Doctoral Dissertation

Primary Science Education Using Two Languages, Bicol and Filipino: The Case of Bicol Speaking Students in the Bicol Region, Philippines

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ABSTRACT

The purpose of this study is to determine in which language Bicol-speaking students have better understanding of science ideas. The study also examined the students' extent of language usage in and outside their homes, and their language preference when learning science. Additionally, this study also investigated primary school teachers' opinions on their students' language preference in learning science.

The study focused in soliciting students' and teachers' perceptions on language use in science, developing instructional materials, and administering science lessons using two local languages, Filipino, the national language, and Bicol, the mother language of the respondents which were then compared to respondents who were taught using the English language, the instructional language of science education.

The study was guided by the following process. *First,* the language demography of the country and the language policies implemented thru the constitution and department of education orders were reviewed. Studies conducted in other regions which are related to mother language-based education were also reviewed. *Second,* the researcher conducted school visits to public primary schools located in the provinces of the Bicol region. School principals and teachers were interviewed, and science classes in three class sections were observed focusing on the language use. *Third,* based on the insights gained, the research design and framework of the study was formulated and research materials were developed. *Fourth,* the research materials were administered to selected participants, afterwards data were collected and analyzed.

The study aimed to address the main research problem: Do Bicol-speaking primary students understand the science lesson and other science related activities better in Bicol or Filipino, compared to English?

In order to provide the answer, the following specific research problems guided the course of the research: (1) What are the effects of using two languages, Bicol and Filipino, on students' academic performance in science compared to using the language of instruction in science? In which language do students understand better? (2) What are the students' language preference in learning science ideas, and their language environment in and out of their school? And, (3) What are the perceptions of primary school teachers towards the mother language-based science education?

The descriptive methodology was employed during the process of this study. Instruments that were used in the research included survey questionnaires and actual classroom lesson, reading comprehension and vocabulary tests in three languages. The survey questionnaires served as data to find out the students' language preference in learning science ideas in science related activities. Actual classroom lessons provides data on students' performance (recitations, class participation, expression of own ideas, following teacher's instructions) in class. The tests in three languages consisted of a reading material about the science topic from the lessons taught, and test items that determine if the students understood what they have been taught.

The findings revealed the following:

1. 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 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.
2. Students who were taught using the Filipino and Bicol languages exhibited easiness and eagerness to participate and follow teachers instruction during science classes. Students were also able to express their own ideas during class recitations and discussions compared to the students who were taught in English.
3. The results of the tests in which student respondents obtained better scores in Filipino was supported by the results of the survey administered to them. The results revealed that majority respondents prefer the Filipino language in learning and comprehending science concepts, in expressing their own ideas, and in following their teacher's instructions.
4. The results also revealed that from teachers' point of view, the Filipino language, even though not the mother language of the students in the region, is the language preferred by students in most science related activities along with the Bicol language. On the other hand, although their students favor the Filipino language in various science related activities, for several reasons (e.g. the difficulty and cost of translating science concept into local languages, the status of English as the international language, the importance of English for higher education, lack of training in multilingual-based teaching), a considerable number of teacher respondents still

perceive that English is the best medium (most appropriate) of instruction for primary science education in the Bicol region.

Several insights were gained from the data of this study. First, the Bicol speaking primary students switch languages between home and school which could affect their learning. Second, the results of the tests revealed that Bicol speaking students have demonstrated better performance when they were taught in the Filipino and Bicol languages. The findings are supported by the studies conducted by Dekker and Dumatog in 2003, by Balce in 2010 and by Oyzon et al., 2012, which similarly resulted to better performance of student respondents in their mother language. Third, the use of local languages in teaching science ideas at the moment would depend on the content being taught. Fourth, the results of the study show that the use of two local languages, Filipino and Bicol languages, in primary science level could benefits Bicol-speaking students in terms of better understanding of science ideas.

Lastly, although Bicol is the mother language of the student respondents, they performed better in the test in Filipino language, which is the national language. This indicate 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.

Based on the findings in this study, it is concluded that, grade 3 Bicol-speaking students understand science ideas from science lessons and other science related activities better in Filipino language and in Bicol language compared to the English language.

Most importantly, the results of this study revealed that the Bicol speaking students were conditioned to the Filipino language that they became familiar and

comfortable using the language. Therefore, if the learners are highly exposed to other language in spite of existing mother tongue language, this may affect the language preference of the students' in the learning process in the classroom.

Thus, the study recommended further research on mother language-based science education by developing more instructional lessons and materials to various thematic content of the science curriculum to determine whether the use of local languages is appropriate to lesson being taught. Further research on finding and developing equivalent or near equivalent meanings or definitions of science terms in the local languages. Providing more opportunities for teachers as well as school administrators to develop school-based instructional materials for science education using local languages that students are familiar.

CHAPTER I

INTRODUCTION

Language is indispensable in all aspects of our social environment. It is the medium to communicate information such as our ideas, our emotions, our strong desires to understand nature and the world we live in. We establish and maintain strong relationship with our family and interact with other people in and outside our community through language. At school, language plays a vital role in the teaching and learning process. Language is an integral feature of educational practice in the classroom. Teachers communicate ideas using specific language. Learners listen and interact through language as the process of learning (Walter, 2011).

In science education, the learning of science ideas can also be facilitated using audio-visual aids. According to Acuña (1994), science concepts develop based on linguistic competence and experience of the students.

However, science education in the Philippines faces a dilemma since the content subject is taught in English which, to Filipino primary students especially in the multilingual provinces, is a foreign language. This consequently affects their understanding of science concepts being taught by their teachers.

The Philippines is an archipelago with 7,107 multicultural and multilingual islands. The country has three main islands, Luzon, Visayas and Mindanao, which are divided into 17 regions, each region composed of several provinces (Figure 1). Based on the National Statistics Office data, as of May 2010, the Population of the country is at 92.34 million. The World Bank estimated the population of the country at 98 million as of 2013. According to

the National Commission for Culture and the Arts (NCCA), 80 major ethno-linguistic groups, along with subgroups, make Philippine society diverse and complex. All these, traditionally, are groups practicing distinct cultures and using domestic kind of economy. The people speak at least 171 languages. Of these languages, eight are considered major languages – Tagalog, Cebuano, Bicol, Hiligaynon, Pampango, Waray, Ilocano, Pangasinan – according to the number of speakers (Figure 2). The Filipino language by virtue of the Philippines constitution was designated as the national and official language, and English considered official language.

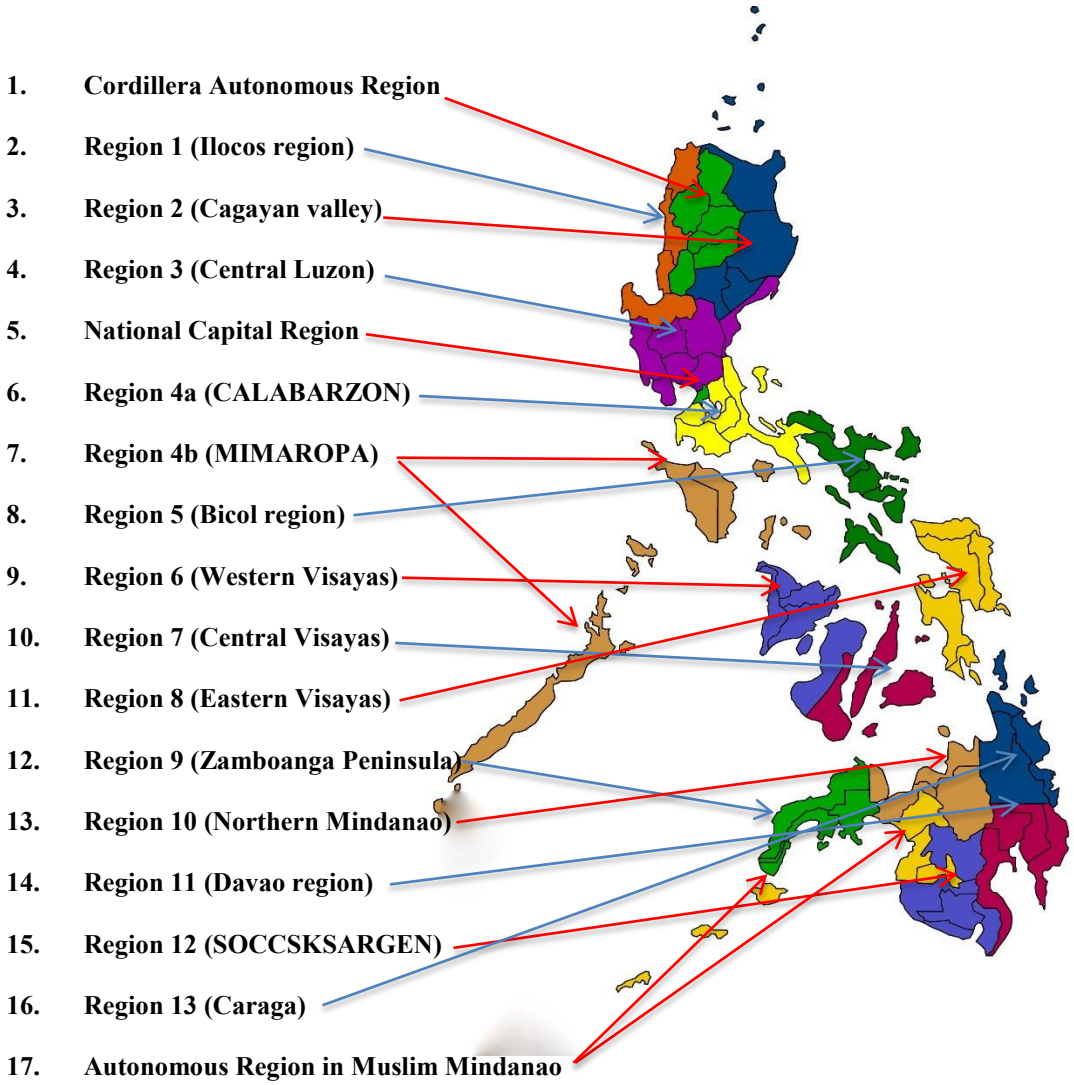


Figure 1. Map of the Regions and Provinces in the Philippines

https://mlephil.wordpress.com/mtb-mle/

Figure 2. Philippine language map

The language diversity in the Philippines is a cultural wealth but also a persisting challenge in primary education particularly in science education.

Because of the language diversity, language policies in education were implemented (Espiritu, 2002). Nevertheless, the existence and implementation of the language policy in education did not stop the never-ending dispute over which language should be used in educating Filipino students. Educators and policy-makers have different opinions in what language is most appropriate in teaching the subjects, such as science and mathematics. Policy makers and educators who support the use of Filipino language in education reasoned that since it is the national language, it can be effective as a medium of instruction in science. The proponents of teaching science in English claim that English as the medium of instruction is tested and feasible, it does not require large amounts of funding, and is an international language. On the other hand, several educators and curriculum developers argue that the vernacular of students should be used as medium of instruction in order for the students to learn more quickly since English and Filipino are considered a foreign language and a second language in other provinces. The differences of opinion in the medium of instruction in science education is due to the low performance of Filipino students, which, additionally, may indicate their comprehension in science, in the National Achievement Tests (NAT) in science conducted by the Department of Education (DepEd), and in Trends in International Mathematics and Science Study (TIMSS).

English is the medium of instruction in science education at the primary and secondary levels. However, Filipino students still perform poorly in both the National Achievement Test in science (NAT 2010-2011 and NAT 2011-2012), and in the Trends in International Mathematics and Science Study (TIMSS 1999 and 2003). In the 2010-2011 National Achievement Test in science (Table 1), grade 3 Filipino students from public schools obtained a mean percent score of

53.48, down from the average of 61.68 and 60.51 the previous 2 years. The following year, the mean percentage score in science achieved by the grade 3 students was 55.15, still a lower mean average.

Table 1

Performance of Grade 3 students in the National Achievement Test in Science

Year	National Average
2008-2009	60.51
2009-2010	61.68
2010-2011	53.48
2011-2012	55.15

(source: depedqc.ph)

In the 1999 TIMSS (Table 2), the Philippines ranked 36th out of 38 countries, attaining an average score of 345 compared to the international average of 488 while at the 2003 TIMSS for 4th graders, the Philippines scored an average of 332 compared to the international average of 489 and ranking at 23rd out of the 25 participating countries.

Table 2

1999 and 2003 TIMSS International Average Compared to the Philippines

International Tests	International Average Score	Rank
TIMSS 1999 (8th Grade)		
International Average	488	
Average of the Filipino students	345	36th out of 38 Countries
TIMSS 2003 (4th Grade)	489	
International Average		
Average of Filipino students	332	23rd out of 25 Countries

(http://timss.bc.edu/PDF/t03_download/T03_S_Chap1.pdf)

The National Achievement Test results (NAT 2008-2009, NAT 2009-2010, NAT 2010-2011 and NAT 2011-2012) and the performance of the students in Trends in International Mathematics and Science Study (TIMSS 1999 and 2003) have indicated problems in science education in the country such as lack of facilities, lack of instructional materials and most importantly the lack of qualified teachers (Tan, 2006).

The goal of science education in the Philippines is to develop scientific literacy among students that will prepare them to be informed and participative citizens who are able to make judgments and decisions regarding applications of scientific knowledge that may have social, health, or environmental impacts (K to 12 Curriculum). The science curriculum will provide students with all the knowledge and skills which are important for them to find work or when they are working in a knowledge-based society. According to the Core Learning Area Standard of the science for the entire K to 12:

> "The learner demonstrates understanding of basic science concepts, applies science process skills, and exhibits scientific attitudes and values to solve problems critically, innovate beneficial products, protect the environment and conserve resources, enhance the integrity and wellness of people, and make informed and unbiased decisions about social issues that involve science and technology. This understanding will lead to learner's manifestation of respect for life and the environment, bearing in mind that Earth is our only home."

However, currently, many primary students in the country study science in English which is not their mother language. The students' language skills

which they learned at home and in their community do not help them in learning science. Using the language that the students are familiar with could ensure better learning for them. A mother language-based learning offers students unconstrained learning environment, and relevant and familiar ideas in the classroom.

Many theories and studies have pointed out that using the mother language would give the students a better opportunity to learn academic content. On mother tongue-based education, Cummins (2000) 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 (1997) 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 (2010), the mother tongue-based multilingual education provides a strong foundation in the learners' first language, enabling them to build knowledge and experiences they bring to the classroom. Lastly, mother tongue-based instruction provides the means for students to understand the science concepts better and helps them to be more critical and rational thinkers. According to Nolasco (2009), Benson (2005) and Sibayan (1994), when the students' mother language is used in the classes, various concepts are easily understood by students and it enables them to be more critical and rational thinkers. The mother language is also best used as bridge in learning main languages of instruction (Sibayan, 1994).

Studies in the Philippines such as the Iloilo (Western Visayas Region) Experiment in 1953 (Orata, 1953), the Lubuagan (Cordillera Autonomus Region) Experiment in 2003 (Dekker and Dumatog, 2003), the teaching of quality science

in Filipino language in Manila in the National Capital Region (Balce, 2010), and the Leyte Normal University-Integrated Laboratory School Experiment (Eastern Visayas Region) in which the Waray language was used in teaching geometrical figures (Oyzon et al, 2012) indicate high performance of students using their mother language. Because of these experiments and other initiatives, the Department of Education issued the DepEd Order No. 74, s. in 2009, institutionalizing the use of mother language in primary education as part of the K to 12 Basic Education Program, and the 2012 DepEd Order No. 16, s., which stated the guidelines on the implementation of the Mother Tongue-Based-Multilingual Education.

The language policies and the views on mother tongue-based education focused mainly on specific mother language in each region or province. However, there is no attention given on a language environment where two languages, the mother language and another regional or national language, could be spoken, written and understood by students, which could be the case of primary students from the provinces of the Bicol region. Furthermore, it has been more than two years since the institutionalization and implementation of the succeeding Department of Education orders on mother tongue-based education; however, many public elementary schools in the country particularly in the provinces of the Bicol region, still have concerns regarding the availability of instructional materials and trainings on teaching science to primary students using the mother language.

In the province of Catanduanes where this research was conducted, initial classroom observations and interviews with principals and teachers were administered in various elementary schools. The interview with principals and

teachershave corroborated the concerns of teachers on the implementation of the mother-tongue based multilingual education in terms (a) the lack of mother tongue-based instructional materials, (b) the lack of words in the local language that are similar or equivalent to the science terms in English, and (c) insufficient knowledge of teachers on teaching science in the local language due to lack of training. . Several teachers and principals who were interviewed suggested the use of the Filipino language because occasionally the teachers also code switch from English to Filipino in explaining science concepts to their students. Furthermore, several teachers and principals stated that the students are also familiar with the Filipino language since it is one of the subjects taught at school.

On the other hand, it also remains to be seen if the use of Bicol, the mother language, in teaching science to Bicol-speaking primary students will produce similar better academic performance as seen in the other researches conducted in other provinces and regions in the country. This assertion is due to several reasons given below.

First, unlike in other regions which are monolingual, the Bicol region, also known as Region 5 is multilingual. There are 4 major Bicol languages spoken in the 6 provinces of this region, in which out of these languages are 11 dialects. The province of Catanduanes, where the study was conducted, has two major languages, the Northern Catanduanes Bicol and the Southern Catanduanes Bicol (Lewis, Simons and Fennig, 2014). In this study, most of the students who participated speak the Southern Catanduanes Bicol, while students from two schools located in the northern part of the province speak the Northern Catanduanes Bicol. In the 11 towns that comprised the province, the Bicol spoken varies in pronunciation, accent and words used, however there are several

terms used in both languages that have similar words, pronunciation and meaning. Furthermore, regardless of the dialect spoken in all towns, most of the people use mainland Bicol (Naga) language in written form. The internal migration of people in the province has also influenced people who speak both languages, particularly the children of the migrants from another town and from another Bicol province.

Second, aside from the language, the prevailing culture in the Bicol region is different compared to other regions. The Bicol culture is known for being religious, conservative and is associated with being resilient because of the frequent typhoons that cause damages each year. Compared to other regions that are highly urbanized, have flourishing main commerce, and are center of politics - regions in which Manila and Cebu belong, the Bicol region is still generally rural and still in the process of development. Additionally, each of the provinces that comprised the region is different from each other. The most obvious difference is the type of Bicol language spoken by each of the six provinces' population. For example, the Bicol language spoken in Catanduanes is different from the Bicol spoken in Albay, in Sorsogon or in Camarines Sur.

Third, Tagalog, the language which is the basis for Filipino, the national language of the country, enjoys its popularity in many provinces of the Bicol region, especially in the popular mass media such as television and radio programs as well as print media.

Lastly, there is inadequate data, at least in the province of Catanduanes, that shows the Bicol speaking students' understanding of science using their mother language, and their perceptions towards the use of the mother language, the national language and the current language used in science education.

The lack of insights from primary school teachers and school administrators on mother language based primary science education in the Bicol region was also addressed in this study.

Without firsthand information on (a) the effects of using the mother language and the national language on students academic performance in science, and (b) students' and teachers' perceptions towards the languages used in science, the goal of primary science education and the mother tongue-based education mandated by the Department of Education may not be fully maximized to benefit the primary students and teachers from the Bicol-speaking region. Hence, this study was undertaken.

1.1 Research Problem

The following research questions were drawn from the real problem existing in the Bicol region in relation to the language issues which were discussed in the background of the study

1.2 Specific Research Questions

In order to arrive at suitable answer, the following specific research questions were considered:

Research Question 1

What are the effects of using two languages, Bicol and Filipino, on students' understanding of science ideas compared to using the language of instruction in science? In which language do students understand better?

The research question was formulated due to the lack of firsthand knowledge on Bicol speaking students' understanding of science ideas when they are taught in Bicol or Filipino, compared to being taught in English language.

Studies done from other regions cannot be associated in the context of the Bicol region because of (1) the differences in culture, (2) differences in language, and (3) Filipino is also widely used by Bicolano people.

Research Question 2

What are the students' language preference in learning science ideas, and their language environment in and out of their school?

The research question 2 was drawn out from the need to know students' language preference when learning science at school because their language at home is not the language used in teaching science at school, which is English. Furthermore, the students can communicate in another language, Filipino, to which they are exposed in media.

Research Question 3

What are the perceptions of primary school teachers towards the mother language-based science education?

The research question 3 was formulated for this study in order to address the perceived lack of information regarding primary school teachers' perception towards the use of their students' mother language in science. The information gathered from teachers' perceptions could support the research questions 1 and 2.

Additionally, the information obtained from the teachers could provide academic policy makers insights that could maximize the mother language-based education in the country.

1.3 Objectives of the Study

To answer research question 1 on the effects of using two languages, Bicol amd Filipino, on students' understanding of science ideas compared to using English, the first objective aimed to:

1. Identify the language the students understand better by implementing science lessons, and by administering tests in three languages, Bicol, English and Filipino.

To answer research question 2 regarding the students' language preference in learning science ideas and their language environment in and out of their school, the second objective aimed to:

2. Find out the students' language preferencein learning science ideas and in other science related classroom activities. And to investigate the students' language environment in and outside their home and at school by administering survey questionnaire.

To answer research question 3 on the perceptions of the primary school teachers towards the mother language based science education, the third objective aimed to:

3. Asses primary school teachers' opinions on their students' language preference in learning science ideas. And to know the teachers' opinions on the use of mother language in science through survey questionnaires.

1.4 Significance of the Study

This study is essential because several academic end-users can make use of the results of this study. Government policy (DepEd Order No. 74, s., DepEd Order No. 16, s.) and previous studies (Dekker and Dumatog, 2003; Balce, 2010; Rubio, 2010; Oyzon; 2012) have focused on the use of the students' mother

language in order to enhance their learning. This study presents a rationale that using not only the students' mother language but also another language which they are conditioned to, could further enhance their understanding of science ideas. Furthermore, policy makers could also find this study beneficial because it could serve as basis for conducting more exhaustive review and analysis on the medium of instruction in the Bicol-speaking region. Moreover, policy makers can determine and formulate what appropriate provisions can be provided to improve science education of primary students especially in many provinces of the country. Lastly, the Bicol language is part of the Bicol culture and its identity, which is part of Filipino culture. This study ensures that the mother language of the students is given a chance to survive the extinction that has befallen to some other local languages in the country.

1.5 Scope and Delimitation of the Study

The study is descriptive in nature and focused on determining whether Bicol speaking students understand better in science using two local languages, Bicol, (mother language), and Filipino, (the national language). Thus, it is delimited to the following:

1. Research Site: Catanduanes, one of the 6 provinces of the Bicol region.
2. Research Sample: Grade 3 Bicol speaking primary students.
3. Data Gathering focusing on:
    - Reading comprehension tests to assess primary students' understanding of science reading content in Bicol and Filipino compared to English.
    - Vocabulary tests to investigate primary students' understanding of science ideas and concepts when common vocabulary or terms are

utilized in Bicol and Filipino, compared to English.

- Implementation of science lessons, and correspoding assessment tests in science in three languages, Bicol, English and Filipino.
- Administering survey to primary students in order to know their language preference and language usage in and outside their homes and school.

