents obtained 12 and 14 out of 15 items, respectively.

From the group of students who were taught and tested in the Bicol language, only one respondent obtained a perfect score out of 15 items. At least 50% of the students were able to explain their answers in their own words in two out of five items which required them to write their answers.

Respondents who were taught and administered with tests in English had difficulty expressing their answers in the open-ended part of the test; some tried writing their answers but were still incorrect.

3.2. Comparison of the Students' Mean Scores Between Three Languages

Analyzing the mean scores between the languages using the one-way analysis of variance (one-way ANOVA), the findings shown in Table 2, reveal that there is a significant difference between the mean scores of the tests in Filipino and English (p=.000) in which students taught in Filipino had better mean scores than the students taught in English.

Table 2.Comparison of the respondents' mean scores between the tests in three languages

(I) Language	(J) Language	Mean Difference (I-J)	Std. Error	Sig.
Filipino	Bicol	2.86667*	.70703	.001
	English	5.53333*	.70703	.000
Bicol	Filipino	-2.86667*	.70703	.001
	English	2.66667*	.70703	.001
English	Filipino	-5.53333*	.70703	.000
	Bicol	-2.66667*	.70703	.001

*. The mean difference is significant at the 0.05 level.

A significant difference between the tests in Filipino and Bicol (p=.001) was also found. Students taught in Filipino, the national language, had better mean scores than the students taught in Bicol, their mother language. Lastly, there is a significant difference in the mean scores between the tests in Bicol and English (p=.001), students taught in Bicol had higher mean scores compared to students taught in English.

3.3. Observations from the Actual Teaching Process

3.3.1. Science class in English

In the science class which utilized the English language, students followed or echoed what their teacher said during the class. The expressions on their faces seemed to indicate that they were trying to understand what their teacher was explaining. Few students participated in the recitations, in which they took time to explain their answers and were uncertain of their ability to speak the language.

3.3.2. Science class in Filipino

The group of students who were taught the lesson in Filipino were more at ease and eager to participate in the recitation. The students could easily understand what their teacher was explaining. Students

who participated in the recitation were able to explain their answers with ease and confidence, and were also able to follow their teacher's instructions during class activities.

3.3.3. Science Class in Bicol

The students who had the science lesson in Bicol were initially unsure what to say or to react when their teacher started teaching in Bicol. However, when the students realized that their teacher would be speaking in Bicol during the science class, their apprehensions slowly turned to ease. However, some of the students seemed puzzled about their teacher speaking the language the whole time.

Similar to the class that utilized the Filipino language, the students in this group were eager participants during class activities and during recitations. Students were also confident in explaining their answers.

3.4.Students' Language Preference in Learning Science

The survey administered to the respondents in the later part of the research had two main components. The first component (Table 3) described the respondents'extent of use of the languages in and outside their home and school, while the second component (Table 4) show the respondents' language preference in science-related learning activities such as class discussions, recitations, science activities and exams.

3.4.1. Respondents' Language Use In and Outside their Home and School

Majority of the students (88.9 %) speak Bicol at home while the rest of the students speak different languages because their families are from other regions in the country. Outside their home, majority (82%) use Bicol when talking to friends or neighbors. 68.9% speak Bicolinside a store, supermarket, church, park or other public establishments, and 62.2% talk to schoolmates in Bicol on their way to school.

Table 3.Respondents' extent of language use at home, in the community, and school

	Language	N=45	Percent
Language spoken at home	Bicol	40	88.9 %
Language spoken outside home	Bicol	33	73.3%
Language spoken in public places	Bicol	31	68.9 %
Language spoken when talking to friends, neighbors and playmates	Bicol	37	82.2 %
Language spoken when having conversation with classmates on the way to school	Bicol	28	62.2 %
Language spoken inside school campus	English & Filipino	36	80 %
Language spoken inside the classroom	English & Filipino	29	64.4 %
Language spoken when talking to teachers	English & Filipino	32	71 %

The language spoken by the students noticeably changes when they enter their school campus. According to 36 (80%) respondents, they use both English and Filipino when having a conversation with schoolmates, teachers and school staff. Similarly, 64.4% of the respondents also use English and Filipino inside their classroom, and 71% talk to their homeroom teacher in both languages.

3.4.2. Respondents' Language Preference at School and in Learning Science

The results show that the student-respondents generally prefer the two local languages, Bicol and Filipino, during conversations inside the school campus, and during science education related activities.

The respondents (71.1%) prefer speaking with their classmates and schoolmates in Bicol. The respondents were almost split in their language preference in having conversations with their teacher in the classroom, in which 40% prefer Bicol, while 37.8% of the students chose Filipino. In science class activities such as in performing experiments or group work, 62.2% of the respondents prefer their teachersgivinginstructions in Bicol and Filipino. In reading activities, 57.8% of the respondents prefer reading science textbooks and other texts in Filipino.