The study did not venture into investigating and comparing of the oral and literal aspect of language usage of primary students. The development of the lesson plans, test materials and survey questionnaires was done at the Graduate School for International Development and Cooperation (IDEC), Hiroshima University in consultation with science specialists in University of the Philippines National Institute for Science and Mathematics Education Development (UP NISMED), professors of Catanduanes State University and elementary school teachers in the research venue. Field testing and administering of the materials was done in selected elementary schools located in the province of Catanduanes, one of the six provinces of Region V (Bicol region) in the Philippines.

Science content for the actual science lesson, the reading comprehension and vocabulary tests were adapted from the prescribed Philippine Elementary Learning Competencies (PELC) Science and the regular science book used in public primary schools which was then translated to Filipino and Bicol languages. The translation of materials from English to Bicol and Filipino languages was done by professors instead of linguists from the college of education in the state university who are from the province. The main reason is the availability of the professors and their close proximity to schools and their students, and their educational experiences. The survey questionnaires were administered to the

students to determine their preference on the use of a particular language or languages in studying science and in science related activities such as class recitations, class discussions about the lesson, in student and teacher interactions during science experiments or activities, exams or tests. Another set of survey questionnaires were administered to primary school teachers which aimed to know their opinions towards mother tongue-based science education and also to determine from their experience and observations, the language in which their students prefer or had better comprehension of science and science related activities.

1.6 Definition of Terms

For a clearer understanding of the terms and concepts used in this study, the following are defined conceptually and/or operationally.

Language is a form of communication unique to mankind. It has many meanings but basically it is a means by which a person is able to convey his/her thoughts, feelings/emotions and field of experiences to another person or group of persons by using symbols or words and or sound by talking and or singing, chanting. It is also the medium by which history, culture and customs are preserved and passed unto the next generation.

National Language is the language that is widely connected to the people/population within a country. It is the language that is historically and cultural embedded in the society and is utilized and spoken in all corners of the country such as the government, school, business, home, park and market places.

Official Language is a language that is usually officially authorized by law as having the special status in a specific state or country. Usually, like in

many countries around the world, it is the language that is being used in the government offices, administration and schools.

Bilingual refers to using and or expressing two kinds of languages with fluency in everyday transactions. Usually the person utilizes his/her first language which is the mother tongue and the second language, which is acquired thru learning from school or by historical influence by a colonizing country.

Mother Tongue (Also known as Mother Language, First Language L1, Vernacular), refers to the mother language that the student participants use at home and in their own communities, villages or ethnic groups. The Philippines has at least 170 vernacular language (dialects not included). It is their native language, extensively spoken and utilized within the home.

Bicol is the mother language of the people of the Region 5 or Bicol region. According to Lewis et al. (2014), there are 4 major Bicol languages and 11 dialects.

Northern Catanduanes Bicol is the Bicol language spoken by the people of Catanduanes who reside in the northern part of the province.

Southern Catanduanes Bicol is the Bicol language spoken by the people from the capital town located in the southern part of the province.

Bicolano or Bicolanos refer to the people who are residents of the six provinces that comprise the Bicol region.

Tagalog is the language in which the Filipino language was based upon. It is the language spoken in the national capital region.

Filipino is the national and official language of the Philippines. The language is also used in school subjects such as social studies and Filipino.

English is the second and official language of the Philippines. Also the medium of instruction in science and mathematics education.

Medium of Instruction means the language that is used for teaching at school. In the Philippine educational system, as mandated by the constitution and various language policies, two languages emerged as the main languages for instruction. Filipino and English. English is used in teaching Science and Mathematics while Filipino is mainly utilized in teaching Social Studies, Arts and Humanities.

Language Preference refers to the students' strong liking of a particular language in science related learning activities which helps them understand ideas and concepts better.

Reading Comprehension is the act of understanding what a person or a student reads about a particular idea or concept. Without understanding, reading could be just symbols or images of words and terms, it does not give any relevant information to the reader.

Common Words in Science is also referred to as "Non-Technical Words" (WELS, 1983; Tao, 1994; Mazna and Zurida, 2006), are simple words in science textbooks and are frequently used by teachers when they explain science ideas to their students.

1.7 Theoretical Framework

Multilingual Education (MLE): Formal use of more than two languages for literacy and instruction (UNESCO, 2003). Ideally, this begins with developing L1 (First Language) and gradually adding other languages. Countries with multiple regional languages of wide communication or more than one official

language may support multilingual education that includes children‘s mother tongues and the more widely spoken languages of the nation. As with bilingual education, a multilingual education program is considered stronger. The educational problem faced by many children from ethno-linguistic communities is three-fold: (a) some have no access to education at all. Those who do have access to school but do not speak the official language find that their knowledge, experience and language are treated as a disadvantage; (b) their language skills do not serve them because their language has no place in the classroom; (c) their learning and problem-solving experiences and their knowledge of “how things work” in their own culture and social setting do not serve them because the culture of the classroom, the teachers, and the textbooks is that of the dominant society (Cummins, 2001). Jessica Ball (2010) theorizes that young children learn a second language in different ways depending upon various factors, including their culture, particularly the status of their culture, language, and community within their larger social setting. Most children who arrive at school with some competence in more than one language have grown up bilingual or multilingual from their earliest days at home, and have not experienced successive acquisition of second or third languages.

Many studies (Meisel, 2006; Fiero-Cobas and Chan, 2001) have shown that children can learn three or more languages starting in their early years. Moreover, with sufficient motivation, exposure, periods of formal study, and opportunities for practice, they can ultimately succeed in attaining proficiency in several languages. However, despite myths about young children being able to ‘soak up languages like a sponge,’ language proficiency does not spring forth in

full bloom during the early years. Experience and research have shown that language acquisition takes a long time.

1. The Conceptual Framework

According to the rationale of mother tongue-based multilingual education, better performance of primary students in science could best be achieved by using the language the students are familiar and understand best (Cummins 2001; Ball, 2010; UNESCO, 2003). However, there are provinces in several regions where two languages are spoken, written and understood by the people. This study explored the possibility of using not only one, but two Philippine languages, Bicol, the mother languages of the students, and Filipino, the national language of the country, in order to maximize Bicol-speaking students' understanding of science ideas.

The conceptual framework diagram illustrated in figure 3 shows the relationship of the main elements, the two Philippine languages, Bicol and Filipino, utilized as medium in instructional materials and in science related activities, compared to using the English language.

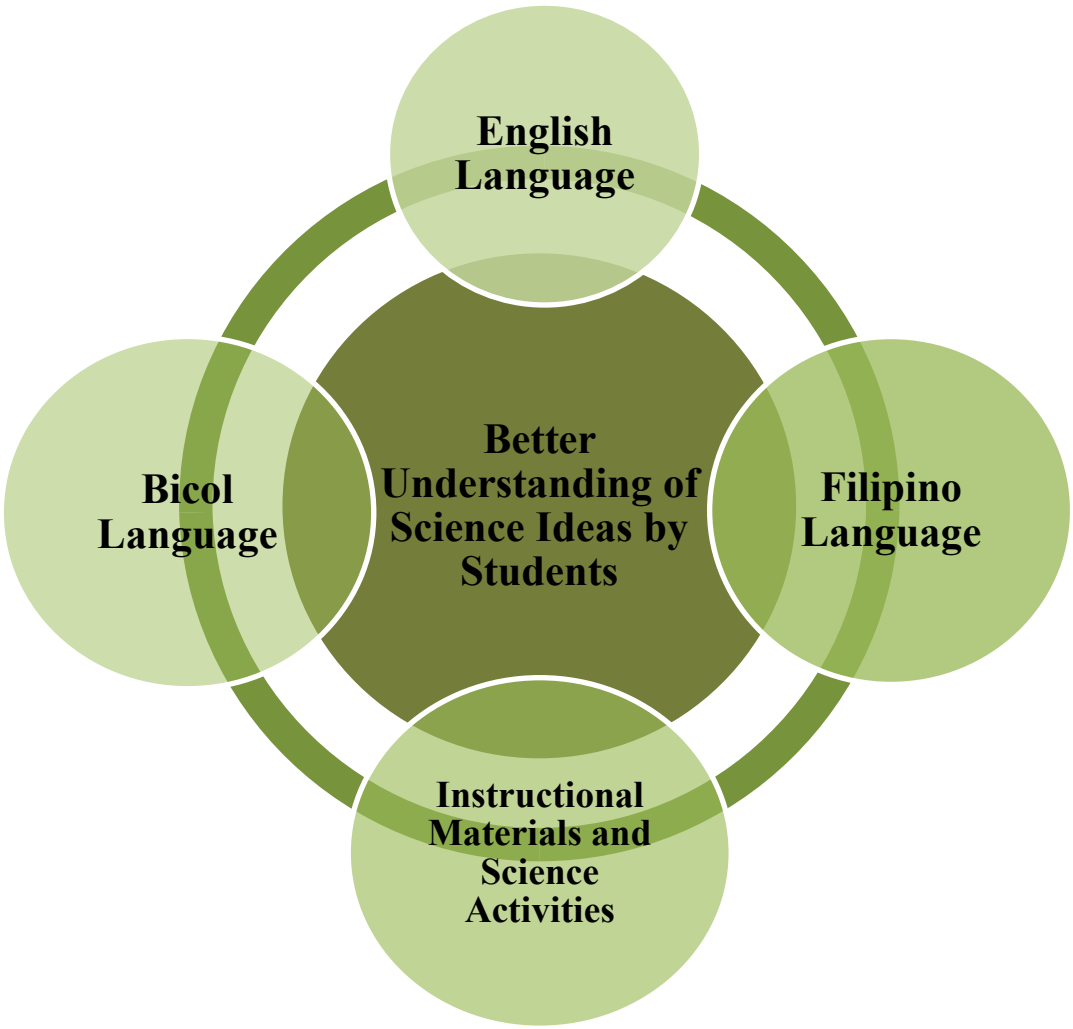


Figure 3. Conceptual Framework on Using Two Philippine Languages Compared to English in Science Education

CHAPTER 2

REVIEW OF RELATED LITERATURE

This chapter discusses language and its role in education and its important function in science education. This chapter also presents a review of related studies on the language situation in the Philippines and the language policies in education in the country. Lastly, the chapter presents and discusss the instructional design models and how one of the models was adapted in this study.

2.1 Language and Education

Language is our tool to express our thoughts, our emotions, to communicate with others, to explain what we have observed, to create set of rules and to share and pass our culture to the younger generation. Unlike animals and several plant species, language is learned by humans instead of being passed through biological processes which makes it very unique. Language is learned first from parents and at home, afterwards when a child ventures outside their home and ultimately within school environment.

Language is a very important factor in every students' learning experience both at home and in school. According to Malone (2007), by the time that children begin school, they had begun gaining confidence in their ability to communicate meaningfully in their mother language. Their knowledge and experiences were shaped through observations and interactions with the people within their community.

Language in the human environment is not infinite, but is constantly adapting according to the current dictate of the society. A majority of what

students learn at school is language. They learn how to read and write (academic written language), and they learn the discourse of academic disciplines (sometimes called academic languages and literacies). Both definitions of language are important to understanding the relationship between language and education.

Language has sphere of influence categorized as *Controlling* (education, government, science and technology, business, mass communication, commerce and industry, the professions, imaginative and creative written literature, and international relations); Semi-controlling (home, marketplace) (Sibayan, 1994).

Language is a pre-requisite for domain of Controlling. In this regard, education plays a very vital function. Education produces functionally literate masses which in turn help in the progress of the country. The language that the school uses in educating the students plays a vital role in their development. Teachers and pupils communicate through symbols, spoken and written language, in classroom activities such as experiments, class presentations, recitations, evaluation and assessment, presentation of subject content, and fostering a classroom experience. Halliday (1979/1980), divided the relationship between language and education into three heuristic categories: (1) learning language, (2) learning through language, and (3) learning about language. Below are Halliday's further explanations on the relationship between language and education.

Learning a Language

In their early years, children are learning both spoken and written language. They are developing use of complex grammatical structures and vocabulary; communicative competence (rules for the appropriate and effective use of language in a variety of social situations);

comprehension of spoken and written language; and ways to express themselves. Educational programs for young children often emphasize curriculum and instruction to facilitate language learning.

Learning through Language

Learning in classrooms is primarily accomplished through language. Teachers lecture, ask questions, orchestrate discussions, and assign reading and writing tasks. Students engage in academic tasks through reading, writing, exploring the Internet, giving verbal answers to teacher questions, listening to teacher lectures and student presentations, participating in whole-class and instructional peer group discussions, memorizing written text and vocabulary, and so on. A major thrust of classroom research since the 1970s has focused on the following question: What forms of classroom language practice facilitate what kinds of learning?

Learning about Language

Perhaps the most obvious classroom practice for learning about language is through the study of grammar and spelling. As linguists point out, the grammar taught in school is a prescriptive grammar and is not what linguists mean by grammar (they mean a descriptive grammar).

In educating the young learners, it is very vital to consider the use of appropriate medium of instruction to facilitate learning and provide a more relaxed and dynamic classroom experience devoid of tentative learning. Students tend to hesitate in class participation if they are not confident in using a language

they not familiar with. In English, early work in science education research often focused on the language demands of learning science (Sutton, 1992) and continues to develop including the realization of the multi-modal ways that students learn science. Scientific language has specific demands. There is an extensive vocabulary to learn.

Some studies show that the vocabulary demands of some secondary school science programs are greater than those of second-language programs (Williams, 2009). This is clearly expecting too much, particularly if the language of instruction is not the same as the students' home language. There have been many studies on how science uses this vocabulary in ways that tend to be different from everyday language use (Halliday and Webster, 2006). The emphasis here on basic science education, on understanding rather than simple reproduction of information, means that students should be using the language in which they feel most comfortable, especially when meeting new ideas.

According to a recent study by Brown and Yoo (2008), students who learned the basic concepts in "everyday English" before learning the scientific terms for the phenomenon fared much better on tests than students taught the traditional way. Brown and Ryoo, called their method the "content-first" approach. "The results reveal that although learning the language of science remains a primary hurdle, students taught using our content-first approach demonstrated an improved conceptual and linguistic understanding of science," they write. "Furthermore, as we examined each groups' differential performance [the students were randomly divided into two groups], it became clear that students' ability to communicate using scientific language was significantly impacted by this treatment." Lastly, Brown and Ryoo said the approach offers a

way to tap into the rich intellectual resources of children and potentially reduce their anxiety about using scientific language.

In 2002, nearly 42% of students in Los Angeles Unified School District, the second largest district in the country, were classified as English language learners.

The Institute of Education Sciences of the United States Department of Education defines English language learners (ELL) as: “Individuals who (1) were not born in the United States or whose native language is a language other than English; or (2) come from environments where a language other than English is dominant; or (3) are American Indians and Alaskan Natives and who come from environments where a language other than English has had a significant impact on their level of English proficiency; and who, by reason thereof, have sufficient difficulty speaking, reading, writing, or understanding the English language, to deny such individuals the opportunity to learn successfully in classrooms where the language of instruction is English or to participate fully in our society.” Today’s science teachers must be prepared to teach students whose first language is not English. (Herr, 2007)

Herr further said that the science classroom is often a frustrating place for English language learners. Science has a complex vocabulary that is difficult even for native English speakers to learn. Difficulty learning English should not be confused with an inability to think scientifically. Many of the strategies that are useful for English language learners are effective for differentiating instruction for other students as well. Use a variety of methods to see which work best with your teaching style and students.

Most teachers, claimed Barnes (1976, 1991) operated well within the actual boundaries of this dimension, but he described two imaginary extreme cases. In the first case, the teachers at the transmission end of the dimension sees language as a kind of speaking tube, and the pupil either receives it or fails to do so. In the second case, the teacher at the other extreme of the dimension will emphasized language as a means of interpretation. He will see discussion and writing as ways of helping pupils to think more effectively, and will credit them with the ability to make sense of experience for themselves by talking and writing about it. (Henderson & Wellington, 1998)

2.2 Introduction of Languages in the Philippines

Before the Spanish colonization, the prevailing education system in the Philippines was informal, focusing on daily life chores and survival. The Philippines was under the Spanish rule for 333 years from 1521 until 1898, the Spanish language was the first official language of the country, at some point the language was widely ued by the people. The Spanish Friars were the first teachers of the Fiipinos, hence the educsation is centered on religion.

Spanish rule gradually declined when the United States occupied the Philippines at the start of the 1900's and imposed a more secularized free public school educational system modeled after the United States and using English in education and institutional transactions (i.e. government offices). Because of the shortage of teachers, a group of educators from the United States called the Thomasites were the pioneer teachers in the country. They were assigned in different parts of the country in order to establish schools. However, students during the US colonization have difficulty in the subjects taught in English. Furthermore the students were forced to learn from the point of view of the

American culture which were reflected in the textbooks and other instructional materials used by the American teachers. This was reported by the Monroe Commission in 1925.

2.3 Mother Tongue-Based Multilingual Education

Mother tongue-based education gives students, especially those in the primary level, an environment where their learning is maximized. Students are confident in class because they use the language that they speak in their homes and in their communities. In 1953, UNESCO stated that, 'it is axiomatic that the best medium for teaching a child is his mother tongue'.

UNESCO 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.'

In 2003, UNESCO published its guidelines on language in education which is a representation of the institutions' current approach on langugae and education in the 21st century. The content of the guidelines is based from previous declarations, recommendations and comes from diverse ideas. These guidelines are divided into three principles. *Principle 1* stated that UNESCO supports mother tongue instruction as a means of improving educational quality by building upon the knowledge and experiences of the learners and teachers. *Principle 2* stated that UNESCO supports bilingual and/or multilingual education at all levels of education as a means of promoting both social and gender equality and as key

element of linguistically diverse societies. Lastly, Principle 3 stated that UNESCO supports language as an essential component of inter-cultural education in order to encourage understanding between different popoulation groups and ensure respect for fundamental rights.

Choosing as the medium of instruction a local language that students speak and are very much familiar with and is embedded in their culture would hasten their learning because students will not face a blank wall to be able to learn and enjoy science. This will also translate into rapid social and economic well-being of the masses since they will be able to understand and apply basic knowledge for daily life needs.

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. Furthermore, children's familiarity and constant exposure in more than one language especially when they are in elementary level, helps in their development. According to Cummins (2001), Bilingualism has positive effects on children's linguistic and educational development. They gain a deeper understanding of the language and how to use it effectively.

2.4 Language Diversity in Many Countries

Language diversity is a reality in many multicultural countries around the world. This linguistic diversity has helped each country find its identity and also have instituted language policies especially in their educational system.

The following countries in Southeast Asia, South and West Asia, East Asia, Central Asia and the Pacific are part of the list of countries which have many languages that was briefly summarized by UNESCO in 2007. These are

Afghanistan, Bangladesh, Bhutan, Brunei, Cambodia, India, Indonesia, Japan, Kazakhstan, Papua New Guinea, Philippines, Pakistan, Uzbekistan, Kyrgyzstan, Tajikistan, Nepal, China, Vietnam, Thailand, Singapore, Myanmar, Malaysia, Lao PDR and Mongolia.

2.5 Mother Tongue-Based Education: International Experiences

The language situation around the world, especially in Southeast Asia is similar to that in the Philippines. The region is one of the most culturally and linguistically diverse. Studies on mother tongue-based education were done in several countries although each of the studies differs in context and in language. These studies were documented by the Southeast Asian Ministers of Education Organization (SEAMEO) in coordination with World Bank in 2008.

The first case study was administered by Ho in Brunei Darussalam (2008). In the study, the Mandarin Chinese was used as medium of instruction in a private school. The study also describes the language as bridge language of instruction in a private Chinese medium school. According to Ho, the use of the Mother Tongue (Mandarin) helped students maintain their Chinese culture and gain access to knowledge which would otherwise not have been available to them.

The second case study which is from Cambodia by Un Siren (2008) described the processes involved in developing mother tongue-based education programs for children from ethno-linguistic communities located in the remote regions of the country which have limited access to the national school system.

The third case study was from Malaysia which was administered by Logijin (2008). The study shows the various activities by government agencies, NGO's and community organizations as they implement and support the use of

the Kadazandusun language among communities in Sabah, Malaysia. The findings reveal many challenges such as the lack of qualified teachers to teach the language and the lack of supplementary Kadazandusun literature which are suitable for children.

In Thailand, a study was done by Siltragool, Chouenon and Petcharugsa (2008). Their study focused on the Pwo Karen mother language mother tongue-first program implemented in Northern Thailand. The study describes the processes and challenges met during the development and implementation of acceptable writing system for a non-dominant language. The authors stated that one of the advantages of the program is that it is well-embedded in the community ably supported by the adults and teachers.

In the case of Vietnam, Huong (2008) discussed about the rapid transition program in which 5 year old preschool children are taught both the J'Rai (their mother language), and the Vietnamese language, the national language. The program focused on the vocabulary, grammatically correct speaking skills, and correct pronunciation. The results show that students are more attentive and participative in classes, and that using both the mother and national languages aided the students in understanding better. Furthermore, students were more confident and engaging with their teacher and classmates.

The case studies mentioned indicated a common denominator, that mother language indeed help students understand what is taught to them, and that they are able to comprehend and interact with their teachers better with confidence. The studies also revealed ongoing challenges in administering and implementing mother tongue-based education. Several of the studies have indicated that some of the solutions to the challenges are teacher training, strong

support from the communities and education ministries and providing and developing adequate instructional materials using the mother language.

2.6 Mother Tongue-Based Education: the Philippine Experiences

Studies in some regions in the Philippines conducted among students who used their mother language learning at school (Bingayen, et al., 2008; Dekker, & Dumatog, 2003; Oyzon, et al., 2012; Espada, et al., 2012) revealed that they were more active and confident in class, were able to express themselves, and obtained better scores in examinations.

One of the most notable studies on mother tongue-based education is the study done in Kalinga located in the northern part of the Philippines. The study was called the Lubuagan experiment (Dekker and Dumatog, 2003). In the study, the Lubuagan language was used as medium of instruction in teaching main subjects such as science and math. The results show that the students in the experimental group utilizing the mother language had better academic performance than the those who were in the regular classes.

In the province of Catanduanes, a study (Laurente, San Gaspar and Paga, 2014) was conducted to determine the views of grades I, II, and III teachers in San Andres East District on the implementation of the Mother Tongue-Based Education which also looked into the problems they encounter in the implementation of the Mother Tongue-Based curriculum as well as the remedial solutions they adopted. The study disclosed that the respondent teachers considered the Mother-Tongue-Based Education as helpful because children are able to understand lessons quickly."

According to Jacinto (2013) in her article *The Local Dialect as Subject and Medium of Instruction*, "by using a language the child already knows, he will be in a better position to construct and explain his world, articulate his thoughts and add new concepts to what he already knows". However, the instructional materials used brought confusion because number words in Bicol are actually Spanish which serves as another barrier to understanding the lessons.

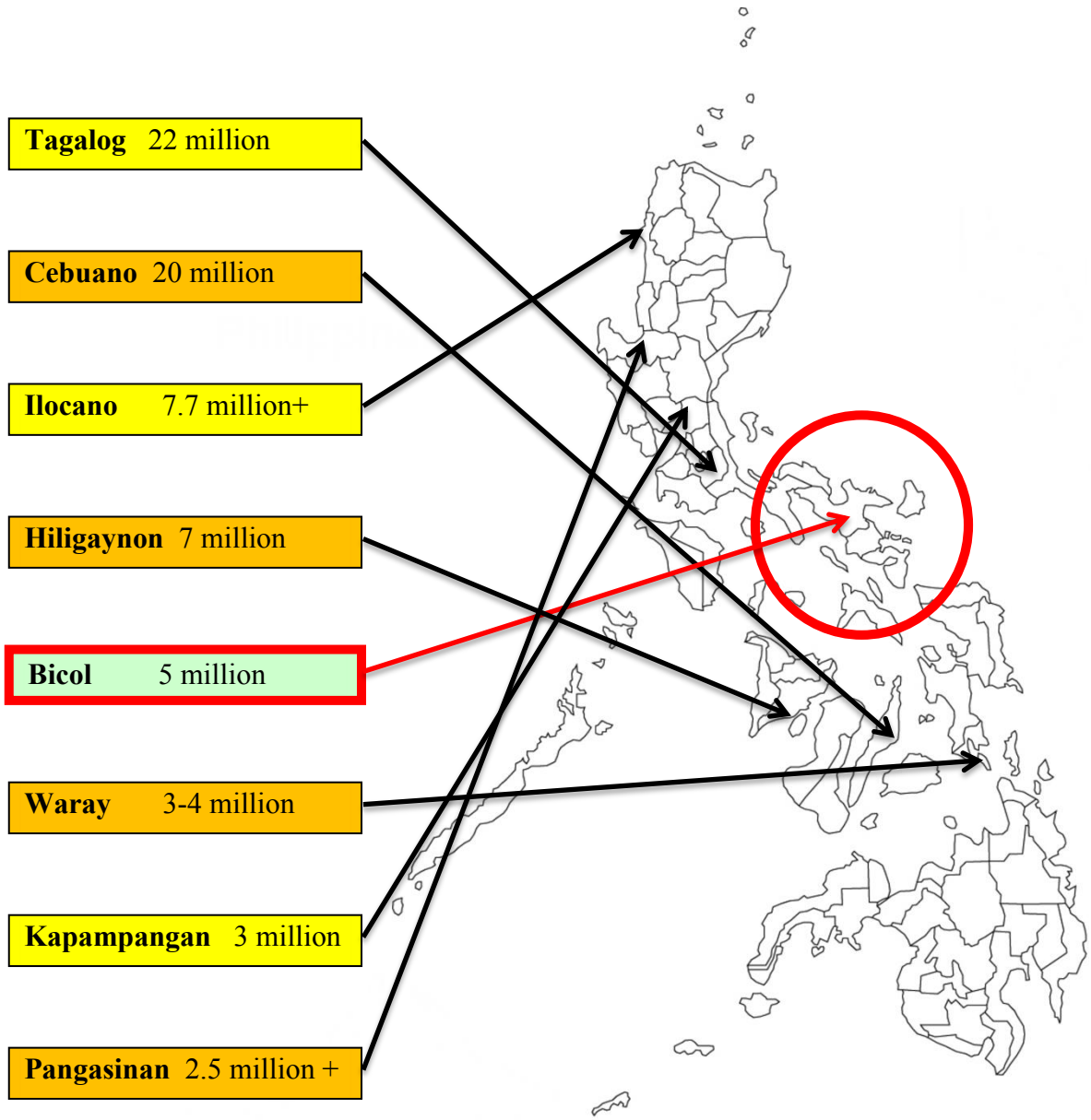
In a study conducted by Gianan (2015) among grades 1 to 3 pupils, it was revealed that respondent teachers believed that the use of Mother Tongue as a subject is beneficial in preserving the culture of the locality. Teachers find it easy to teach in the vernacular since pupils easily understand the lesson.

The above-cited study however did not focus on science lessons alone but was concerned with virtually all the subjects in the primary grades.

2.7 The Language Situation in the Philippines

Currently, the Philippines has at least 171 recognized languages of which eight (figure 4) are considered major languages mainly because of the number of speakers – Tagalog, Pampango (Kapampangan), Bicol, Hiligaynon, Waray, Cebuano, Ilocano, Pangasinan - with Filipino as the national language, and English the official language as mandated by the constitution. People who are from some of the provinces belonging to the National Capital region, Regions 3 (Central Luzon), 4a (CALABARZON) and 4b (MIMAROPA), made up the largest population of the Tagalog speakers. On the other hand, the Cebuano (Bisaya) language has the second largest population of speakers, and they came from the Regions 6 and 7. Speakers of the Waray language live in provinces

belonging to the Region 8. Pampango or Kapampangan speakers hailed from several of the provinces in Region 3.

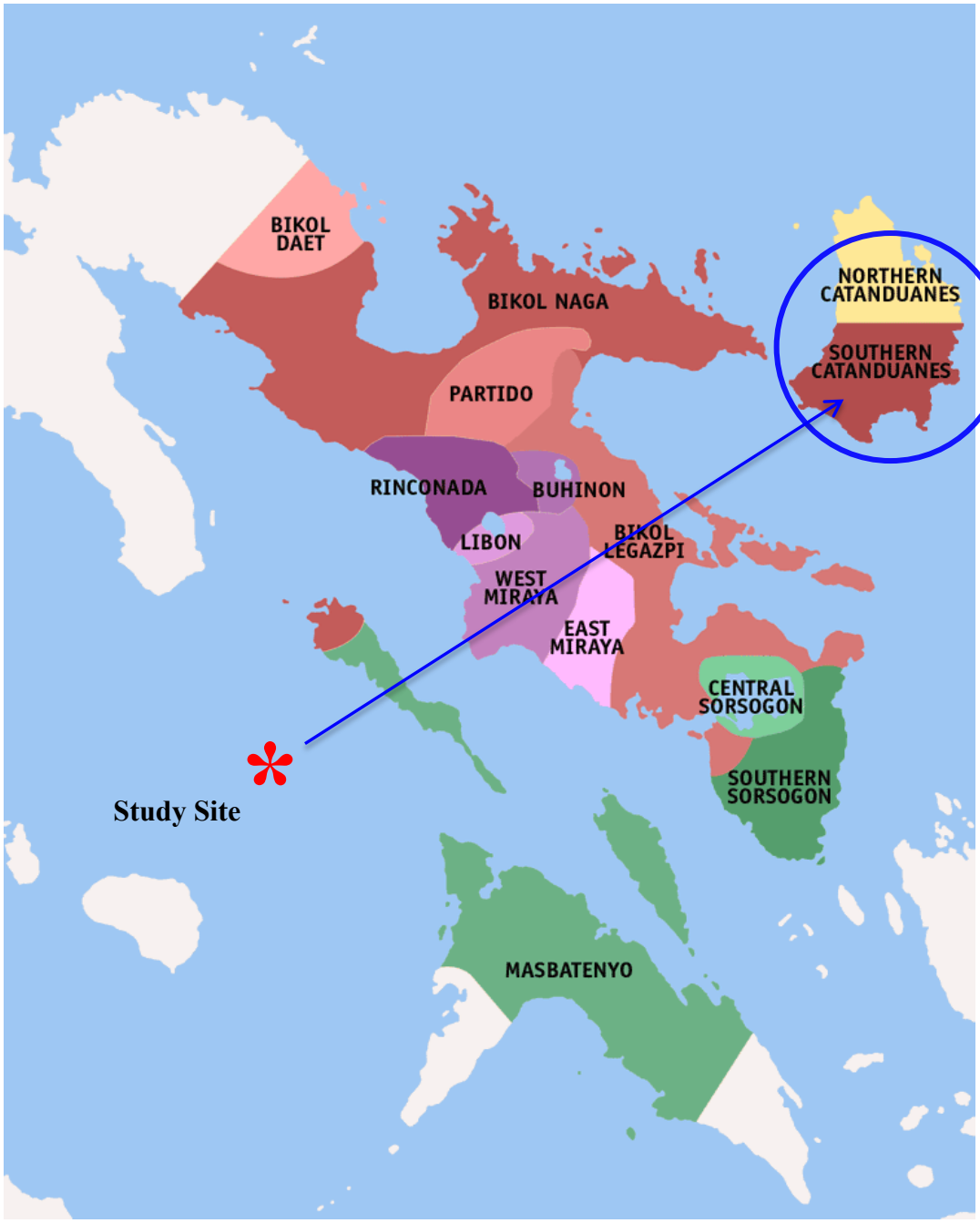


(Source: Philippine Census, 2000. Table 11. Household Population by Ethnicity, Sex and Region: 2000)

Figure 4. *The 8 main languages according to the estimated number of speakers*

Speakers of Hiligaynon hail from the provinces of the Western Visayas region. The Ilocano language is spoken by the people of the province of Ilocos Norte and Ilocos Sur, La Union and Abra in the Ilocos region (Region 1), while the Pangasinan or Pangasinense language is spoken in the province of the similar name, Pangasinan and in some other provinces like Benguet and Tarlac.

In this study, the student and teachers who participated speak the Bicol language. Speakers of the Bicol language are from the six provinces of the Region 5 namely Catanduanes, Albay, Masbate, Camarines Norte, Camarines Sur and Sorsogon. Although the language spoken in the region is Bicol, there are actually several Bicol languages spoken by the Bicolanos and these are the following (Figure 5): Bicol Daet, Partido, Bicol Naga, Rinconada, Buhinon, Northern Catanduanes Bicol, Southern Catanduanes Bicol, Bicol Legazpi, Libon, West Miraya, East Miraya, Central Sorsogon and the Southern Sorsogon Bicol. According to McFarland (2004), the linguistic diversity of the Philippines arises from natural processes broadly related to language change, the divergence between linguistic communities caused by lack of communication and the converse convergence caused by high rate of communication between communities.



http://en.academic.ru/pictures/enwiki/66/Bikol_languages.png

Figure 5. Map of the Bicol region and the Bicol languages

2.8 Language Policies in the Philippines

The language diversity in the Philippines created concerns and difficulties in the medium of instruction in education which eventually led to the implementation of several language policies (Table 3). By mandating these policies, the government assumed that the under one unifying language will be achieved.

Commencing with the Bilingual Education Policy (BEP) in 1974 (Quisumbing, 2003) and subsequent language policies for education that followed.

The 1987_Constitution (Article 14, Sec. 6 and 7), 1996 Commission on Higher Education (CHED), Language Policy (CHED memorandum order No. 52), 2006 Department of Education (DepEd) Order No. 36.

The 1974 and 1987 Philippine Bilingual Education Policy (NBE Resolution No. 73-7) stated the separate use of Filipino and English as media of instruction in specific subject areas. The 1987 Constitution *(Article 14, Sec. 6 and 7*) also stated that Filipino is the National Language and that Filipino and English are Languages of Instruction. Additionally, the vernacular language (currently referred to as the mother language) was allowed to be utilized as auxiliary language for primary education from early grade levels up to grade 3. However, according to Alvarez (1991), there was no serious effort in implementing the use of Filipino in the Philippine educational system.

The 1996 Commission on Higher Education (CHED) Language Policy *(CHED memorandum order No. 52)* stipulated that:

1. Language courses should be taught in either Filipino or English
2. Literature subjects may be taught in Filipino

3. Humanities and Social Sciences- preferably taught in Filipino

The 2006 Department of Education (DepEd) Order No. 36, s. emphasized on strengthening the use of English language as a medium of instruction in Science and Health and Mathematics and stated that English shall be used as primary medium of instruction in all private and public schools. Since the passage of the Bilingual Education Policy and the subsequent language policies that followed leading to the 2006 DepEd Order No. 36. s., English was still the medium of instruction for science and mathematics education. One of the main reason is that during that time, the countrys' GDP relied mainly on remittances by overseas Filipino workers (OFW). Thus, English became a must in order to get a job overseas. In that same year, a congressman, Educardo Gullas, proposed a bill in Congress seeking for and English-only language in education. This proposal was countered in 2008 by congressman Magtanggol Gunigundo, who proposed a multilingual education bill calling for the use of mother languages in the Philippines in primary education. These proposals and counter proposals on medium of instruction in education were at stand still because of the divisions between lawmakers and educational policy-makers.

As the arguments in the Congress are going on, studies such as the Lubuagan experiment done in Lubuagan located in the northern part of Luzon, have shown that the primary students show better academic performance when their mother language was used to teach other subjects at school.

Citing these empirical studies on the use of mother language in education, in 2009, the Department of Education institutionalized mother tongued-based multilingual education (MLE) under the DepEd Order No. 74, s. The mandate

stated that the MLE is the effective use of more than two languages for literacy and instruction.

Table 3

Language Policies in the Philippines

Language Policies	Description
1974 Bilingual Education Policy	The Filipino and English languages shall be taught separately as media of instruction.
1987 Language Policy under the 1987 Constitution	Filipino and English shall be used in specific subject areas. Resolved the issue of the national language which is the Filipino
1996 Commission on Higher Education (CHED) language Policy	Language course shall be taught in Filipino or English
The 2006 Department of Education Order No. 36, s.	Strengthening the use of English as medium of instruction to Math and Science.
The 2009 Department of Education Order No. 74, s.	Mandated the mother tongue-based multilingual education
The 2012 Department of Education Order No. 16, s.	Guidelines were given on the implementation of mother tongue-based multilingual education. Mandated the initial 12 mother languages that could be used in education
The 2013 Department of Education Order No. 13, s.	Clarification of the guidelines on mother tongue-based multilingual education 7 more mother languages added to be used as medium of instructi

In 2012, the Department of Education implemented the Department Order No. 16, s. in February 2012 which stated the guidelines on the implementation of the mother tongue-based multilingual education (MTB-MLE). Furthermore, the

department order mandated the use of one of 12 initial languages, which also included the 8 major languages, in the schools where the said language(s) is/are widely used by the students. The 12 mandated languages include: Tagalog, Kapampangan, Pangasinense, Iloko, Bikol, Cebuano, Hiligaynon, Waray, Tausug, Maguindanaoan, Maranao and Chabacano. The guidelines aim for the following: (a) language development which establishes a strong education for success in school and for lifelong learning, (b) cognitive development which focuses on higher order thinking skills (HOTS), (c) academic development which prepares the learner to acquire mastery of competencies in each of the learning areas, and, (d) socio-cultural awareness which enhances the pride of the learners' heritage, language and culture (DepEd, 2012).

In 2013, the Philippine Department of Education (DepEd) released the DepEd Order No. 31, s. 2013 which aimed to clarify the policy guidelines on the implementation of the language learning areas and their time allotment in grades 1 and 2 of K to 12 basic education program. Furthermore, additional guidelines to the DepEd Order No. 16, s. 2012 (guidelines on the implementation of the mother tongue based multilingual education) was issued by adding 7 more mother languages, Ybanag, Ivatan, Sambal, Aklanon, Kinaray-a, Yakan and Surigaonon as language of instruction for grade 1 students who speak one of the languages mentioned.

2.9 Synthesis of the Related Literature and Studies

The review of literature and studies revealed that studies had been undertaken on teaching subjects in the primary level using different languages both locally and internationally. However, apart from the limited studies conducted along primary grades teaching involving language as a variable, it

also disclosed a dearth of researches within the locale of this study on topics related to the use of varied languages in teaching courses in the primary level. No particular investigation was done to look into the teaching of science using varied languages.

Furthermore, according to the result of interviews conducted on teachers and school principals, there are none or not enough instructional materials and teacher training support for the mother tongue-based primary science education. Local support is also needed to realize the goal of the mother tongue-based education.

CHAPTER III

METHODOLOGY

This chapter presents and describes the methodology that was administered in this study in order to answer the research questions posed in Chapter 1.

The following are the specific questions and corresponding research objectives:

1. What are the effects of using two languages, Bicol and Filipino, on students' understanding of science ideas compared to using the language of instruction in science? In which language do students understand better?

   Research Objective 1, to identify the language that the students understand better by implementing science lessons, and by administering tests in three languages, Bicol, English and Filipino.

2. What are the students' language preference in learning science ideas, and their language environment in and out of their school?

   Research Objective 2, to find out the students' language preference in learning science ideas and in other science related classroom activities. And, to investigate the students' language environment in and outside their home and at school by administering survey questionnaire.

3. What are the perceptions of primary school teachers towards the mother language-based science education?

   Research Objective 3, to assess primary school teachers' opinions on their students' language preference in learning science ideas. And, to

know the teachers opinions on the use of mother language in science by administering survey.

3.1 Research Design

In order to provide answers to the 3 research questions and 3 corresponing objectives, this study employed the descriptive mixed method. The descriptive method utilized in the study are the observational method and survey method.

The students' understanding of science ideas was measured in this study by administering reading comprehension test, vocabulary test on common words used in science, and by implementing science lessons in three languages, Bicol, English and Filipino. It is assumed that if the students obtain high scores in the test in a particular language, this may indicate understanding of science ideas in that language.

Research Question 1

What are the effects of using two languages, Bicol and Filipino, on students' understanding of science ideas compared to using the language of instruction in science? In which language do students understand better?

To provide answer to research question 1 on the effects of using two languages, Bicol and Filipino, on students' understanding of science ideas compared to using English, the first objective aimed to dentify the language that the students understand better by implementing the following:

1. Reading comprehension test in Bicol, English and Filipino languages.
2. Vocabulary test in Bicol, English and Filipino languages.
3. Implementation of science lesson in Bicol, English and Filipino languages.

The reading comprehension and vocabulary tests were utilized in this study in order to assess the students' understanding of ideas through the texts they read.

The first data gathering focused on students' reading comprehension. Reading is important in primary education because it forms the basis for all other areas of learning (UNESCO, 2004). Students in science classrooms are given numerous opportunities to read expository text in a variety of formats and for a variety of purposes. They read to solve a problem, understand the steps in an experiment, gain base knowledge about a concept, answer their own questions, compare their inquiry results with what others have found, expand their basic understanding of a concept, and for enjoyment (Johnson and Martin-Hansen, 2005).

The second data gathering focused on assessing students' understanding of vocabulary of common words used in science. Vocabulary is a major component of literacy, and understanding novel words and concepts is important for young students as they are confronted with a great deal of new terminologies in the passage they read, especially in content areas such as science (Cohen, 2012). In order for primary students to understand science ideas, it is important that they are able to understand the vocabulary and its meaning. The implementation of actual lessons to the students provides more venue to assess students' understanding of science ideas, such as the class discussions and recitations, following teacher's instructions during science activities or experiments, and their performance in the assessment test which are administered in order to know if the students understood what was taught.

Research Question 2

What are the students' language preference in learning science ideas, and their language environment in and out of their school?

To provide the answer to research question 2 on the students' language preference in learning science ideas and their language environment in and out of their school, the second objective aimed to find out the students' language preference in learning science ideas and in other science related classroom activities. Furthermore, it investigated the students' language environment in and outside their home and at school by administering multiple choice survey questionnaire.

The use of the multiple choice survey in this study provided responses from the students regarding which language they would choose to use in science related activities. The survey was thought to be a better instrument for the study compared to interview due to the number of participants and their grade level.

Research Question 3

What are the perceptions of primary school teachers towards the mother language-based science education?

To provide answer to research question 3 on the perceptions of the primary school teachers towards the mother language-based science education, the third objective of the study assessed primary school teachers' opinions on their students' language preference in learning science ideas. Additionally, it

determined the teachers' opinions on the use of mother language in sciencethrough mutltiple choice survey questionnaires.

Utilizing the survey questionnaire on teachers was thought to be appropriate because, although it still has limitations, it will provide a more detailed and substancial information regarding the teachers' opinions on their students' language preference in science, and the teachers' opinions on the use of the mother language in science.

For data gathering, the following procedures were carried out: (1) class observations, (2) implementation of science lessons in three languages, Bicol, English and Filipino, (3) tests in three languages, and (4) interviews using survey questionnaires. The study was guided by the research framework represented by Figure 6. To achieve the target data, 4 data gathering processes on primary student participants and primary teachers were considered. The first focused on testing the students' reading comprehension when science reading material is in Bicol, English or Filipino language. The second focused on testing students' understanding of vocabularies on common words frequently used in science class in Bicol, English or Filipino language. The third administered science class lessons with corresponding summative tests on students in Bicol, English and Filipino language. Lastly, another data gathering was administered to primary teachers using surveys (Figure 7). Prior to developing and administering of the 4 stages of data gathering, the researcher visited primary schools and observed science classes focusing on the use of language by the teachers and the students.

The results were then analyzed and compared in order to know the effect of using two local language on primary students' academic performance and behaviors in science.