During class recitations, 55.6 % of the respondents prefer using Filipino, while 31.1% chose both the Filipino and Bicol languages. 66.7% of the respondents prefer Filipino in presenting and expressing their own ideas during science class discussions, experiments and oral reports. If given a choice of language during exams, 62.2% of respondents would prefer Filipino, on the other hand 37.8 % of the respondents would prefer a combination of English and Filipino language. Lastly, 53.3% of the respondents prefer the Filipino language in doing their homework, while 31.1% favor using both Filipino and Bicol languages.

Table 4.Respondents' language preference at school and in science-related learning activities

	Language	N=45	Percent
Having a conversation with classmates and schoolmates	Bicol	32	71.1%
Having a conversation with teachers inside the classroom	Bicol	18	40 %
	Filipino	17	37.8 %
Following teacher's instructions during science class activities	Bicol & Filipino	28	62.2 %
Reading science related books	Filipino	26	57.8 %
During class recitations	Filipino	25	55.6 %
	Filipino & Bicol	14	31.1 %
When expressing own ideas to the teacher and classmates	Filipino	30	66.7 %
During exams	Filipino	28	62.2 %
	English and Filipino	17	37.8 %
In doing homework	Filipino	24	53.3 %
	Filipino & Bicol	14	31.1 %

4. DISCUSSION

Overall, the results of the tests and the class observations indicate that respondents could comprehend better not only in their mother language, Bicol, but also in Filipino, the national language as compared to English.

The student respondents who were taught in Bicol, along with the students who were taught in Filipino responded better to their teachers during class participation and in expressing their own ideas. The results of the tests show that the student respondents who were taught in the Filipino language had better performance in the exams compared to the students who were taught in the mother language, Bicol. However, the mean scores of the students who were taught in Bicol are still considered above average by their teachers.

Noticeably, the students' better performance in the national language, Filipino, compared to the students' mother language, Bicol, seem to indicate that the students are more familiar with the Filipino language in the academic environment. Other studies which resulted in the respondents obtaining higher mean scores or comprehending better in Filipino language included Balce's [11] study on teaching science in Filipino and Rubio's [17] study on using two languages in learning science. However in those particular studies, the respondents' mother language is Tagalog, which is closely related to the Filipino language [19], [20].

On the other hand, students who were taught in English performed the least in the test. Students also had difficulty in writing their own answers in items requiring them to answer in their own words. Some of the students even wrote the same sentence of the test items.

Based on the observations in the science classes taught in Bicol and Filipino, most students were more confident in explaining or presenting their own ideas during class discussions, and were more active during class recitations. Students seemed to understand what their teachers were teaching in class. Furthermore, the students easily followed their teachers' instructions during class activities. Lastly, students had better mean scores in the tests that were administered after the science classes.

The results obtained from the survey administered revealed that most of the student respondents prefer using the Filipino language during science class discussions, recitations, in reading science-related texts, in doing their homework and in exams. On the other hand, most students prefer their teacher speaking in Filipino and Bicol when giving instructions in class activities in and outside their classroom.The respondents' choice of the Filipino language also indicated their familiarity of the said language at school since it is also used in other subjects such as Social Studies. Additionally, the respondents could also be influenced by the mass media, such as radio and television programs, which utilize the Filipino language. These observations were based on their response regarding the language of the radio and television programs they usually listen to and watch, in which the majority of the respondents stated that they often listen and watch programs in Filipino.

In summary, based on the results of the study, mother-tongued based science education is beneficial to the Bicol-speaking primary students.Itsiginificantly enhances the learning outcomes of students from minority language communities and also improves the quality of basic education. [21]-[23].Furthermore, the findings reveal that the student respondents also had better performance when taught science in Filipino which is not their mother language. Moreover, the transition from one language to another at home and at school could affect the students' learning of science. According to Malone [18], one of the problems faced by children in multilingual communities is that 'their language skills do not serve them because their language has no place in the classroom. Instead, textbooks and teaching are in a language they neither speak nor understand'.

5. CONCLUSION

Several insights were gained from this study. First, the results reveal that Bicol speaking students have better academic performance when they were taught using the local languages they are familiar with compared to being taught using the English language. It also confirmed and supported the other studies [8]-[10],[12] which resulted to better performance of student respodents in their mother language. Second, although Bicol is the mother language of the respondents, they had better performance in the test in Filipino, the national language. This indicates that at this time, the Filipino language has a stronger foundation as an academic language than Bicol since Filipino is also the language of instruction in subjects such as Social Studies and Filipino. In addition to Filipino being spoken, written and used as medium of instruction, it is also used in school textbooks, magazines and newspapers. Furthermore, Filipino is widely spoken by teachers, staff and students inside the school campus. Third, primary students switch languages between home and school which could affect their learning. Fourth, the suitable use of local languages in teaching science concepts at the moment would depend on the content being taught. Lastly, the use of two local languages, Filipino and Bicol, in primary science could have potential benefits for students especially in the provinces of the Bicol region.

Thus, the researcher is recommending further research on mother and local language-based science education by developing more instructional lessons and materials to various thematic content of the science curriculum. This step could determine whether the use of local languages is appropriate to other science lessons.

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