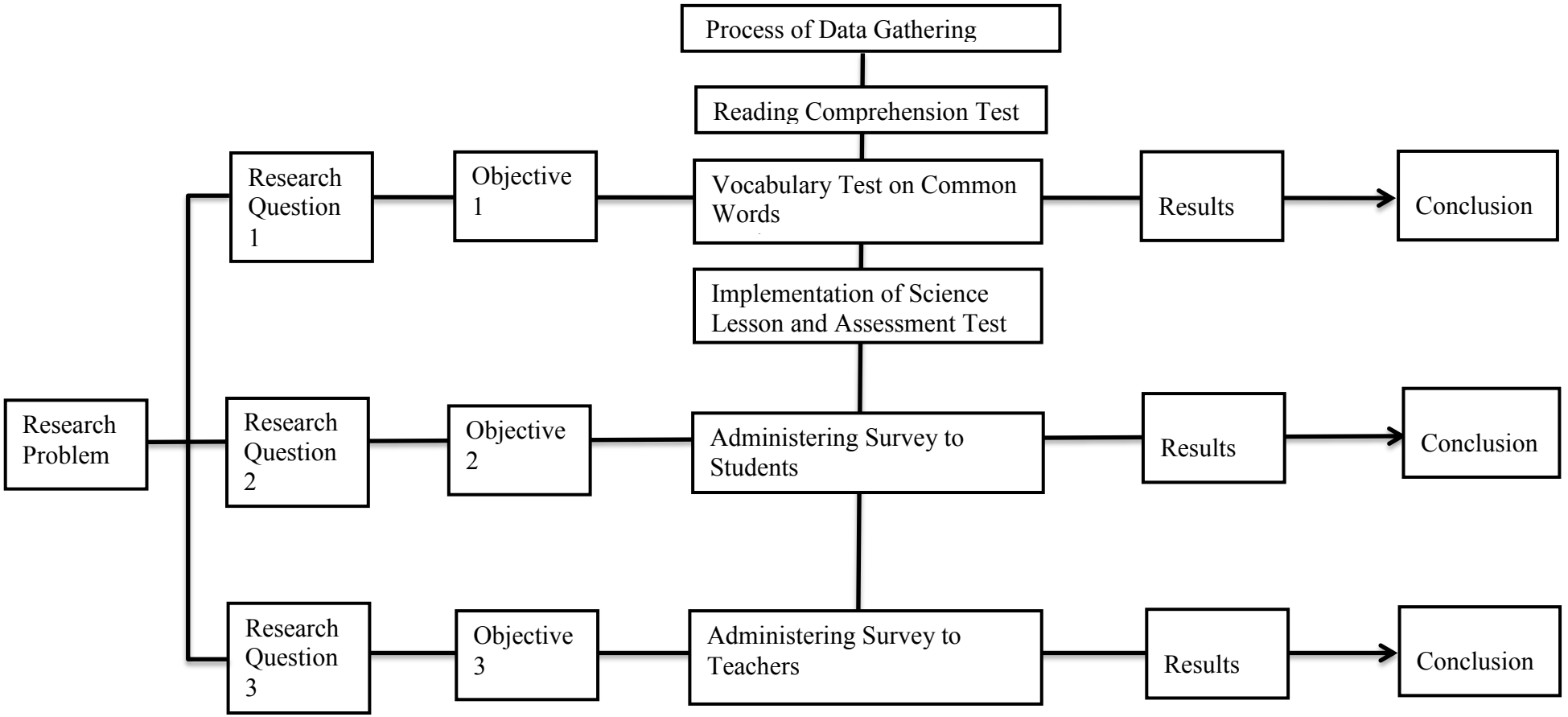


Figure 6. The Research Framework of the Study

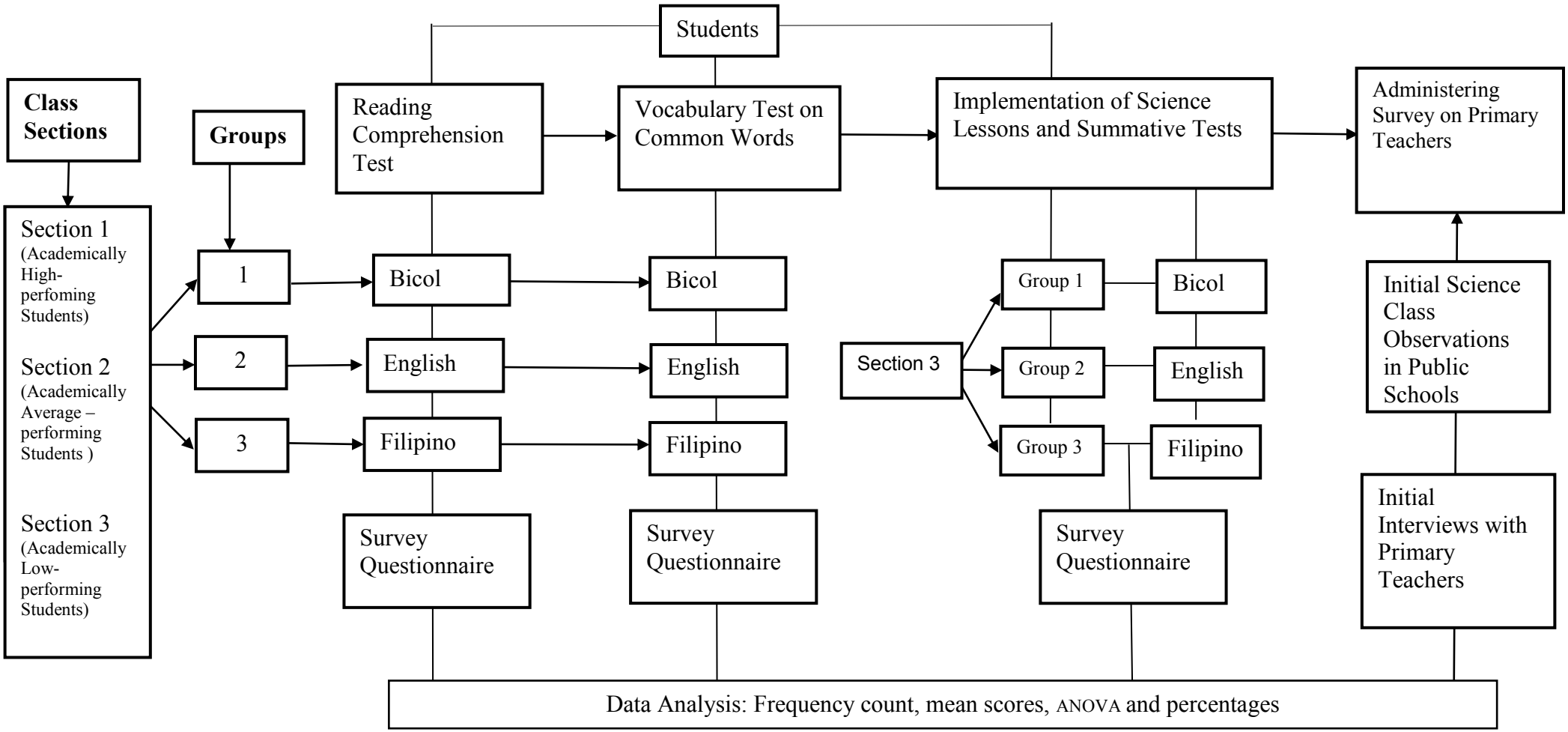


Figure 7. 4 Processes of Data Gathering

3.2 Processes of Data Gathering

To arrive at the answers to the three specific research questions, and to support the three objectives, the following processes were undertaken:

3.3 Research Site and Sampling

For the goal of this study, the province of Catanduanes in the Bicol region was selected as research site. Catanduanes was chosen from among the 6 provinces in the region for the study because of the researcher's familiarity of the language, culture and location in the Bicol region. The selection for the participating public schools as venue for study was based on the number of class sections and students, school accessibility and feasibility of the study. The participating public schools follow the regular public elementary education program implemented by the Department of Education. Science education is based on the basic education curriculum of the department of education.

The student participants during the course of the study were grade 3 students from selected primary schools in the province. In the Philippine public schools, students are usually assigned in different sections based on their academic achievements. The students belong to three class groups referred to as the following: Section 1, students who belong to this section are considered the fast learners or academically high-performing students. Section 2, academically average performing students are assigned to this group. Section 3, students who are slow learners or academically low-performing students are assigned to this class.

3.3.1 Reading Comprehension Test

The implementation of the reading comprehension activity in a science class and its corresponding test was first conducted in this study. The test was administered in order to know in which language science reading materials is better understood by the primary students.

3.3. 2 The Research Instruments

In this study, the test materials were intended to assess students' understanding of the content of the reading materials. The topic selected was the lesson about animals, a part of the curriculum in the 3rd grade. The lesson on animals is divided into several sub-topics which is taught in the public schools between the second and third quarter of the school year. The specific lesson chosen for the study focused on the proper ways of handling animals. The one-page reading text was taken from the science textbook and was translated into the Filipino and Southern Catanduanes Bicol languages. At the end of the text, an assessment 10-item test in both the Filipino and Bicol language was also developed to assess the students' understanding of the content of the reading lesson.

The reading materials used in this study were taken from a science textbook in English language which is used by primary students in public schools. It was then translated into Filipino and Bicol languages. From the translated materials, corresponding test questions were developed to confirm students' understanding of the science content. Administering tests in three languages assessed the students' understanding of science ideas from the reading materials. The tests consisted of multiple choices, true or false items, and open-ended questions in which students explained in their own words the science concepts in

the readings. The test items were adapted from the existing test materials used in public schools, however, modifications were done to conform with the target data of the study. Prior to administering of the test, the test items were pre-tested to another group of students in order to know which item or items needed revisions.

3.3.3 The Participating Schools

The first stage of the study was conducted in 2010 in three public elementary schools located in the north and south districts of Virac, one of the eleven towns in the island province of Catanduanes. The language spoken in the town is called the Southern Catanduanes Bicol.

3.3.4 The Student Participants

Shown in table 4, the participants of the study were 284 grade 3 students from the three public elementary schools mentioned. There were 131 male (M) and 153 female (F) students. The age of the grade 3 primary students ranges from youngest at eight (8) to the oldest at thirteen (13) shown in Table 4.

Table 4
Demographic Characteristics of the Grade Three Students from Three Schools

Age	School A		School B		School C	
	M	F	M	F	M	F
8	10	16	2	10	8	13
9	34	38	28	27	29	31
10	10	3	9	8	6	4
11			2			2
13				1		
	47	57	41	46	43	50
Total	104		87		93	
	284 (131 Male, 153 Female)					

3.3. 5 Data Collection Procedure

Before the readings and tests were administered, the grade three student-participants in each section were randomly grouped into three, as shown in Table 5. Each group of student participants was assigned a reading material and test materials in a particular language.

Table 5

Groupings of the Grade 3 students during the tests in three languages

	Groups	Tests	N=284
Section 1 Above average performing Students	Group 1	English	33
	Group 2	Filipino	33
	Group 3	Bicol	33
Section 2 Average performing Students	Group 1	English	32
	Group 2	Filipino	32
	Group 3	Bicol	34
Section 3 Low performing students	Group 1	English	30
	Group 2	Filipino	30
	Group 3	Bicol	27

Before the students began answering the test materials, the instructions were clearly explained to the students. The students were then instructed to answer the test items in 20 minutes. In the multiple choice items, they were instructed to choose the best answer by encircling the letter of their answer. In the True or False items, they were instructed to write true if the idea of the sentence is correct, and false if it is not. In the open-ended items, the students were instructed to write their answers in their own words. The researcher, with the help of the homeroom teachers, explained the instructions of the test to the students. The students were given ten minutes to read a one-page text written in a particular

language, in Bicol, English or Filipino, assigned to them. Afterwards, they handed back the reading materials. The test materials were then distributed to them.

3.3.6 Data Analysis

Mean scores, frequency counts and percentages were utilized in analyzing the data collected from the study. To find out the significant differences between the means scores of students between the tests in the three languages, the one-way analysis of variance (ANOVA) was employed.

3.4 Vocabulary Test on Words Commonly used in Science

The second process of data gathering was implemented to provide further information on students' understanding of science ideas when common words are utilized in Bicol, English or in the Filipino language.

The study was also conducted to address the teachers' and school administrators' concerns regarding the availability of similar science terms in Bicol and Filipino language, which could help students understand science content. Most terms taught in science do not have equivalent terms in the local languages in the Philippines. Thus, the focus is on common words often used by teachers in explaining science terms, the lessons or content in English.

3.4.1 Research Instruments

In this stage of the study, vocabulary tests were administered to primary students using words or terms commonly used by teachers in science classes. The tests were administered to the student respondents in order to

determine their understanding of the common words frequently used in science related activities.

The process of developing the data gathering material was done in several stages. First, common words were collected from the science textbooks and syllabus. Second, because of unavailability of linguists in the province, the researcher in consultation with his adviser, a science specialist from the University of the Philippines, and university professors from Catanduanes State University, instead sought the help of primary school teachers because of their vast experiences in teaching science, to list common words in English which they often use in science classes to explain science content or ideas. 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 15 items are words, according to the teachers who were interviewed and surveyed, in which despite the frequency of usage by the teachers in order to explain science ideas, students still have difficulty in understanding.

The final list (Table 6) was then consulted with the professors, the principals of the 4 participating schools and the teachers of the respondents. Fourth, a 15-item test 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 6

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

Collected from Interviews of Primary Teachers, and from Grade 3 Textbook				From the List of WELS Study 1983	
dispose	plow	swab	transmit	compare	observe
injure	rub / rubbing	scoop	vibrate	dip	remove
loosen		swallow		leave / leaves	

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. After pre-testing, several items were revised.

3.4.2 Reliability of the Test Instruments

The test instruments in three languages administered to the three groups of Grade 3 students, first group, students who took the test in Bicol, second group, students who took the test in English, and third group, students who took the test in Filipino, had an internal reliability of Cronbach's α=.721, α=.713, and α=.708 respectively, for the vocabulary test in Filipino language, test in English language, and test in Bicol language.

3.4.3 The Participating Schools

Unlike the first stage of the study, the second stage was conducted between July and December 2012 to Grade 3 students from four public elementary schools in four towns, Virac and Bato, both located in south of the

province, and the towns of Viga and Panganiban, located in the north of the province of Catanduanes were chosen for the study.

3.4.4 The Student Participants

Two hundred seventy-nine grade 3 students who participated in this stage of the study. The students belong to Sections 1, 2 and 3. There were 146 females and 133 males. The students' age ranges between 8 and 13 (Table 7).

Table 7

Demographic Characteristics of the Grade 3 Students from Four Schools

	School A		School B		School C		School D	
Age	M	F	M	F	M	F	M	F
8	5	4	1	4	5	4	6	11
9	29	39	17	21	23	20	21	19
10	4	2	10	8	4	4	4	3
11	0	0	2	3	1	1	0	0
12	0	0	1	1	0	0	1	0
13	0	0	0	0	0	0	1	0
	38	45	31	37	33	29	33	33
Total	83		68		62		66	
	279 (133 Male, 146 Female)							

3.4.5 Data Collection Procedures

Prior to the test, the grades 3 student-participants in each of the three sections were randomly grouped to assign them to their permanent grouping (Table 8). Each of the three groups was assigned tests in Bicol, English of Filipino language. Before administering the tests, the researcher with the help of the homeroom teachers explained the procedure of the tests.

Table 8

Groupings of Grade 3 Students in the Vocabulary Tests on Common Words Used in Science

Class Sections	Groups	Tests	N=279
Section 1	Group 1	English Test	31
	Group 2	Filipino Test	31
	Group 3	Bicol Test	31
Section 2	Group 1	English Test	32
	Group 2	Filipino Test	32
	Group 3	Bicol Test	32
Section 3	Group 1	English Test	30
	Group 2	Filipino Test	30
	Group 3	Bicol Test	30

3.4.6 Data Analysis

The data collected from the study was analyzed 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 participants, the research employed the one-way analysis of variance (ANOVA).

3.5 Implementation of Science Lesson Using Three Languages, Bicol, English and Filipino

The results of the reading comprehension and vocabulary tests served as the basis in the development of the science lessons in two Philippine languages, Bicol, and Filipino. This third data collection of the study aimed at determining the primary students' academic performance in science lessons in three languages, Bicol and Filipino, and English.

3.5.1 Research Instruments

The third process of this study was implemented by developing a lesson a plan which was based from the syllabus provided to the schools by the department of education. It was then taught in three languages to three randomly grouped students. The class lessons in the three languages were observed, taking note on how students behave during recitations, class discussions and following their teacher's instructions.

3.5.2 Reliability of the Research Instruments

To ensure the validity of the research instruments, the researcher consulted two science specialists, three college and university professors as well as the principal and teachers of the school involved in the research. The test materials were pre-tested to another group of students, afterwards necessary revisions were made prior to the actual administering of the test. 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.

3.5.3 Content of the Lesson and Instructional Materials

After the local office of the Department of Education gave the permission for the study to be conducted, the school administrators and teachers were coordinated to be involved 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.

To ensure the validity of the content of the instruments, the researcher consulted a science specialists, two university professors as well as the principal and teachers of the school involved. After consultations, the final lesson plan, the instructional and assessment materials were developed and pre-tested on a separate group of students. After pre-testing, several items were revised.

3.5.4 The Participating Schools

Because of the limitations in time and availability of schools and target students, the third process of this study was conducted primarily in one public elementary school from a small village where Southern Catanduanes Bicol is widely spoken. The village is located at the outskirts of the main capital of the province.

3.5.5 The Student Participants

Forty-five grade three students participated in the study (Table 9).

The students' age ranges between 8 and 10. Of the forty-five student, twenty-two are female and twenty-three are male.

Table 9
Demographic Characteristics of the Grade 3 Students

Age of Students	Gender		Total
	M	F	
8	8	11	19
9	11	9	20
10	3	3	6
Total	22	23	45

The students' academic characteristics are similar to students who are in the below average section, section 3, in the mainstream public elementary schools in the province. The researcher in consultations with the adviser, two professors from a university and science specialist, chose to implement science lessons to section 3 students. The reasons were based on the results of first two stages of this study. In the first two stages, section 3 students did not perform better compared to section 1 and 2 students. However, since the first two processes were limited to tests, it was thought that implementing science lessons would provide a much better and added information on which language students understand better.

3.5.6 Development of Instructional Materials in Two Philippine Languages, Bicol and Filipino, and the English Language Guided by an Instructional Design Model

One of the objectives in this stage is to develop instructional materials in two local languages, Bicol, the mother language, and Filipino, the national language, and English the second and academic language. In order to develop such instructional materials, an instructional design model is needed as a guide during the process of development as well as the actual implementation.

Instructional design models are processes or procedural guides in developing lessons, instructional materials and instructional systems in order to facilitate an effective learning of students. They help guide teachers and instructional designers to produce applicable and more pleasing instructional environment to the learners. According to Molenda et al. (2003), as well as being a construct, instructional design is also a field of theory and practice within the larger field of instructional technology. Designers work in various environments, including schools, colleges and universities.

There are various instructional design models, to which the ADDIE model with the phases Analysis, Design, Development, Implementation, and Evaluation, considered the basic foundation of all models. Another well-known instructional design model is the Dick and Carey model, also known as the Systems Approach Model. Walter Dick and Lou Carey originally published the model in 1978 in their book entitled *The Systematic Design of Instruction*. The Kemp Model is the learner needs and goals, and is small scale, making it adaptable for individual lessons. The model is particularly useful for developing instructional programs that blend technology, pedagogy and content to deliver

effective, reliable, and efficient learning and seems to encourage designers to work in all areas defined.

The conceptualization, development and implementation of the instructional materials during the third stage of this study was done by adapting from the instructional model, ASSURE designed by Heinich et al. (2002). The model consisted of 6 stages of instructional design development. A, for analysis of the learners, S for stating of objectives, S for selection of methods, media and materials, U for the utilization of the instructional materials, R for requiring learner response and lastly E for evaluation and revision (Figure 8).

The ASSURE model was adapted because of the following. First, using the model allows the teacher to understand his/her students' characteristics better. Second, it gives the teachers the opportunity to be more creative in developing and implementing the instructional materials. Third, it allows the teacher to prepare all the necessary materials early. Lastly, it gives teachers the chance to revise according to the results and critics after the lesson is done.

Figure 8. Instructional Design for Science Lesson Using Two Languages Adapted from ASSURE Model

3.5.7 Data Collection Procedure

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 (Table 10). Each of the group has 15 students assigned.

Table 10
Groupings of the Grade 3 Students for the Implementation of Science Lesson in Bicol, English and Filipino

Groups	Science Lessons in:	No. Of Students	M	F
Group 1	Bicol	15	12	21
Group 2	English	15	12	21
Group 3	Filipino	15	14	19

The students who were sent to the first group were taught and administered corresponding tests in the Bicol language, while students sent to the second group were taught and tested using the English language, and the third group of respondents were taught in the Filipino language and were given tests in the same 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.

3.5.8 Data Analysis

Mean score, percentages and the frequency count were 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 between the three languages administered to the three groups of respondents.

3.6 Survey on Students' Language Preference in Learning Science Ideas and in Science Related Activities.

To achieve the second objective of the study, a survey was administered to the students to find out their language preference in learning science ideas and in other science related classrrom activities.

3.6.1 The Research Instruments

The data gathering tools in this stage of the study were the survey questionnaires that provided further information that cannot be measured in the assessment tests. The survey questions could identify the use of the three languages at home, in their community and in school. The questions also identified the students' preferred language during science classes and while studying science. A close-ended (multiple choice type) survey questionnaire was developed because it was thought to be less time consuming given the limited time allowed by the school for conducting the research. Aside from that, it would be easier for primary students to follow and understand this type of survey compared to others such as the Likert scale type, the ranking or the open-ended type. Furthermore, according to Siniscalco and Auriat (2005), the main advantages of the close questions are the participants are restricted to a finite (and therefore more manageable) set of response, they are easy and quick to answer, they have response categories that are easy to code, and they permit the inclusion of more variables.

The survey questionnaires, which were originally written in English, were translated into Filipino language upon the recommendation of the principal and the teachers. The students' language preference survey questionnaire was written in a multiple type-questions intended for Grade 3 pupils.

The contents of the survey material are divided into 3 parts. The items in the first part collected information about the students' demographic characteristics. The second part consisted of items designed to ask the students about the languages they use in and outside their homes and at school. Lastly, the third part consisted of items asking the students' language preference in learning science, during recitations, doing homework, exams, reading and when their teacher gives instructions during science class activities.

3.6.2 The Student Participants

The students who were given the survey questionnaires are 284 grade 3 students who participated in the reading comprehension test, 318 grade 3 students who participated in the vocabulary test on common words, and 45 grade 3 students who participated in the implementation of the science lesson in three languages.

3.6.3 Data Collection Procedure

After the tests in reading comprehension, vocabulary (common words), and science lessons in three languages, the survey questionnaires were distributed to the students who participated in the tests mentioned. Then, the researcher with the help of the homeroom teacher explained each item and procedure. After the testing, all data were collected and analyzed.

3.6.4 Data Analysis

Percentages and the frequency count were utilized in the anaylsis of the results of the survey administered to students.

3.7 Survey on Teacher's Perceptions on the Medium of Instruction in Science Education

To achieve the third objective of the study which aims to assess the teachers' opinions regarding their students' language preference in learning science ideas, and to know the teachers' opinions on using the mother language in science, a survey was administered to the primary school teachers.

The survey conducted to teachers aimed to know their students' language preference in the following classroom activities: (a) listening to their teacher's explanations of science concepts , (b) explaining their ideas during recitations, (c) following their teacher's instructions during science activities, and (d) attending a science class. The survey also aimed to compare the teachers' and their students' opinions on students' language preference in science related activities; and to find out what language teachers think is appropriate in teaching science to their students, and their reasons for choosing a language.

3.7.1 The Research Instruments

The instrument in the study made use of the close-ended/multiple choice survey questionnaire. In order to obtain information that can be compared to the results of the previous study conducted to the students, the items were designed using specific questions and corresponding multiple choices for the teachers to choose their answers from.

The contents of the survey material were divided into six parts. The items in the first part were intended to collect information about the teachers' demographic characteristics. The second part consisted of items designed to ask the teachers about the languages they use in and outside their homes and at school, and items asking if they were trained on using local language in teaching.

The third part of the survey consisted of items asking the teachers about their students' academic performance at school and the national achievement test. The fourth part of the survey comprised the items regarding the reasons for low performance of public school students in the class.

The fifth part of the survey consisted of the main data for the research. In these items, teacher respondents were asked about the language that their students prefer in science related activities. The final items asked the respondents about the language that they think is suitable for teaching science to primary students and their reasons for choosing that particular language.

These are the main items in the fifth part of the research instrument:

- According to your observation, students are able to have a better understanding of science concepts when explained in _____.
- According to your observation, students can best explain science concepts in their own words in _____.
- According to your observation, students can immediately follow instructions in science class activities when you speak in _____.
- According to your observation, students are more comfortable in this language during science class recitations.
- According to your observations students find it easy to read in this language

Each of the items above has at least between 3-7 corresponding choices from which the teachers chose their answers. The choices are the three languages, Bicol, English and Filipino or a combination of the three languages. The respondents were asked to answer by encircling the letter of their choice.

The fifth part of the survey comprised the items in which the respondents were asked about their opinions on language in science education. And one of the main items is the item asking the respondents, which language do they think is more appropriate for students when teaching science? Why?

The items above requested the respondents to write and explain their answers in their own words. The results are presented as verbatim data. The questionnaires were written in English. Each item, and procedure for answering were explained by the researcher to the respondents before it was administered.

3.7.2 The Research Site

The study was conducted in five public schools located in the northern and southern part of Catanduanes.

3.7.3 The Teacher Participants

The participants of the study were 24 grade three and four primary school teachers (Table 11). Their age range is between 27 years old and 60 years old. The teachers who participated in the survey are all from the different provinces of the Bicol region. There were at least 3 teachers who were originally from other regions but did not participate in the research. Among the 24 respondents, there was only 1 male teacher, he was teaching grade 4 students at the time the research was administered. The teachers are reassigned to another grade level or to another school in another province after a certain number of years.

Fifteen of the respondents are teaching grade 3 while 9 are grade 4 teachers. Fifteen of the teachers obtained a Bachelor's degree in Education, while 3 teachers graduated with Master's degree courses. Six of the teachers have a bachelor's degree with master's units. In terms of the number of years in the teaching profession, 7 teachers has been teaching for only 5 years while two teachers have been teaching for at least 27 years. Their average teaching hours for science range from 40 minutes for grade 3 to 1 hour for grade 4.

Table 11

Frequency table for Teachers' Demographic Characteristics

	Frequency N=24	
Age	20-29	1
	30-39	7
	40-49	6
	50-60	10
Gender	Male	1
	Female	23
Educational Attainment	B.E.	15
	M.A. Ed.	3
	Bachelors with MA units	1
Grade level being taught	Grade 3	15
	Grade 4	9
Number of years in teaching primary science	0-5 years	7
	6-10 years	3
	11-15 years	5
	16-20 years	5
	21-25 years	2
	26-30 years	2

All 24 teacher respondents stated that they were not trained to use multiple languages in teaching science during their pre-service training. They also did not

receive any in-service training for teaching science using the mother language. The teachers are in charge of the primary students from various sections.

In the public schools in the region, students are sent to various class sections depending on their academic performance. Thus, students who performed better in class are usually sent to Section 1, while students who are average performers in class are sent to Section 2, and students whose academic performance is below average are sent to Section 3 or lower sections depending on the number of students.

3.7.4 Data Collection Procedure

Five schools in which students participated in the reading comprehension and vocabulary tests were visited. Permission from the local office of the Department of Education as well as the school principals were obtained to be able to administer the survey to the teachers.

The teachers were given an orientation regarding the study before handing them the survey. Because of the teachers' busy schedule, they were given three days to complete the survey questionnaires. Each of the items in the survey was explained to them prior to distributing them to the teachers.

3.7.5 Data Analysis

Percentages and the frequency count were utilized in the anaylsis of the results of the survey administered to students.

CHAPTER IV

RESULTS AND DISCUSSION

4. Results Providing Answer to Research Question 1

Research Question 1

What are the effects of using two languages, Bicol and Filipino, on students' understanding of science ideas compared to using the language of instruction in science? In which language do students understand better?

4.1 Results of the Tests on Students' Reading Comprehension

The results of the tests on students' reading comprehension administered to 284 students from 3 public elementary schools is shown in Table 12

The results reveal that students from section 1 (academically high performing) students obtained almost the same mean scores in the science tests in all three languages. The mean scores are better compared to the mean scores obtained by students from sections 2 and 3.

Table 12

Mean Scores of Grade 3 Students in All 3 Schools in the Reading Comprehension Tests in Three Languages Grouped According to Level of Performance

Class Sections	Groups	Tests	N= 284	Mean Scores
Section 1 *Above average performing Students*	Group 1	English Test	33	8.24± 1.85
	Group 2	Filipino Test	33	8.27±1.32
	Group 3	Bicol Test	33	8.15± 1.71
Section 2 *Average performing Students*	Group 1	English Test	32	6.09 ±2.06
	Group 2	Filipino Test	32	7.28±1.87
	Group 3	Bicol Test	32	8.03 ±1.27
Section 3 *Low performing students*	Group 1	English Test	30	4.17± 2.51
	Group 2	Filipino Test	30	5.47± 2.09
	Group 3	Bicol Test	30	6.07±1.94

The students' performance in the test regardless of the languages used, supported the assessment by their teachers that from among the many sections in the grade 3 level, the section 1 students are expected to have the best or the highest academic performance compared to other sections of students.

Students from section 2 acquired better mean scores in Bicol language than in the Filipino and English languages respectively. The students have lower mean scores compared to the students from section 1, but are better compared to the mean scores of students from section 3. Section 3 students attained a better mean score in the science test using the Bicol language while they obtained the lowest mean score in English.

The data shows that most of the student participants particularly those belonging to the lower sections, had difficulty in writing and explaining their own answers in the open-ended question of the test in the three languages, especially in the test using English. Many students did not write their answers on the answer sheets, several students wrote one or two words, a few even wrote the same question on the items again. This indicates that, the primary students who participated in the study still need improvement in terms of expressing their ideas in writing, and in understanding the instructions given by their teachers. The above finding corroborates the results in the study of Brown and Ryoo (2008) of Stanford University showing that students understood better the term when lesson was conducted in their everyday language of their native tongue. This finding is also in keeping with UNESCO's statement that 'it is axiomatic that the best medium for teaching a child is his mother tongue'.

The new findings in this stage of the study show that the students from section 2 and section 3 have better performance in the test in Bicol and Filipino languages compared to the test in English.

4.1.2 Comparison of Student Mean Scores Between the Three Languages

To find out if there are significant differences in the mean scores of the students between three languages, the one-way analysis of variance (one-way ANOVA) at the $p < .05$ level in science standardized test scores for the three languages was administered.

The results show that the mean scores of section 1 (Table 13) students in the three tests using a particular language do not have any significant mean difference, indicating that these group of students can perform well in any of the three languages.

The mean scores of section 2 students between the tests in Bicol and Filipino do not have significant difference, however there is significant difference between English and Bicol as well as between tests in English and Filipino. Tests results of section 3 students reveal that there is a significant difference between English and Filipino and also between English and Bicol.

Students performed better in the tests using the Filipino and Bicol compared to English language. On the other hand, there is no significant difference between Filipino and Bicol. The above finding indicates that the students appear to be at home with their mother tongue and the national language of the Philippines.

Table 13
Comparison of the Grade 3 Students' Mean Scores Between the Tests in Three Languages in the Reading Comprehension Test

Class Sections	(I) Language	(J) Language	Mean Difference (I-J)	Std. Error	Sig.
	English	Filipino	-.030	.406	.997
		Bicol	.091	.406	.973
Section 1	Filipino	English	.030	.406	.997
		Bicol	.121	.406	.952
	Bicol	English	-.091	.406	.973
		Filipino	-.121	.406	.952
	English	Filipino	-1.188*	.440	.022
		Bicol	-1.936*	.433	.000
Section 2	Filipino	English	1.188*	.440	.022
		Bicol	-.748	.433	.201
	Bicol	English	1.936*	.433	.000
		Filipino	.748	.433	.201
	English	Filipino	-1.300*	.476	.021
		Bicol	-1.907*	.489	.001
Section 3	Filipino	English	-1.300*	.476	.021
		Bicol	-.607	.489	.432
	Bicol	English	1.907*	.489	.001
		Filipino	.607	.489	.432

This is because, in the provinces of Catanduanes, teachers interchangeably use the mother tongue and the Filipino language during informal or casual talks with students, thus making the language easily becoming part of their everyday language. English, on the other hand, is used only in the subject English, hence, dealing with the lessons in science delivered through the English language is difficult.

4. 2 Results of the Vocabulary Test on Common Words used in Science

The results of the vocabulary tests on common words used in science administered to 279 grade 3 students from 4 schools in 4 towns located in the north and south of the province is shown in Table 14.

The results show that students obtained better scores in the tests in Filipino, while students who took the test in Bicol also obtained better mean scores, though, lower than Filipino test. Students who were administered with the

test in English got the lowest scores. The results seem to indicate that, if teachers use Filipino in explaining science lessons using the common words, students could understand the lessons and science ideas better. Students from section 1 (academically high performing students) obtained the highest mean scores from among the three sections, while section 3 students (academically low performing students) got the lowest mean scores. Section 1 students have better mean scores in the test using the Filipino language. They gained lower mean scores in the Bicol language and the lowest in the test using the English language. Section 2 students (academically average performing students) also performed better in the vocabulary test using the Filipino language compared to the vocabulary tests using the Bicol and English languages. They obtained the lowest mean scores in the vocabulary tests in English. Similarly, section 3 students also obtained better mean scores in the tests in Filipino language compared to the test Bicol. They also scored the lowest in the vocabulary test using the English. Most of the students had difficulty in writing their own answers in the open-ended items of the tests.

Table 14

Mean Scores of Grade 3 Students in the Vocabulary Tests in Three Languages

Class Sections	Groups	Tests	N=279	Mean Scores SD
Section 1	Group 1	English Test	31	6.35 ± 2.04
	Group 2	Filipino Test	31	8.23 ± 1.64
	Group 3	Bicol Test	31	7.39 ± 1.54
Section 2	Group 1	English Test	32	5.13 ±1.99
	Group 2	Filipino Test	32	7.16 ±1.79
	Group 3	Bicol Test	32	6.25 ±2.03
Section 3	Group 1	English Test	30	4.57 ± 2.07
	Group 2	Filipino Test	30	6.83 ± 1.72
	Group 3	Bicol Test	30	6.17 ± 1.74

It will be noted that the students performed better in the test using Filipino compared to the result of the test in Bicol despite the fact that Bicol is their mother tongue. This could be explained by the fact that Bicolanos are familiar with everyday vocabulary spoken or written in Filipino, but not with science concepts translated in Bicol. The translated Bicol version of the originally English terms are things that are new to the students considering that the concepts in science are not part of their everyday conversation. Hence, the relative difficulty in learning in Bicol compared to Filipino is due to the fact that the Filipino terms in science are sometimes encountered in television viewing and radio listening, which usually make use of Filipino for general comprehension by Filipinos all over the country, which incidentally have their respective dialects or mother tongues.

4.2.1 Comparisons of the Mean Scores between the Three Languages

Using the one-way analysis of variance (ANOVA) on the students' mean scores in the tests in three languages shown in Table 15, the mean difference between the scores of section 1 students are only significant between the vocabulary 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 vocabulary tests in English and Filipino (.000), between the vocabulary tests in English and Bicol languages (p=.031). Lastly, the mean scores of section 3 students have significant difference between the vocabulary tests in English and Filipino (p=.000) and also between the vocabulary tests in English and Bicol (p=.002).

Table 15

Comparisons of Grade 3 Students' Mean Scores Between the Tests in Three Languages in the Vocabulary Test on Common Words Used in Science

Class Sections	(I) Language	(J) Language	Mean Difference (I-J)	Std. Error	Sig.
Section 1	English	Filipino	-1.870*	.446	.000
		Bicol	-1.032	.446	.059
	Filipino	English	1.870*	.446	.000
		Bicol	.838	.446	.151
	Bicol	English	1.032	.446	.059
		Filipino	-.838	.446	.151
Section 2	English	Filipino	-2.062*	.486	.000
		Bicol	-1.250*	.486	.031
	Filipino	English	2.062*	.486	.000
		Bicol	.812	.486	.222
	Bicol	English	1.250*	.486	.031
		Filipino	-.812	.486	.222
Section 3	English	Filipino	-2.400*	.470	.000
		Bicol	-1.633*	.470	.002
	Filipino	English	2.400*	.470	.000
		Bicol	.767	.470	.239
	Bicol	English	1.633*	.470	.002
		Filipino	-.767	.470	.239

4.2.2 Words which Students Find Easy, and Difficult to Understand

After the mean scores of the students in the tests were analyzed, the students' answers were evaluated in each of the test items in the vocabulary test containing the 15 common words used in science and determined which have the most correct answers and the least in the tests in English, Filipino and in Bicol. This could provide information on common words easily understood, or are still difficult for students to understand when used by their teachers in explaining science ideas. During the evaluation, the terms were separated in the multiple choice items from the terms used in the open-ended items. The words with above 70 correct answers were chosen as words that could be easy for students to understands, while words obtaining 50 and below incorrect answers would constitute the words which students seem to have difficulty understanding. The results are shown in Table 16.

In the test in English, the words which most students were able to answer correctly are the following: remove, scoop, dip and injure. The findings seems to indicate that the students found the words easy to understand or are familiar with the word remove, and were able to understand the words scoop, dip and injure. On the other hand, the words in the test with the most incorrect answers are, swab, leave, vibrate and plow. The teachers stated in their informal interviews that the words could be difficult for students to understand when used in discussing or explaining science ideas in class.

Table 16

Number of Students who Chose Correct and Incorrect Answer in Each Item

Common Words			Correct			Incorrect		
			N=93	N=93	N=93	N=93	N=93	N=93
Multiple Choice Items								
English	**Filipino**	**Bicol**	**English**	**Filipino**	**Bicol**	**English**	**Filipino**	**Bicol**
Remove	Alisin	Harion	93	86	88	0	7	5
Scoop	Sinusungkit	Piga-kusit	82	84	78	11	9	15
Dip	Ilublob	Ilub-lob	70	84	79	23	9	14
Injure	Masaktan	Makulu-gan	68	77	62	25	16	31
Dispose	Inayos	Pinarinas	59	68	42	34	25	51
Rub/ rubbing	Pag-kuskos	Pagpilisi-pos	57	81	76	36	12	17
Vibrates	Yumanig	Ga-tanyog	28	36	27	65	57	66
Plow	Pag-araro	Pag-arado	21	45	46	72	48	47
Leave	Nag-iwan	Ga-hubon	16	76	52	77	17	41
Swab	Kuskusin	Is-isun	1	57	61	92	36	32
Open-ended Items								
Loosen	Binubu-haghag	Pigapa-luwag	0	0	0	93	93	93
Observe	Obserbahan	Obserbah an	0	0	0	93	93	93
Swallow	Lunukin	Itulon	0	0	0	93	93	93
Transmit	Nagdadala	Ga-dala	0	0	0	93	93	93
Compare	Pagham-bingin	Pag-kum parahon	0	0	0	93	93	93

In the vocabulary test in Filipino, the words which obtained the high correct answers by the students are *remove*, *scoop*, *rub*, *dip*, *injure* and *leave*. The results indicate that the students could understand the words better when spoken by the teachers in Filipino language during the implementation of the lessons. On the other hand, the words in Filipino that obtained high incorrect answers are *vibrates* and *plow*, indicating that students are not familiar with the terms. The word *swab* obtained almost an average correct and incorrect answers.

In the vocabulary test in Bicol, the words *remove*, *dip*, *scoop* and *rub* obtained high correct answers by the students which indicate that they are able to understand the meaning of the words. On the other hand, the words *vibrate*, *dispose* and *plow* got the most number of incorrect answers which implies unfamiliarity of the words or their difficulty in understanding them. Two words, *injure* and *leave*, obtained an average number of correct answers by the students.

The words used in the open-ended test items in all three languages did not get any correct answers from the students which imply that the grade 3 students have difficulty in expressing their answers in written form.

The findings indicate that several of the common words (swab, leave,) in English frequently used by primary teachers in science still present difficulty for students to understand. On the other hand, the findings show that when these common words were translated to Bicol or Filipino, the students were able to understand it. Words like, vibrates and plow, even if spoken or written in Bicol and Filipino, were found to be difficult for the students to understand.

4.3 Results of the Implementation of Science Lessons Using Two Languages, Bicol and Filipino

The science lessons that were administered to 45 grade 3 primary students from one public elementary school were observed. The student participants belong to section 3, generally termed as academically low-performing students. The reason for focusing on this group of students is that in the first and second processes of this study, they obtained lower mean scores in the tests while students from section 1 and 2 had better mean scores.

The main focus of the class observations was the students' and their teacher's behaviors with regards to the use of the language during the implementation of science lessons.

4.3.1 Observations of the Science class in English Language

In the science class which utilized the English language, students followed or echoed what their teacher said during the class. Oftentimes the teacher tended to let the students finish the phrase of what she was explaining in class. The expressions on the students' 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 express their answers and were uncertain of their ability to speak English. During class activities, it took some time for the students to follow their teacher's instructions.

4.3.2 Observations from the Science class in Filipino Language

The students who were taught the science lesson in Filipino language were, at first, tentative upon hearing their teacher conducting the lesson in Filipino. Gradually, they became more at ease and more willing to participate in

the recitation. The students were able to understand what their teacher was explaining. Students who participated in the recitation were able to express their answers with ease and confidence, and were also able to follow their teacher's instructions during class activities.

4.3.3 Observations from the Science class in Bicol Language

The students who had the science lesson in Bicol language were, initially, uncertain what to say when their teachers started speaking in the Bicol language, similar to the reactions of the other group of students who were taught in the Filipino language. However, when the students realized that their teacher would be speaking in the Bicol language during the science class, their apprehensions slowly turned to ease. However, some of the students seemed puzzled about their teacher speaking the Bicol language for the whole duration of the lesson. Similar to the class that utilized the Filipino language, the students in this group were eager in class activities and recitations. The students were also confident in explaining their answers.

The insights gained from observations in the three classes from one school indicated that both the Filipino and Bicol languages could be utilized in teaching science to Bicol speaking students. The results also show that Filipino, even though not the mother language of the students, helps the students express their ideas during recitations and gain more self-confident in answering or explaining their ideas during the class discussions.

4.3.4 Results of the Assessment Tests after the Implementation of Science Lesson in Bicol, English and Filipino

The results of the science tests in three languages administered to three groups of students presented in Table 17 indicate that respondents who were taught science using the Filipino language achieved the highest mean score of 13. The group of students taught using their mother language, Bicol language, obtained an average mean score of 11.26.

Table 17
Grade 3 Students Mean Scores in the Three Assessment 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

On the other hand, students who were taught using the English language got the lowest average mean score of 8.40. This proves that respondents could comprehend better not only in their mother language, Bicol, but also in Filipino, the national language, compared to English language. Out of the 15 students in the group that was taught and tested in the Filipino language, 8 students obtained perfect scores (15 points out of the 15 item test), 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 points while two respondents obtained 12 and 14 points 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 of 15. 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. The students who were taught and administered English tests had difficulty expressing their answers in the open-ended test, several of the students tried writing their answers in the English language but their answers were still incorrect.

4.3.5 Comparison of the Students' Mean Scores between the Assessment Tests in Three Languages After Science Lessons

The results of the students' mean scores in the tests in three languages using the one-way analysis of variance are (one-way ANOVA) in Table 18. Based on this analysis, there is a significant difference between the mean scores of the science tests in the Filipino language and English language (p=.000), between the science tests in the Filipino and Bicol languages (p=.001), and between the science tests in the Bicol and English languages (p=.001).

Table 18

Comparison of the Grade 3 students' 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.

4.3.6 Results of the Class Observations on Actual Science Class in a Public School Before the Implementation of the Data Gathering

Prior to the development of research materials and lesson plans and its implementation, a public school was visited and a science class was observed to gather baseline data on how science is taught to primary students. The main focus of the observation was to know how teachers use language in teaching or explaining science ideas to their students. Table 20 and 21 show the excerpts from the science classes observed in public elementary school in Virac, Catanduanes. The full verbatim transcript of the science class observation can be read in Appendix B.

The following discussions were observed between the teacher and the students in the science class. First, the teacher spoke in English most of the time wherein she explained the science ideas to the students at least twice. The teacher also used examples of the main subject matter during the implementation of the lesson. Second, the teacher gave a verbal cue, such as a rising intonation, to indicate that the students should finish her sentence with correct word(s). Third, the teacher called the students who raised their hands to answer her questions. When no one among the students knew the answer, or if they were unsure of their answers, the teacher randomly called out a student to answer her questions. *Fourth,* the teacher constantly paid attention to her students' behaviors when she expounded an idea about the lesson. For example, when the teacher observed that her students did not seem to understand the ideas she was explaining, she repeated the information. When the teacher noticed that her students did not seem to follow what she was saying in English, she instinctively switched to speaking in Filipino

to stress a point or to ensure that the students really understood her explanation (see underlined conversation in Table 20 and Table 21).

Table 20

Verbatim Excerpt 1 from the Science Class Observations in a Primary School

Guide: T: Teacher S: Student SS: Students
T: So when we say pollination it is transfer of pollen from the anther to the…. **SS:** Stigma **T:** Okay, I guess you should write this, it the transfer of pollen grains from the anther to the stigma (writing on the blackboard). There are two kinds of pollination, who can give me one? (T looks towards her students searching for someone to raise hand and answer…..waited longer hoping many students will raise their hands) **SS:** Ma'am! (at least 7 SS raising hands) **T:** Yes, Carl Joey? **S:** (looking at the textbook) Self-pollination **T:** Yes, self pollination. What do we mean by self-pollination, look at this flower, (teacher holding a replica of flowers). Everybody eyes here. I have here the stamen, which is the male part. And we have here the pistil, which is the female part. Once the pollen grain from the anther is transferred to the stigma of the same flower, that is self-pollination. **SS:** pollination **T:** Do you understand? **SS:** YES **T:** Meaning. The pollen grain from that same flower (pointing to the flower) was transferred to the pistil of the same flower. We are talking of how many flowers here? **S:** One T: ONE. "Isa lang" (in Filipino language) OK? From the anther to the stigma…….(pause for a few seconds, looking at the students)……. It maybe of the wind, water or … **SS:** insects **T:** As long as the pollen was transferred to the stigma of the same flower, we call that self…. **SS:** pollination **T:** OK? **SS:** nods **T:** There is a butterfly, the butterfly flew on this flower (pointing at the flower), and then the butterfly transferred to this flower (pointing to another flower), and then the butterfly transferred to this flower **SS:** (raising hands) **T:** then some of the pollens dropped on the stigma of this flower (pointing to another flower). What do you call that pollination? **SS:** (4 raised their hands). **T:** Yes? (pointing to a student) **S:** Cross-pollination. **T:** YES. It is now a cross-pollination. We are talking of what? The transfer of pollen from the anther of the flower, and it was transferred to another of the same kind. Do you understand? **SS:** YES **T:** Because if the butterfly, let's say it transferred to a Santal plant, and that particular butterfly has pollen grains on it's wings. Can it pollinate Santal Flower? Yes or No? **SS:** NO

Fifth, most of the time, only a few students were confident enough to participate in the recitations. Most of the students kept quiet when the teacher

asked questions about the lesson. Several students, even though they did not raise their hands, were called to participate in the recitation. Oftentimes, it was observed that many students read their answers from their books or notebooks .

Table 21

Verbatim Excerpt 2 from the Science Class Observations in a Primary School

Guide: T: Teacher S: Student SS: Students
T: What if I have two Gumamela plants, imagine (pointing to an object) this is a Gumamela plant. (Looks towards the students for a few seconds, checking is the students are still following) who can follow? This is another, what plant is this? **SS:** Gumamela **T:** Another Gumamela plant (holding one plant in each hand), we have another Gumamela plant. What if the butterfly flew here (pointing to the plant), and transferred here? (pointing to a second plant) And the pollen from this plant was transferred to the stigma of this plant, which is also a Gumamela. What kind of pollination is that? **S:** (raised hand) **T:** Yes? **S:** Self-Pollination. **T:** (gestures that it was not the right answer). When we say about self-pollination, we are talking about one flower only. **SS:** (2 raising hands) **T:** The pollen of this flower was transferred to the stigma of the same flower, that is self-pollination. But, The pollen of this flower was transferred to this flower (pointing the another flower in the same plant), that is cross-pollination (teachers tap the desk). **SS:** (whispering to each other in Bicol language) **T:** Now I'm asking you, I have a Gumamela plant here (pointing to a plant), and another Gumamela plant here (pointing to another plant), the butterfly flew here and then transferred here, the pollen from this flower was transferred to this flower. What kind of pollination is that? **S:** (raised hand) **T:** Yes, James? **S:** Cross-pollination **T:** Cross-pollination! Very Good! It may be of the same plant or of another plant of the same ___ **SS:** the same kind **T:** <u>It should be both Gumamela. "Magkaibang Plants". "Sinong Nakaka-intindi"? (Filipino language). Who can follow?</u> <u>**SS**: (Several raised their hands).</u> **T:** Who can follow? (Looks towards the students for few seconds). OK. **T:** So what if the butterfly sipped the nectar of this flower, then the pollen grain from this flower (pointing to a flower) was transferred to the stigma of this flower (pointing to the same flower), what pollination is that? **S:** (raised hand) **T:** YES? **S:** Self-pollination **T:** Very Good! Self-pollination. The pollen grains of that flower was used ,or the same pollen was used to….what?, to be….to used to fertilize the same…… **SS:** flower

Sixth, while the teacher was focusing on the presentation and explanation of science ideas of the lesson, it was observed that several students were discussing

the lesson among themselves in the Bicol language. Several times, it was also observed that the students also spoke to one another in the Filipino language to explain the teacher's questions and to communicate the answers found in their textbooks.

4.3.7 In Summary

1. Student participants had better mean scores in Bicol and Filipino compared to English, in the reading comprhenesion test.
2. Student participants had better mean scores in Filipino, and in Bicol compared to English, in the vocabulary test on common words used in science.
3. Student participants actively participated in class recitations, and were able to express their ideas during discussions in the science lesson using Filipino language, as well as the science lesson using the Bicol language, compared to the science lesson using the English language.
4. Students who were taught science using the Filipino language had the highest mean score, followed by the students who were taught in Bicol. Students who were taught in English obtained the lowest mean score.
5. It was observed in an actual science class, that the teacher spoke mostly in English. The students generally finished their teachers' sentence or phrase during the discussion. Students who did no understand their teacher talked among themselves about the lesson in Filipino and Bicol languages.

4.4 Results of the Survey Addressing Research Question 2

Research Question 2

What are the students' language preference in learning science ideas, and their language environment in and out of their school?

4.4.1 Results of the Survey on Students After Administering the Reading Comprehension Test

After finishing the reading comprehension tests, all the student respondents were given the survey questionnaires to know their language use and language preference in learning science. The findings (Table 22) reveal that 88% of the students stated that they use the Bicol language during conversations at home when they have conversations with their family and other relatives, 74% use Bicol outside their home when they communicate with their neighbors, vendors at stores, markets, at the church, in the park; while 76% talk with friends in Bicol.

Table 22

Students Extent of Language Use In and Outside Home, and at School

Survey Items	**Section 1**	**Section 2**	**Section 3**	***N=284***	***%***
Language students use at home					
Bicol	86	88	77	251	88.4%
Language students use outside their home					
Bicol	80	68	63	211	74.3%
Language students use when having conversation with friends					
Bicol	77	63	69	209	76.6%
Language that students use inside the classroom					
Filipino	50	60	38	148	52.1%
English	20	27	22	69	24.3%
Bicol	29	11	27	67	23.6%

The data in Table 23 shows that fifty-two percent (52%) of the students affirmed they use the Filipino language in the classroom when they have conversations with their classmates and teachers. The majority of those who chose Filipino belong to sections 1 and 2.

Table 23

Grade 3 Students' Extent of Language Use at School and Their Language Preference in Science Related Activities

Survey Items	Section 1	Section 2	Section 3	N=284	%
Language that students use inside the classroom					
Filipino	50	60	38	148	52.%
English	20	27	22	69	24.%
Bicol	29	11	27	67	23.6%
Language students had to use during science class					
English	94	94	81	269	94.7%
Other language that students use in studying science					
Filipino	54	61	68	183	64%
Language in which the students are at ease during recitation					
Filipino	69	65	25	159	56%
English	26	22	28	76	26%
Language that their teachers use in teaching science					
English and Filipino	51	36	45	132	46.5%
It is easier for students to understand their teachers when their teachers teach using this language					
Filipino	72	61	31	164	57.8%
Students find it easy to follow their teachers' instructions when they speak this language					
Filipino	70	61	46	177	62.%
Students are comfortable studying science in this language					
English	70	50	46	166	58.5%
Language which makes it easier for students to read and understand science					
Filipino	68	61	36	165	58%

On the other hand, at least 94% of all the student-respondents indicated they are required to use English while studying science and in performing science related activities; whereas 64% of the students affirmed that the other language they use in studying science is Filipino.

Fifty-six percent of the students revealed that they are more relaxed when they speak in Filipino during class recitations. Moreover, According to 46.5% of the student-respondents, their teachers use both English and Filipino language in teaching science. In this case, teachers had to switch from using English to Filipino language to explain a particular science concept. During science related activities, 57% of the student-respondents expressed that they understand their science teacher when he or she uses the Filipino language. 62% of the students prefer their teachers giving directions or instructions in Filipino. 58% of the respondents stated that reading and understanding science concepts is easy if they use the Filipino language.

Fifty-eight percent (58%) of the students indicated that they are comfortable studying science in English. A closer analysis on the 166 students who chose English revealed that a greater number (70) of students came from section 1, 50 students came from section 2 and 46 students from section 3 also stated that they are comfortable studying science in English.

In Table 24, 35% of the students asserted that they can understand science lessons in English. Most of these students belong to sections 1 and 2. More than half of the students (63%) indicated that they can only slightly understand science lessons when taught in English. Many of those who answered this came from the section 1 students.

On the other hand, only 1% said they do not understand a science lesson in English. Ninety-four percent (94%) of the student-respondents stated that they Thirty-nine point three percent (125 students) of the students reported that their teachers use both English and Filipino in teaching science. It meant that, while teachers mainly teach in English, at intervals, they have to switch to speaking in Filipino when they think it will help their students understand what they are teaching.

On the other hand, 32.1% (102 students) of the students answered that their teacher teaches science only in English. With regard to other language(s) used while studying science, 58.2% (185 students) of the respondents indicated that they use Filipino while 31.8% (101 students) use English. 94.7% (269 students) understand a science lesson when it is conducted in Filipino; while 5% declared they slightly understand it in the Filipino language. However, 89% also confirmed that using the Bicol language makes a science lesson easy to understand; 10% slightly understand a science lesson when taught in Bicol.

Table 24
Grade 3 Students' level of understanding science content and ideas in Bicol, English and Filipino

Survey Items	**Section 1**	**Section 2**	**Section 3**	***N=284***	***%***
Students' level of understanding when science is taught in English					
Yes	34	37	29	100	35.%
A little	64	60	56	180	63.%
No	1	1	2	4	1.4%
Students' level of understanding when science is taught in Filipino					
Yes	96	93	80	269	94.7%
A little	3	5	7	15	5.3%
No	-	-	-	0	-
Students' level of understanding when science is taught in Bicol					
Yes	85	94	74	253	89%
A little	14	3	13	30	10.6%
No		1		1	.35%

4.4.2 Results of Survey Administered to Grade 3 Students Before Administering the Vocabulary Test on Common Words Used in Science

The survey was administered before the students took the vocabulary tests in three languages. During the time that the survey was administered, there were a total of 318 grade students who participated.

Table 25 presents the language in which students can understand in casual conversation. Results from the survey show that majority of the respondents confirmed that they understand the Bicol language while 47 (14.8%) slightly understand it, which could indicate that their family migrated from provinces in other regions. 284 (89.3%) students understand Filipino, on the other hand, 27 (8.5%) slightly understand it. Only 7 (2.2%) among the students do not understand the language.

Table 25
Grade 3 Students' Understanding of the Language in Casual Conversation

Items	***N*=318**	**%**
Bicol language		
Yes	271	85.2 %
A little bit	47	14.8 %
Filipino Language		
Yes	284	89.3 %
A little bit	27	8.5 %
No	7	2.2 %

Table 26 shows that the majority of the students use the Bicol language at home when having daily conversations with their parents, siblings and other family members. Other students speak Filipino, to which they refer to as Tagalog, at home. One of the main reasons these students speak the Filipino language, is

that it is the language they speak in their home province before their family migrated to the Bicol region. Other reasons include inter-marriage wherein the mother language of one of the parents of the student is Tagalog or Filipino.

Outside their home, more than half of the respondents use the Bicol language while playing with friends and when having conversations with their neighbors. Bicol is also used in public places such as the markets, churches, parks and other public places. Although most of the students speak in Bicol language in and outside their homes, several students also use the Filipino language in conversations at home and in their communities.

Table 26

Grade 3 Students' Extent of Use of the Languages In and Outside their Home.

	Section 1	**Section 2**	**Section 3**	***N*=318**	**%**
Language the students use at home					
Bicol language	84	88	72	244	76.7%
Filipino language	23	15	25	63	19.8 %
English language	1	6	4	11	3.5
Language students use outside their home					
Bicol language	83	82	70	235	73.9 %
Filipino language	25	24	31	80	25.2 %
English language	-	3	-	3	0.9 %
Language students use when talking to friends					
Bicol language	73	72	67	212	66.7 %
Filipino language	35	33	33	101	31.8 %
English language	-	4	1	5	1.6 %

The results indicated a noticeable change in language use by several of the students at school. Table 27 shows the language use of students and teachers in the classroom. Forty-one percent (131 students) stated that they normally use Filipino inside the classroom, although 36% (117 students) of the students still use Bicol when having conversation inside the classroom. When classes start, there is

also a noticeable change in the language use of the students. The survey results also show that 84% (267 students) of the students study science in English in the classroom, this included reading science books, writing, class discussions and recitations.

Table 27

Language the Grade 3 Students Use in the Classroom and during Science classes

	Section 1	**Section 2**	**Section 3**	***N*=318**	**%**
Language students use inside the classroom when conversing with classmates and teachers					
Filipino language	58	32	41	131	41.2 %
Bicol language	33	44	40	117	36.8 %
English language	16	33	20	69	21.7 %
Language students use during science class					
English language	90	87	90	267	84 %
Filipino language	11	11	3	27	8.5 %
Bicol language	6	11	7	24	7.5%
Language teachers use when teaching science					
English and Filipino language	42	44	39	125	39.3 %
English	36	28	38	102	32.1 %
English, Filipino and Bicol language	25	33	21	79	24.8 %
Other languages students use					
Filipino/Tagalog language	50	61	74	185	58.2 %
English only	44	42	15	101	31.8 %
Bicol language	8	5	11	24	7.5 %

The survey question items in which the students were asked for their language choice when studying science or during science classes if given the chance to choose, the following answers were revealed in Table 28. 62.3% (198 students) of the students identified Filipino as the language they are comfortable with while studying science. Whereas 23% (73 students) of the students indicated Bicol as the language they are comfortable with.

Sixty-four point eight percent (64.8% or 206 students) of the students responded they prefer using the Filipino language during class recitations, while 68 (21.4%) students confirmed preference in using the Bicol language. Forty-point nine percent (130 students) of the students prefer their teacher to use the Filipino language in giving directions during science class activities.

Forty-one point two percent (131 students) of the students selected Filipino as the language they prefer during science classes while 39% (124 students) chose English. Forty point six percent (129 students) of the students pointed out that Filipino makes reading and understanding science easy, whereas 34% maintained it is English.

Table 28

Grade 3 Students' Language Preference in Learning Science when given Chance to Choose between Bicol, English and Filipino

	Section 1	***Section 2***	***Section 3***	***N=318***	***%***
Language students are comfortable with while studying science					
Filipino language	70	73	55	198	62.3 %
Bicol language	27	19	27	73	23 %
English language	11	22	14	47	14.8 %
Language students prefer during recitation					
Filipino language	75	64	67	206	64.8 %
Bicol language	14	29	25	68	21.4 %
English language	19	16	9	44	13.8 %
Language students prefer when following science teacher's instructions					
Filipino language	41	37	52	130	40.9 %
English language	48	44	22	114	35.8 %
Bicol language	19	28	27	74	23.3 %
Language students prefer during science class					
Filipino language	36	51	44	131	41.2 %
English language	55	43	26	124	39 %
Bicol language	17	15	31	63	19.8 %
Language students prefer when reading about science					
Filipino language	39	35	55	129	40.6 %
English language	47	37	25	109	34.3 %
Bicol language	22	37	21	80	25.2 %

It was found out from the results that a majority of the students who chose Filipino or Bicol were students from sections 3 and 2. On the other hand, students from section 1 often chose English as their preferred language.

In the survey items which focused on what students think with regards to the language they would prefer when their teacher is teaching science, in tests, and in doing their homework, the results revealed the following, as shown in Table 29.

Table 29
Grade 3 Students' Language Preference in Science-related Activities

	Section 1	**Section 2**	**Section 3**	***N*=318**	**%**
Language students prefer their teacher use while teaching science					
Filipino language	42	57	55	159	50 %
English language	51	29	17	97	30.5 %
Bicol language	15	23	29	62	19.5 %
Do students understand science class in English?					
Yes	69	47	40	156	49.1 %
A little bit	35	53	57	147	46.2 %
No	2	9	4	15	4.7 %
Language students find difficult during exam					
English language	74	85	77	236	74.2 %
Filipino language	14	18	9	41	12.9 %
Bicol language	20	6	15	41	12.9 %
Language prefer during exam					
Filipino language	53	61	66	180	56.6 %
Bicol language	30	38	25	93	29.2 %
English language	25	10	10	45	14.2 %
Language students prefer when doing homework					
Filipino language	48	56	68	172	54.1 %
Bicol language	30	33	22	85	26.7 %
English language	30	20	11	61	19.2 %

Half (50%) the population of the student respondents chose Filipino as the language they can understand better if utilized by their teacher in science class, while at least 30% of the students selected English, the rest chose Bicol. One hundred fifty-six students (49.1%) understand science in English. A greater number of the students (112 students) who chose Filipino belonged to sections 2 and 3, 46.2 % can understand it slightly; 4.7% of the respondents cannot understand the lessons in English. Of the 49.1% (156 students) who indicated that they can understand English during science lessons, many of the students belonged to section 1.

On the other hand, most of the 46.2% of students who stated that they can only slightly understand English during science lessonsbelonged to both sections 3 and 2.

A greater number of students (236 students) reported that English is the language that is difficult in science examinations, while 56.6% (180 students) stated that if given a choice, Filipino is easier to use during examinations. Lastly, 54.1% (172 students) of the respondents prefer using Filipino when doing their homework, 26.7% (85 students) favor the Bicol language, only 19.2% (61 students) respondents prefer English.

4.4.3 Results of the Survey Administered to Students Who Participated in the Implementation of Science Lesson in Three Languages

After completing the assessment tests, the students were given survey questionnaires in order to know their language preference in learning science, and their language environment in and outside their homes and school.

The data presented in Table 30 shows that majority of the students (88.9%) use the Bicol language in their conversations at home. Outside their home, 82% of the students, use the Bicol language when talking to friends or neighbors. Inside a store, in the supermarket, at the church, in the park or other public establishments, 68.9% of the students use the Bicol language. When having conversations with schoolmates on their way to school, 62.2% of the students use the Bicol language.

Table 30

Grade 3 Students' 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. The results show that 80% of the students use both the English and Filipino languages when having conversations with schoolmates, teachers and school staff. In the same way, 64.4% of the students use the English

and Filipino languages inside their classroom. When talking to their homeroom teacher, 71% of the students use both the English and Filipino languages.

The transition of using language from home to school indicated the difference between the home language and the academic or school language in which students have to adapt to which could have an effect in their learning of science. Hence, the second part of the survey was to look for students' language preference in learning science.

The results in Table 31 show that the student-respondents generally prefer the two languages, the Bicol and Filipino languages, during conversations inside the school campus, and in performing science education related activities.

If given a choice, 71.1% of the students would prefer to use the Bicol language during their casual conversations with their classmates and schoolmates. Forty percent (40%) of the students prefer using the Bicol language when having conversations with their teacher in the classroom, while 37.8% of the students prefer the Filipino language.

During the performance of science class activities (in group work mode), 62.2% of the students prefer that their teacher give instructions in the Bicol and Filipino languages. In reading science textbooks and other texts, 57.8% of the students prefer to read in the Filipino language. During class recitations, 55.6 % of the respondents prefer the Filipino language, while 31.1% of the students prefer both the Filipino and Bicol languages. In science class discussions, doing experiment or in reporting, 66.7% of the students prefer to speak in the Filipino language, especially in presenting and expressing their own ideas to the class.

Table 31

Grade 3 Students' Language Preference at School and in Science-related Learning Activities

	Language	N=45	Percent
Having conversations with classmates and schoolmates	Bicol	32	71.1%
Having 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 %

If given a choice of language during exams, 62.2% of respondents would prefer to use the Filipino language. on the other hand 37.8 % of the respondents would prefer a combination of the English and Filipino languages. Lastly, 53.3% of the respondents prefer the Filipino language in doing their homework, while 31.1% favor using both Filipino and Bicol languages.

4.4.4 In Summary

1. Bicol Speaking Students had to switch languages when they enter their school. From using their mother language, Bicol, they had to speak in Filipino or English inside the campus.
2. Student participants prefer using Filipino during recitations, in expressing their ideas, in following their teachers' insructions, in reading science texts, in exams and in doing their homework.

4.5 Results of the Teachers' Survey Addressing Research Question 3

Research Question 3

What are the perceptions of primary school teachers towards the mother language-based science education?

4.5.1 Results of the Survey on Teachers' Perceptions on the Medium of Instruction in Teaching Science

Twenty-three (23) out of the 24 teachers are from the province of Catanduanes, while 1 teacher is from the mainland province of Albay. Eleven (11) of the 24 teachers mix Bicol, Filipino and English languages in their conversations at home, while seven (7) teachers speak only in Bicol. When these teachers talk to their neighbors, nine (9) teachers talk in the Bicol language while eight (8) teachers alternately use the Filipino, Bicol and English languages in conversation. Table 32 below shows that the teachers generally communicate in a combination of Bicol, English and Filipino language.

Table 32

Teacher's Extent of Language Use Outside their Homes

	Language	N=24	Percent
Markets/stores	Bicol	12	50%
	Bicol, Filipino & English	5	20%
Town Hall	Bicol	10	41.7 %
	Bicol, Filipino & English	6	25%
	Filipino & Bicol	6	25%
Banks	Bicol, Filipino & English	10	41.7%
Restaurants	Bicol, Filipino & English	10	41.7 %
	Bicol	6	25%
Public Transportations	Bicol, Filipino & English	8	33.3%
	Filipino & Bicol	6	25%
	Bicol	6	25%
Office of private companies	Bicol, Filipino & English	12	50%
	Filipino & Bicol	5	20%

Table 33 shows the data on teachers' language use in school campus. Most of the teacher participants also use a mixture of the Bicol, Filipino and English languages when talking to their students. Furthermore, the teachers also alternately speak the three languages as they converse with their students' parents, co-teachers, and school staff.

Table 33

Teachers Extent of Language Use Inside the School campus

	Language	**N=24**	**Percent**
When talking to students	Bicol, Filipino & English	17	70.8%
When talking to parents	Bicol, Filipino & English	12	50 %
	Filipino & Bicol	6	25%
When talking to co-teachers	Bicol, Filipino & English	16	66.7%
When talking to the principal	Filipino & English	14	58.3 %
	Bicol, Filipino & English	8	33.3%
When talking to school staff	Bicol, Filipino & English	16	66.7%
	Filipino & English	8	33.3%
When talking to students in the classroom	Bicol, Filipino & English	17	70.8%
	Filipino and English	6	25%

However, when talking to their school administrators or principals, 58% of the teachers speak in either Filipino or English. Thirty-three percent (33%) of the teacher participants use a combination of the three languages. The extent of language used by the teachers was observed during the school visits. The school principals and teachers talked with the researcher during the course of the field research. During the initial face-to-face discussion, the teachers and the school principals were self-conscious of the language they used towards the researcher, thus they spoke in English during the initial conversations. However, as they became more relaxed, theyexpressed their thoughts by speaking in a combination of the Bicol, Filipino and English languages.

The data presented in Table 34 show that 12 out of the 24 (50%) of teachers indicated that their students understand the science concepts better when they were explained in Filipino. The teachers' perception on this matter is parallel to the results of the survey conducted to grade 3 primary students from sections 2 and 3. Majority of the students also stated that they prefer their teachers to use the Filipino language in explaining science concepts during science classes.

The results show that 12 (50%) of the teacher respondents indicated that their students best explain their own ideas and science concepts in the Filipino language and Bicol language during class discussions; eight (8) teachers indicated that their students are confident in explaining science concepts in the Filipino language. These results are similar to the results of the survey administered to the grade 3 students. Thirteen teachers (54.2%) out of the 24 teachers responded that their students could easily follow their instructions in science class when the Filipino and Bicol languages are used; while 6 teachers stated that their students easily follow their instructions when they speak in the Filipino language.

Table 34

Teachers' Views on their Students' Language Preference in Science Activities

Survey items	Language	N=24	%
Students are able to have a better understanding of science concepts when explained in	Filipino	12	50%
	Filipino, Bicol	6	25%
Students can best explain science concepts in their own words in	Filipino & Bicol	12	50%
	Filipino	8	33.3%
Students can immediately follow instructions in science class activities when you speak in	Filipino & Bicol	13	54.2%
	Filipino	6	25%
Students find it easy to read when using this language	Filipino & Bicol	14	58.3%
	Filipino	8	33.3%
Students are more comfortable in this language during science class recitations	Filipino & Bicol	12	50%
	Filipino	10	41.7%

Fourteen teachers (58.3%) stated that their students are at ease reading in both the Filipino and Bicol languages; on the other hand 8 (33.3%) of the teachers stated that their students find it easy reading science in Filipino. Lastly, according to 12 (50%) teachers, their students are able to participate better in recitations when they speak in both the Filipino and Bicol languages. Ten of the 24 teachers however say that their students are more comfortable during recitations when speaking only in Filipino.

The results of the above survey items convey the teachers' observations on their students' language preference in science related activities. The teachers perceive that the students favor the Filipino and Bicol languages.

4.5.2 Teachers' Language Preference in Teaching Science

Table 35 presents the data on teachers' opinion about the language they think is appropriate for students when they are teaching and while they are having science class activities. The respondents were also asked to state their reasons for chosing a particular language.

Table 35
Language the Teachers Perceive as More Appropriate for Students when they Teach Science

Language	**Teachers N=24**	**%**
Filipino and Bicol	8	33.3%
English	7	29.2%
Filipino	5	20.8%
Bicol	4	16.7%
Total	24	100%

After the teachers stated their choice, 11 out of the 24 teacher respondents explained their reasons for chosing a language, while 9 teachers did

not specify any reasons. Based on the results, 8 teachers selected the Filipino and Bicol languages as the appropriate languages for teaching science at the primary level. The teachers presume that the combination of Filipino and Bicol in teaching science is relevant for the reason that their students can easily understand the lessons in these languages, aside from the fact that they, teachers and students, are both familiar with Bicol and Filipino .

On the other hand, 7 of the teachers chose English as the most appropriate language since, as they asserted, the science terms in English have no equivalent terms in the Bicol and Filipino languages. Hence, the teachers face predicament in translating science terms to the local languages each time they had to provide a better explanation to their students. One consideration for this situation is that the teachers were not trained on the use of multiple languages in teaching science.

Five out of the 24 teachers chose Filipino as a suitable language in teaching science as it is a familiar language, thus, easy for the students to understand. The Bicol language was chosen by 4 teachers and pointed out that this language is the students' mother tongue , which helps them discern science contents.

From the results of the teacher survey, it is noticeable that many of the teacher respondents still surmise English is the best language for teaching science to primary students. Their main reason is that there is no equivalent words in the local languages. Furthermore, the teachers pointed out the difficulty of finding and translating those science terms from English to Filipino or Bicol. Additionally, they stated that they were not trained to do so.

Tables 36, 37 and 38, are the verbatim statements of the teachers' citing their reasons for selecting the Bicol language, English language or the Filipino language as the most appropriate medium for primary science education:

Table 36

Teachers who chose Filipino and Bicol language (Verbatim)

1. "They are already exposed to the local language."
2. "Pupils can easily understand science concepts if language is Bicol and Filipino".
3.. "The pupils can easily understand these two languages".

Table 37

Teachers who chose Bicol language (Verbatim)

1. "The pupils can easily understand the mother language. Pupils can express their feeling and can express mother language".
2. "Bicol, because pupils can understand well"
3. "To understand the science concept easily"

Table 38

Teachers who chose English language (Verbatim)

1. "English because the science ideas are difficult to translate in Filipino or Bicol"
2. "Science terms are hard to translate to Filipino or Bicol language"
3. "English is spoken abroad"
4. "Since the test in science is in English and terms in Science are English. Then English should be used."
5. "There are a lot of science terms which cannot be translated in our dialect, thus may results to confusion"
6. "Pupils will find it hard to switch to other languages especially to English when they reach higher levels of study"
7. "Lack of reference materials/ the dialect used by our grade 1,2 are not our own dialect in Catanduanes"

4.5.3 Summary

Several insights were obtained from the results of this process. First, juxtaposing the results of the survey on the teachers and the grade three students, it can be inferred that the teachers and students have almost similar points of view on the language that is appropriate for class recitations. The teachers asserted that their students prefer using a combination of Filipino and Bicol in recitations. Most of the grade 3 students (Tables 15, 23 & 29 (maybe 28, pls check the number of this table) stated they prefer using Filipino during recitations. The results also indicated that even though the students' mother language is Bicol, they still favor the Filipino language along with Bicol language during recitations and science classes, and in following their teachers' instructions.

Second, in the survey on teachers' opinion on which language is better suited for teaching science, the results indicate that a number of teachers still favor the use of English. The reason behind this assertion is due to the fact that it is difficult to translate English science terms to Bicol or Filipino because of its inadequate words for science. Aside from that, they are not trained to translate science terms to the local language. Additionally, the teachers asserted that using local languages in science could confuse the students when they reach higher level of education. The teachers believe that teaching their students in English will help them reach and finish college. Lastly, even though all of the teacher respondents have not undergone training on mother tongue-based multilingual education, they have spontaneously and constantly been using the local languages in explaining concepts that are difficult for students to understand.

Although their students prefer the Filipino and Bicol languages in various science related activities, a considerable number of the teacher still think that

English only is the best medium of instruction for primary science education. They reasoned that it is difficult to translate science terms into local languages. Additionally, the teacher respondents stated that English is an international language, and that being taught well in the English language will help their students reach and finish college.

4.5.4 Comparison of the Results of the Study

Comparisons were made among the results of the tests (reading comprehension test, vocabulary test on common words, and summative test after science lessons), the results of the surveys, and the observations from actual classroom science teaching prior to the administering of tests and surveys.

Among the three tests that were administered to grade 3 students, the results seem to indicate that the students have better performance in the tests in both Filipino and Bicol languages. On the other hand, most of the students who were assigned the tests in English obtained lower mean scores. In both the vocabulary tests on common words, and the summative tests, surprisingly, the students had better mean scores in tests in Filipino compared to the tests in Bicol language. The results of the tests were further supported by the results of the survey revealing that a greater number of students prefer using the Filipino and Bicol languages in learning science and during science related activities. A parallelism can also be seen between the results of the survey on students and teachers with regard to the language the students prefer using in learning science. According to the students, they prefer either Filipino or Bicol in learning science. In the same way, the teachers also claimed that through their observations their students tend to favor Filipino or Bicol in learning science.

However, the teachers stated that English is better than Filipino or Bicol in teaching primary science, at least, to the students in the province. They asserted that teaching science in Bicol or Filipino is crucial due to the following reasons: (a) inadequate science terms in the local language, thus, translating science terms from English to the local language is arduous, (b) insufficient reference materials in the local dialects familiar to the students, and (c) impediment to higher level of learning in the area of science. In the survey results on students, a greater number revealed that their teachers use both English and Filipino during science class. This was also observed during the actual science class observations. It was observed that the teachers generally teach science in English and that their students were required to speak and write in the same language since, according to the teachers, English is prescribed in the curriculum as the medium of instruction for teaching science.

4.5.5 Overall Summary of the Results

Based on the results of this study, the complimentary behavior of the Bicol and Filipino could be an effective medium of instruction to the Bicol-speaking primary students of the province of Catanduanes. In this context, using both Bicol and Filipino languages provided the learners with better opportunities to understand science ideas in the teaching-learning process at the classroom level. Furthermore, the learners gained confidence in expressing their thoughts and in answering the teachers' questions in the science class. The findings of this study also affirm that the Filipino language could serve as a support medium of instruction to enhance understanding of science ideas at Grade 3 level in the province of Catanduanes. The students were conditioned to the Filipino language

that they have become familiar and more comfortable with the language. Thus, the high exposure to the language affects the language preference of the students in the learning process at classroom level.

4.6 DISCUSSIONS

The following discussions below focuses on the answers to the research questions posed in Chapter 1.

4.6.1 Answers to the Research Question 1

Research Question 1.

What are the effects of using two local languages on students' understanding of science ideas compared to using the language of instruction in science? In which language do students understand better?

The findings of this study revealed that the grade 3 Bicol-speaking students who participated in the tests administered in the three processes of this study, had better performance in the tests in Bicol and Filipino languages compared to the test in English. It indicated that those students understand science ideas better in both Bicol and Filipino.

Reading Comprehension Tests in Three Languages

Most students especially in section 2 (academically average-performing students) and section 3 students (academically low-performing) had better mean scores in the Bicol and in Filipino languages. Therefore, it indicates that the students understand science ideas better in Bicol and Filipino languages. They have difficulty understanding science ideas in English. Moreover, it shows that most of the students are more familiar with choosing their answers from multiple choices but have difficulty in expressing their ideas in writing in almost all the three languages. Only a few of the students were able to write their own answers, and those students belong to the section 1.

The results of the study illustrate that the mean scores of the students in the science reading comprehension tests in the Bicol and Filipino languages are significantly higher than in English especially those who belong in sections 2 and 3, hence those students might necessarily be taught in Bicol or Filipino at the introductory phase of elementary science education. It also points out that the Filipino language could be a suitable medium of instruction in science education for average and low achieving, Bicol speaking students.

The results of the test are further supported by the findings in the survey of the students which show that Bicol speaking students prefer using the Filipino language during recitations, and in following their teachers' instructions during science activities. Further research that would identify the factors that could have contributed to the respondents' slightly higher mean scores in the Filipino language compared to their mother language and the result of the survey showing their preference of the Filipino language will be able to help explain the results.

Vocabulary Tests on Common Words Used in Science

Students obtain better mean scores in the vocabulary tests in the Filipino language. The students in section 1 consistently performed better in the vocabulary tests, as well as in the reading comprehension tests, in all languages compared to students in sections 2 and 3.

On the other hand, the average and below-average performing grade three students have the lower mean scores in the test in English language. Majority of the students in both grade levels were not able to answer the open-ended question items in all three languages. This observation indicates that the students have difficulty in expressing their own ideas in writing and understanding the instructions.

The results of the vocabulary tests indicate that the Filipino language could be an effective medium of instruction in science especially for students who belong to sections 2 and 3.

Assessment Tests After Science Lessons in Three Languages

Overall, the results of the tests and the class observations indicate that student respondents could understand science ideas taught in the science lesson 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 science ideas using the Bicol language, along with the students who were taught in the Filipino language performed better 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 summative exams compared to the students who were taught in the mother language, Bicol.

The students' better performance in the summative test using the Filipino language, compared to the students' mother language, Bicol language, implies that the students are more familiar with the science lesson in the Filipino language. This observation in similar to the observations of Balce's (2010) study on teaching science in Filipino and the Rubio's (2010) 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.

Those students who were taught in English performed the least in the test. Students also had difficulty in expressing their answers writing in the open-ended questions. 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 languages, most of the students were more confident in explaining or expressing their own ideas during class discussions, and were more active during class recitations. This indicates that students understand the science lessons implemented by their teacher. Furthermore, the students easily followed their teachers' instructions during class activities.

4.6.2 Answers to Research Question 2

Research Question 2.

What are the students' language preference in learning science concepts, and their language environment in and out of their school?

The data obtained from the survey questionnaire administered to the student participants illustrate that most of the student respondents prefer using the Filipino language during science class discussions, recitations, in reading science learning materials, in doing their homework and in taking exams. Most students prefer their teacher to speak in Filipino and Bicol languages when giving instructions in class activities like experiments.

The results of the survey also illustrate that the majority of the students speak their mother language at home and outside their home, these include speaking with their friends and neighbors, at public places and at business establishments. However, when the students arrive at their school, most of the students indicated that they switch to the use of Filipino language when they speak to teachers and other students within the campus. The students also have to switch to the English language when the science lesson begins.

4.6.3 Answer to Research Question 3

Research Question 3.

What are the perceptions of elementary school teachers towards the mother language-based science education?

In the case of the teachers' point of view, the Filipino language, even though not the mother language of the students in the region, is the language preferred by the students in most of the science related activities. This is based on their experiences in teaching primary students.

Although their students favor the Filipino and Bicol languages in various science related activities, several science teachers still acknowledge English as the effective medium of instruction for primary science teaching. The teachers reasoned that it is difficult to translate science concepts from English into local languages. Several teachers assumed that using the mother language could confuse the students at the higher level of learning. Furthermore, the teachers asserted that they lack training on using the mother or local languages in teaching science at primary level.

CHAPTER V

CONCLUSIONS and RECOMMENDATIONS

This chapter presents the conclusions and recommendations drawn from the results of this study. To arrive at the conclusion, this study was guided by the following specific research questions and corresponding research objectives:

1. What are the effects of using two languages, Bicol and Filipino, on students' understanding of science ideas compared to using the language of instruction in science? In which language do students understand better?

   Research Objective 1, to identify the language that the students understand better by implementing science lessons, and by administering tests in three languages, Bicol, English and Filipino.

2. What are the students' language preference in learning science ideas, and their language environment in and out of their school?

   Research Objective 2, to find out the students' language preference in learning science ideas and in other science related classroom activities. And, to investigate the students' language environment in and outside their home and at school by administering survey questionnaire.

3. What are the perceptions of primary school teachers towards the mother language-based science education?

   Research Objective 3, to assess primary school teachers' opinions on their students' language preference in science ideas. And, to know the teachers opinions on the use of mother language in science by administering survey.

Summary of the Results

In summary, according to the results of this study, using both the Bicol and Filipino languages in learning science could be beneficial to the Bicol-speaking primary students of the province of Catanduanes. The Bicol and Filipino languages provided better opportunities for the students to understand science ideas taught by their teachers. Additionally, as observed by the researcher, the students gained confidence in expressing their thoughts and answers during science class discussions.

The survey and test results also indicated that the Filipino language, although not the mother language of the students, seemed to help them understand science ideas, which was similarly observed by the researcher. This is also due to the fact that the language is also used at school and is widely utilized in media such as the TV and radio, which in turn is very popular in several provinces of the Bicol-speaking region.

Several insights were gained from the data of this study. First, the Bicol speaking primary students switch languages between home and school, which could affect their learning. Second, the results of the tests revealed that Bicol speaking students have–demonstrated better performance when they were taught in the Filipino and Bicol languages. The findings are supported by the studies conducted by Dekker and Dumatog in 2003, by Balce in 2010 and by Oyzon et al., 2012, which similarly resulted to better performance of student respondents in their mother language. Third, the use of local languages in teaching science concepts at the moment would depend on the content being taught. Fourth, the results of the study show that the use of two local languages, Filipino and Bicol languages, in primary science level could benefits Bicol-speaking students in terms of better understanding of science ideas. Lastly, although Bicol is the mother language of the student respondents, they performed better 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, Music, Arts, Physical Education and Health 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.

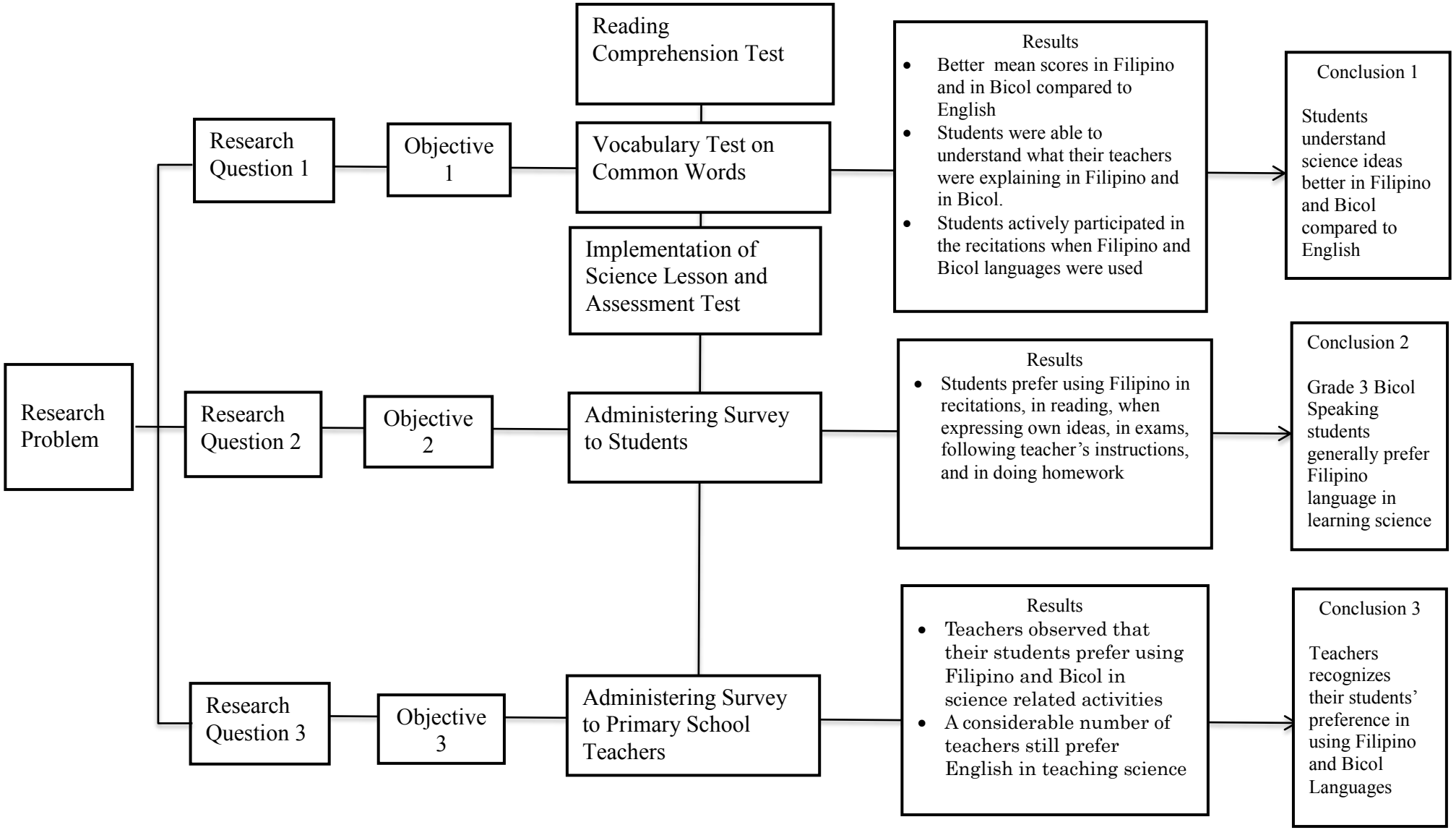


Figure 9: Results and Conclusions

CONCLUSION 1

Research Question 1.

What are the effects of using two local languages on students' understanding of science ideas compared to using the language of instruction in science? In which language do students understand better?

Based on the findings in this study, it is concluded that grade 3 Bicol-speaking students understand science ideas better from science lessons and other science related activities in the Filipino language and the Bicol language.

CONCLUSION 2

Research Question 2

What are the students' language preference in learning science ideas, and their language environment in and out of their

Based on the results of the survey on students, it is concluded that grade 3 Bicol-speaking students generally prefer using the Filipino language in learning science and in science related activities, even though the Filipino language is not their mother language.

CONCLUSION 3

Research Question 3

What are the perceptions of primary school teachers towards the mother language-based science education?

Based on the results of the survey on teachers, it is concluded that primary school teachers recognize their students prefer the Filipino language along with the Bicol language in learning science ideas in various science related activities. Although the teachers have recognized their students' language preference, a number of teachers still prefer using English in teaching science.

Implications of the Study

The goal of science education in the Philippines is to develop scientific literacy among students, preparing and molding them to be well-informed and involved citizens who are able to make judgments and decisions regarding applications of scientific knowledge that may have social, health or environmental impacts (K to 12 Curriculum Guide: Science, 2013). In order for this goal to be achieved, science education should recognize the importance of the students' language. Science learning involves the use of spoken and written language essential for primary students to understand science ideas. In order for students to understand science ideas, the language in which science ideas are communicated by the teachers should be in the language that the students are

familiar with. In the aspect of learning theory, the study does not only support the idea that learning is facilitated by the language that students are familiar with, but it also shows that two local languages can be utilized in science teaching to further enhance students' learning.

In the aspects of practice and policy-making, the findings of the study can provide information to the development of policies intended for better multilingual based education. The results of the study can contribute to the mother language-based multilingual education process being undertaken in other regions. It could broaden the perspectives of the theories and language policies on mother tongue-based multilingual education by not limiting the utilization of only one mother language to primary students, but also by using available local languages which could help maximize the students' learning.

RECOMMENDATIONS

Language plays an important role, in the development and learning process of the students. Learning has always been equated with schools and teachers who constantly adapt, develop, and employ various learning environment for their students, this includes the use of a language in instruction.

The results of this study reveal that the Bicol-speaking primary students had better understanding of science idea not only when using their mother language, Bicol, but also the Filipino language. Using the languages mentioned had positive influence among the students during class discussions, class recitations, class activities and in science tests.

In this regard, the following are recommended:

1. Develop more instructional materials in science written in the local languages (ex. in Filipino and Bicol languages)
2. Conduct further research on equivalent or near equivalent science terms, both technical and common words, in the local languages.
3. For the policy makers, to provide more opportunities and develop school-based local language based instructional materials for science education for teachers as well as school administrators.

REFERENCES

Acuña, J.E. (1994). Language of instruction in science education. *In, The Language Issue in Education*. Congress of the Republic of the Philippines, Manila and Quezon City.

Acuña, J.E. and Miranda, B.T.(1994) A Closer Look at the Language Controversy. In, *The Language Issue in Education*. Congress of the Republic of the Philippines, Manila and Quezon City.

Alvarez, A.A. (1991) Pilipino or English in Science Learning? The Case of Bilingual Education in the Philippines. University Brunei Darussalam.

Balce, M. (2010) *Teaching Quality Science Education in Filipino*. Paper presented at the 1st Philippine Conference-Workshop on Mother Tongue-based Multilingual Education, Capitol University, Gagayan de Oro City, Philippines.

Ball, J. (2010). Promoting young indigenous children's emergent literacy in Canada. *Prepared for the Canadian Childcare Federation.* Retrieved from *http://www.ecdip.org/docs/pdf/UNESCO%20Summary%202010.pdf*

Bautista, Ma. L. (1995). "Tagalog code-switching revisited". *Philippine Journal of Linguistics.* pp. 15-29.

Bautista, Ma.L. and Tan, G. (Eds.). (1999). *The Filipino Bilingual: A Multi-disciplinary Perspective.* Linguistic Society of the Philippines.

Benson, C. (2005). The importance of mother tongue-based schooling for educational quality. Paper commissioned for EFA Global Monitoring Report, The Quality Imperative.

Bernardo, A.B.I (2004). Mc Kinley's questionable bequest: 100 Years of English in Philippine Education. *World Englishes*. 23/1, pp. 1731.

Brock-Utne, B. (2001). Education for all-in whose language? Oxford Review of Education. 27/1 pp. 115-133.

Brown A. B. and Ryoo, K. (2008) Teaching science as a language: A "content-first" approach to science teaching. *Journal of Research in Science Teaching*. Vol. 45, Issue 5, pp. 529-553. DOI: 10.1002/tea.20255

Castillo, E.S. and Brigham, S. (1998) Language policy for education in the Philippines.

Cummins, J. (2000). Bilingual children's mother tongue: Why is it important for education? Sprogforum, vol/issue: 7 (19), pp. 15-20. Retrieved March 30, 2012 from http://www.iteachilearn.com/cummins/mother.htm

del Rosario, G. (1983) Pilipino as the language of instruction in science: The maugnayin approach. In science learning and teaching: Language in focus. science education development plan.

Dekker, D. (2010). What is mother tongue-based multilingual education? In starting where the children are: A collection of essays on mother tongue-based multilingual education and language issues in the Philippines, R.M. Nolasco, F.A. Datar, Azurin A. Eds., Quezon City: 170+ Talaytayan MLE Inc., pp. 23-25.

Dekker, D. E., and Dumatog, R.C. (2003) *First language education in lubuagan, Northern Philippines.* Paper presented at the Conference on Language Development, Language Revitalization and Multilingual Education in Minority Communities in Asia, November 6-8, Bangkok, Thailand.

Retrieved from http://www.tandfonline.com/doi/abs/10.1080/14664200508668280

Department of Education (2013). NAT Overview and 2012 Test Results. Retrieved August 2013, from http://depednaga.com.ph/files/2013-NAT-Presentation-Dr.-Benito-for-DTC.pdf

Department of Education Order No. 74, s. 2009 Retrieved from http://www.deped.gov.ph/orders/do-74-s-2009

Department of Education Order No. 16, s. 2012 Retrieved from http://www.deped.gov.ph/orders/do-16-s-2012

Dick, W., & Carey, L. M. (1978). *The systematic design of instruction* (1st ed.). Glenview, IL: Scott Foresman.

Dick, W., & Carey, L. M. (1996). *The systematic design of instruction* (4th ed.). New York: Harper/Collin.

Espiritu, C.C. (2002). Language policies in the Philippines. National Commission for Culture and the Arts.

Fernandez, M.S. (1983). Science learning and teaching: Language in focus. Proceedings of Symposium on the Role of Language in Science Learning.

Fierro-Cobas, V. & Chan, E. (2001). Language development in bilingual children: A primer for pediatricians. CONTEMPORARY PEDIATRICS-MONTVALE-, *18* (7), 79-98.

Gagne, R. (1985). The conditions of learning.(4th Ed.). New York: HoH, Rinehart and Winston.

Gianan, Sarah Jane F. (2015). Profile, attitudes and problems of grades 1 to 3 teachers in Virac North and South Districts on the implementation of the K to 12 curriculum, Catanduanes State University, Philippines.

Gonzales, A (2003) Language planning in multilingual countries: The case of the Philippines. De La Salle, Manila

Gonzales, A. and Sibayan, B. (1986). Eleven years of bilingual schooling (1974-1985). Linguistics Society of the Philippines.

Halliday, M. A. K. 1979/1980. "Three aspects of children's language development: Learning language, learning through language, learning about language." *Oral and Written Language Development: Impact on Schools. Proceedings from the 1979 and 1980 IMPACT Conferences,* ed. Yetta Goodman, Myna Hausser, and Dorothy Strickland. Urbana, IL: International Reading Association and National Council of Teachers of English.

Heinich, R., Molenda, M., Russel, J.D., Smaldino, S.E. (2002) Instructional media and technologies for learning. 7th ed. Upper Saddle River, New Jersey: Merrill Prentice Hall.

Henderson, J. and Jerry W. (1998). Lowering the language barrier in learning and teaching science. *School Science Review*, v 79 n 288 pp. 35-38, 41-46

Herr, N. (2007). The sourcebook for teaching science, California State University, Northridge. John Wiley/Jossey-Bass Publishers.
Retrieved from https://www.csun.edu/ science/index.html

Jacinto, A.L. (2013). The local dialect as subject and medium of instruction. *The Modern Teacher*. Vol. 62, No. 3, pp. 85.

Johnson, B. and Christensen, L. (2004) Educational research: Quantitative, qualitative and mixed approaches. Pearson, United States of America.

Johnson J.C. and Marten-Hansen, L. (2005). Improving science reading comprehension. Retrieved from http://www.nsta.org/publications/news/story.aspx?id=50301

Kemp, J. E. (1985). *The instructional design process*. New York: Harper & Row.

Laurente, Julie Anne T., Maria Lilia C. San Gaspar, & Kathreena F. Paga (2014). Mother tongue-based education: Views, practices and remedial solutions among Grades 1 to 3 teachers in selected schools in East District, San Andres, Catanduanes State University, Philippines.

Lewis, M. Paul, Gary F. Simons, and Charles D. Fennig (eds.). (2015). *Ethnologue: Languages of the World, Eighteenth edition.* Dallas, Texas: SIL International. Online version: http://www.ethnologue.com. Copyright © 2015 SIL International

Malone, S. (2007). Mother tongue-based multilingual: Implications for educational policy, Paper presented at the Seminar on Education Policy and the Right to education: Towards More Equitable Outcome for South Asia's Children. September 17-20, Kathmandu.

Manalang, P.S. (1994) Language of teaching reconsidered. In, The Language Issue in Education. Congress of the Republic of the Philippines, Manila and Quezon City

Mazna, A. and Zurida, I. (2006). Comprehension level of non-technical terms in science: Are we ready for science in English? *Jurnal Pendikdik dan Pendidikan, Jil, 21, 73-78.*

Meisel, J. M. (2006) The bilingual child, in The Handbook of Bilingualism (eds T. K. Bhatia and W. C. Ritchie), Blackwell Publishing Ltd, Oxford, UK. doi: 10.1002/9780470756997.ch4

Mckernan, J. (1991,1996). Curriculum action research: A handbook of methods and resources for the reflective practitioner. Kogan Page Limited, 120 Pentonville Road London N1 9JN

Molenda, Reigeluth, and Nelson (2003). Instructional design. In L. Nadel (Ed.), Encyclopedia of cognitive science, Vol. 2, pp. 574-578. London: Nature Publishing Group.

Morrison, G. R., Ross, S. M., Kalman, H. K., & Kemp, J. E. (2011). *Designing effective instruction* (6th ed.). Hoboken, NJ: John Wiley & Sons.

National Statistics Authority (2015). Philippine population projections. Retrieved from http://www.nscb.gov.ph/secstat/d_popnProj.asp

Nolasco, R.M. (2009). 21 Reasons why children learn better while using their mother tongue, A primer on mother tongue-based multilingual education (MLE) and other issues on languages and learning in the Philippines. Retrieved March 30, 2012 from http://sites.google.com/site/mlephilippines/Home/mle-resources

Orata, Pedro T. (1953) The Iloilo experiment in education through the vernacular. In Unesco, *The use of vernacular languages in education*, 123-131. Paris.

Ogena, E.B. (1998) Science education in the Philippines: Challenges for development. National Science Education Congress. U.P. College of Education.

Oyzon V.Q., Lubio, C.C., Ripalda L.M., Salamia, J.I. (2012) Teaching geometrical figures in Waray: The LNU-ILS experience. Paper presented at the 2nd Philippine Conference-Workshop on MTB-MLE. February 16-18, 2012, Punta Villa Arevalo, Iloilo, Philippines.

Philippine Statistics Authority (2014). Population of the Philippines. Retrieved from http://www.nscb.gov.ph/activestats/psgc/listreg.asp

Rickford, J.A. (1998) Using the vernacular to teach the standard. Department of Linguistics Stanford University.

Rubio, K.C. In Science Learning: Two Languages are better than one. Paper presented at MLE Confab-Workshop, February 18-20, Cagayan De Oro, Philippines, 2010. Retrieved from https://mlephil.wordpress.com/mle-papers-at-cdo/

SEAMEO (2009). Mother tongue as bridge language od instruction: policies and experiences in Southeast Asia. Ed. Mont Redmond. Bangkok: SEAMEO. Retrieved from http://sitesources.worldbank.org/EDUCATION/Resources/278200109907 9877269/5476641099079993288/LanguageofInstructionSAR1.pgf

Sibayan, B.P. (1994). Philippine language problems". In Jasmine Acuna, ed., The Language Issue in Education, Proceedings of the Congress of the Republic of the Philippines Komisyon sa Wikang Filipino 1994 at mga Batas, Kautusan, Pahayagan, At Kapasyahan Tugnkol sa Wikang Pilipino.

Siniscalco, M.T. and Auriat, N. (2005). Questionnaire design. In UNESCO International Institute for Educational Planning, Ross, K.N. Ed. International Institute for Educational Planning/UNESCO 7-9 rue Eugène-Delacroix, 75116, France.

Retrieved from http://www.unesco.org/iiep/PDF/TR_Mods/Qu_Mod8.pdf

Sullivan, Kathleen J. (2008). Using everyday language to teach science may help students learn, Office of University Communications, Stanford University.

Sumera, F. C. (2007) Kemistri ng carbon: Maikling kurso sa paggamit at pag-unawa ng mga konsepto ng kemistri ng carbon. Sentro ng Wikang Filipino-Diliman, Universidad Ng Pilipinas

Tan, M. (2006). Improving the quality of science and mathematics education by enhancing teachers' quality. Panel presentation. Japan Education Forum III, February 9, 2006 ; Hitotsubashi Memorial Hall, National Center of Sciences Building, Tokyo, Japan

Trends in International Mathematics and Science Study TIMSS (2003).

International Student Achievement in Science. Retrieved August 12, 2009, from http://nces.ed.gov/timss/timss03tables.asp?figure=2&Quest=2

Tao, P.K. (1994) Comprehension of non-technical words in science: The case of students using a 'foreign' language as the medium of instruction.

Research in Science Education, 24 (1) (1994), pp. 322–330

Thomas, W.P. and Collier, V.C. (1997). School effectiveness for language minority students, disseminated by: National Clearing House for Bilingual Education. The George Washington University Center for the Study of Language and Education. Retrieved from www.thomasandcollier.com/1997_Thomas-Collier97-1.pdf

UNESCO (1953). The use of vernacular languages in education. Paris: UNESCO. Retrieved September 8, 2011, from http://sites.google.com/site/mlephilippines/Home/mle-resources

UNESCO (2003). Position paper. Education in a multilingual world. 7, place de Fontenoy - 75007 Paris, France

UNESCO (2007). Advocacy kit for promoting multilingual education: Including the excluded. pp. 1-7. Bangkok: UNESCO Asia and Pacific Regional Bureau for Education Bangkok. Thailand. Retrieved from: unesdoc.unesco.org/images/0015/001521/152198e.pdf

Walter, S.L. (2011). Mother tongue-based education in developing countries: Some emerging insights". Retrieved September 26, 2014 from http://www.docstoc.com/docs/89783742/Mother-Tongue-based-Education-in-Developing-Countries-Some

Wiersma, W. and Jurs, S. (2005). Research methods in education: An introduction. Pearson United States of America.

A P P E N D I C E S

APPENDIX A

REQUEST FOR PERMISSION TO CONDUCT SURVEY

April 9, 2010

Dr. Artemio Q. Rivera
The Schools Division Superintendent
Division of Catanduanes
Virac, Catanduanes

S i r:

Good day, Sir. I am Jualim D. Vela, presently a graduate student of the Graduate School of International Development and Cooperation at Hiroshima University.

I am currently on the last stage of my research study on the medium of instruction for science education in Catanduanes. I have previously conducted preliminary data gathering and class observations last year and in June this year at Virac Pilot Elementary School, Virac Central Elementary School and Jose M. Alberto Memorial School.

Upon the recommendation of my research professors, I plan to conduct further research for my graduate thesis at the same public elementary schools mentioned above between June 2010 and March 2011. In this connection, I would like to request your permission and assistance in conducting my research studies and data gathering in those schools.

The aim of my study is to test the comprehension of students in science education using English, Filipino and Bicol. Grade three students are the participants for the study. The information that I will gather will be significant to my study and will also be valuable to the development of science education in our province.

Should you and your good office have any questions or further information, kindly contact me at milaujalev@yahoo.com.

I am hoping for your kind consideration in this matter. Thank you very much.

Sincerely,

Jualim D. Vela
Graduate Student
Graduate School for International Development and Cooperation
Hiroshima University

Noted by:
Dr. Hideo Ikeda
Dean/Adviser
Graduate School for International Development and Cooperation Hiroshima University

APPENDIX B

Reading and Test Material in English

Proper Ways of Handling Animals

You should learn to handle animals so that they cannot harm you.

Exercise care when feeding your newborn pets. A mother dog is protective of its young. It might hurt you when you go near the newborn puppies.

Do not make your pet angry. An angry pet may fight back. Teasing an animal may make it bite or scratch you.

Keep animals in their own places. Make a home for them in the backyard. In this way, you can keep a safe distance from them.

Some animals carry germs and parasitic animals.

Avoid placing this animals near your body. Wash your hands with soap and water if you happened to touch them.

Handling animals properly will keep you safe from the harm they can do.

Name:_____ Date: _____
Age: _____ Sex: Male:_____ Female:_____
School:_____
Grade 3 Section:_____

A. Direction: Encircle the letter of the best answer.

1. How do we keep a safe distance from animals or pets?
   a. By running away from them
   b. By staying inside the hose
   c. By putting them in their own home

2. Why do we need to be careful when touching pets or animals?
   a. They will be afraid of us
   b. Some of them carry harmful germs
   c. They are expensive
3. Why does a mother of newborn animals gets angry?
   a. She is sleepy
   b. The mother is protective of its young
   c. The mother is hungry

B. Direction: Write True of False

On the blank_____ before each number, write T if the sentence is true of write F if the sentence is false.

_____1. Wash your hands if you touched the animals that carry germs.

_____ 2. Teasing animals will make them happy.

_____ 3. Some animals carry germs and parasites.

_____ 4. You should not touch animals that carry germs.

C. Write your answer on the blanks provided after each question.

1. Why do we need to be careful when feeding animals with newborns?

   _____

2. What makes your pet or animal angry?

   _____

3. If an animal is angry, what can it do to you?

   _____

Thank you for your time.

APPENDIX C

Reading and Test Material in Filipino

Tamang pag-aalaga sa mga hayop

Kailangang matutunan ang tamang pag-aalaga sa mga hayop.

Maging maingat sa pagpapakain sa bagong panganak na hayop. Ang inahin ay mahigpit sa pagpoprotekta sa kanyang mga anak. maari ka nyang saktan kapag lumapit ka o kapag hinawakan mo ang mga anak nya.

Iwasang magalit ang alagang hayop. Maaaring mangagat at maka-sakit ang isang galit na hayop. Iwasan ding pag-laruan at galitin ang hayop dahil baka ikaw ay makalmot, ma-tuka o ma-kagat.

Bigyan ng sapat at maayos na tirahan ang mga alagang hayop. Sa pamamagitan nito ay magkakaroon ng sapat na distansya sa kanila.

Ilan sa mga hayop ay nagdadala ng mikrobyo at parasites.

Iwasang mapa-dikit sila sa inyong katawan. Mag-hugas ng inyong kamay sakaling mahawakan nyo sila.

Malalayo kayo sa kapahamakan kung maayos nyong alagaan at tratohin ang mga hayop.

Pangalan:_____ Petsa_____

Edad: _____ Kasarian: Lalaki:_____ Babae:_____
Paaralan:_____
Ikatlong Baitang Seksyon:_____

A. Panuto: Bilugan ang letra ng pinakamabuting sagot

1. Bakit nagagalit ang ina ng bagong silang na hayop?
   a. Siya ay natutulog
   b. Mapagtanggol ang ina sa anak
   c. Nagugutom ang ina
2. Paano tayo magiging ligtas sa mga alagang hayop?
   a. Lumayo sa kanila
   b. Manatili lang sa loob ng bahay
   c. Ilagay sila sa kanilang tahanan
3. Bakit kailangang huwag basta-bastang humawak ng mga hayop?
   a. Baka sila matakot
   b. Ang ilan sa kanila ay may dalang mga mikrobyo
   c. Mahal ang presyo nila

B. Panuto: Tama o Mali

Sa patlang bago ang bawat bilang, isulat ang T kung kung Tama at M kung Mali ang sagot.

_____ 1. Ang ilan sa mga hayop ay nagdadala ng mga mikrobyo at dumi.
_____ 2. Huwag hahawak sa mga hayop na nagdadala ng mikrobyo.
_____ 3. Maghugas ng kamay pagkatapos humawak sa mga hayop na nagdadala ng mga mikrobyo.
_____ 4. Ang panunukso at pagbibiro sa mga hayop ay nakapagpapasaya sa kanila.

C. Isulat ang inyong sagot sa patlang pagkatapos ng mga tanong.

1. Bakit kailangang maging maingat kung magpapakain ng mga bagong silang na alagang hayop?

_____

2. Ano ang nakakapagpagalit sa alagang hayop?

_____

3. Kung nagagalit ang alagang hayop ano ang maaring gawin niya sayo?

_____

Maraming salamat sa iyong pag-sagot.

APPENDIX D

Reading and Test Material in Bicol

Tamang Pag-ataman ning Hayop

Kaipuhan mamatidan ang tamang pag-ataman nin mga hayop.
Mag-ingat kung ga-bahug ning igwang bag-ong mundag na ataman na hayop. Ang ina, grabe ang pag-protekta sa sainyang ugbon. Puwede kang kagaton kung magtaning ka sa sainyang mga bag-ong mundag na ugbon.

Mag-rikay na mangisog ang ataman na hayop. Ang nauyam na ataman pwedeng manlaban. Pwede kang ma-kagat o ma-kam£ot pag sinugutan mo ang hayop.

Ikahang ang mga hayop sa saindang sadiling lugar. Mag-gibo ning estaran sa rikod kang saindong ha£ong. Sa paaging ini makarikay ka buda igwa kang distansiya sa sainda.

Ang ibang mga hayop igwang da£ang mga mikrobyo buda parasites.

Magrikay sa makataning sa hayop sa saimong ginhawa. Hugasan ang mga kamot ning sabon buda tubig kung nakaputan sinda.

Ang tamang pag-ataman sa mga hayop makasisiguro na makarikay ka sa anumang pakulog na saindang magigibo sa imo.

Panga£an:_____ Petsa_____

Edad: _____ £a£aki:_____ Babayi:_____
Eskwelahan:_____
Ika-tu£ong Grado Seksyon:_____

A. Direksiyon: Bilugan ang letra ng pinakatamang simbag.

1. Paenano kita maka-rikay sa posibleng paku£og ning alagang hayop?
   a. Mag-gibo ning saindang istaran tapos duman sinda ikahang
   b. Dai sinda tin-o-hun
   c. Mag-pirmi sana sa laog ning ha£ong
2. Ngata ta kaipuhan na dai basta-basta magkapot ning mga hayop?
   a. Tibaad matakot sinda
   b. Maha£ ang presyo ninda
   c. Ang iba sa inda igwang da£ang mikrobyo
3. Ngata ta mangisog ang ina kan bag-ong mundag na hayop?
   a. Ga-katulog sya
   b. Piga-protektahan nya ang sainyang mga ugbon
   c. Nagutom sya
4. Direksiyon: Tama o Sala

B. Sa mga blangko sa enotan kang numero, isurat ang T kung ang pigasabi tama o isurat ang S, kung sa£a.

_____ 1. Ang ibang mga hayop igwang dalang mga mikrobyo buda ati.

_____ 2. Dai magkapot ning mga hayop ta ang iba sa inda igwang mikrobyo.

_____ 3. Maghugas ning kamot pagkatapos magkapot ning mga hayop.

_____ 4. An pag-pala sugot-sugot sa mga hayop ay nakapa-ugma sa inda.

D. Direksiyon: Isurat ang saindong simbag sa blanko pagkatapos ning mga hapot.

1. Ngata ta kaipuhan mag-ingat kung pigapa-kaon ang ataman na igwang bag-ong mundag na ugbon?

_____

2. Ano ang makakapag-pauyam sa alagang hayop?

_____

3. Kung nauyam ang alagang hayop ano ang pwede nyang gibuhon sa imo?

_____

Mabalos sa pag simbag.

APPENDIX E

TRANSCRIPT OF THE INITIAL CLASS OBSERVATIONS

Science Class Virac Pilot Elementary School

Topics: Parts of the Flower
Pollination

Guide: T: Teacher S: Student SS: Students

T: How many flowers are there in this particular plant? (teacher holding a Gumamela plant)
SS: Three
T: Alright, three, so for example, the pollen grains can be found here, on the anther right?
SS: Yes
T: So once the pollen grain from the anther was transferred to the stigma, it maybe because of some pollinators or insects, it maybe because of wind or water . But once the pollen was transferred to the stigma we called that polli……
SS: nation
T: So when we say pollination it is transfer of pollen from the anther to the….
SS: Stigma
T: Okay, I guess you should write this, it the transfer of pollen grains from the anther to the stigma (writing on the blackboard). There are two kinds of pollination, who can give me one?
SS: Ma'am! (at least 7 SS raising hands)
T: Yes, Carl Joey
S: (looking at the textbook) Self Pollination
T: Yes, self-pollination. What do we mean by self-pollination, look at this flower, (teacher holding a replica of flowers). Everybody eyes here. I have here the stamen, which is the male part. And we have here the pistil, which is the female part. Once the pollen grain from the anther is transferred to the stigma of the same flower, that is self pollination.
SS: pollination
T: Do you understand?
SS: YES
T: Meaning. The pollen grain from that same flower (pointing to the flower) was transferred to the pistil of the same flower. We are talking of how many flowers here?
SS: One
T: ONE. "Isa lang" (in Filipino) OK? From the anther to the stigma……(pause for a few seconds, looking at the students)……. It maybe of the wind, water or …
SS: insects
T: As long as the pollen was transferred to the stigma of the same flower, we call that self….
SS: pollination
T: OK?

T: There is a butterfly, the butterfly flew on this flower (pointing at the flower), and then the butterfly transferred to this flower (pointing to another flower), and then the butterfly transferred to this flower
SS: (raising hands)
T: then some of the pollens dropped on the stigma of this flower (pointing to another flower). What do you call that pollination?
SS: (4 raised their hands).
T: Yes? (pointing to a student)
S: Cross-pollination.
T: YES. It is now a cross-pollination. We are talking of what? The transfer of pollen from the anther of the flower, and it was transferred to another of the same kind. Do you understand?
SS: YES
T: Because if the butterfly, let's say it transferred to a Santal plant, and that particular butterfly has pollen grains on it's wings. Can it pollinate Santal Flower? Yes or No?
SS: NO
T: No, it can not. It can only pollinate what?, the same kind (SS: kind). So pollen grains from this flower was transferred to the stigma of this another flower of the same kind, we call that cross
SS: Cross-pollination
T: What if I have two Gumamela plants, imagine (pointing to an object) this is a Gumamela plant. (Looks towards the students for a few seconds, checking is the students are still following) who can follow? This is another, what plant is this?
SS: Gumamela
T: Another Gumamela plant (holding one plant in each hand), we have another Gumamela plant. What if the butterfly flew here (pointing to the plant), and transferred here? (pointing to a second plant) And the pollen from this plant was transferred to the stigma of this plant, which is also a Gumamela. What kind of pollination is that?
S: (raised hand)
T: Yes?
S: Self-pollination.
T: (gestures that it was not the right answer). When we say about self-pollination, we are talking about one flower only.
2-3 SS raising hands.
T: The pollen of this flower was transferred to the stigma of the same flower, that is self pollination. But, The pollen of this flower was transferred to this flower (pointing the another flower in the same plant), that is cross-pollination (teachers tap the desk).
SS: (whispering to each other in Bicol language)
T: Now I'm asking you, I have a Gumamela plant here (pointing to a plant), and another Gumamela plant here (pointing to another plant), the butterfly flew here and then transferred here, the pollen from this flower was transferred to this flower. What kind of pollination is that?
S: (raised hand)
T: Yes, James?
S: Cross-pollination
T: Cross-pollination! Very Good! It may be of the same plant or of another plant of the same

SS: the same kind
T: It should be both Gumamela. "Magkaibang Plants". "Sinong Nakaka-intindi"? (Filipino language). Who can follow?
SS: (Several raised their hands).
T: Who can follow? (Looks towards the students for few seconds). OK.
T: So what if the butterfly sipped the nectar of this flower, then the pollen grain from this flower (pointing to a flower) was transferred to the stigma of this flower (pointing to the same flower), what pollination is that?
S: (raised hand)
T: YES?
S: Self-pollination
T: Very Good! Self-pollination. The pollen grains of that flower was used ,or the same pollen was used to….what?, to be….to used to fertilize the same…….
SS: flower
T: We call that self
SS: pollination
T: pollination. But if the pollen of this flower (pointing to the flower in the same plant) was transferred to this flower (pointing to another flower), we call it cross….
SS: pollination
T: pollination.
T: Or the pollen grains of this flower (pointing to the flower) was transferred to another flower (pointing to another flower in another plant) of the same kind, that is cross……
SS: pollination
T: pollination.
T: So do not forget we have two kinds of pollination (writing on the blackboard). We have self….
SS: pollination
T: ….pollination, and ….Cross….
SS: pollination
T: pollination.

T: Now, what will happen to the pollens, once it drops to the stigma? That is our lesson today. (one S raised hand)

T: On the board, a pistil. And what makes up a pistil? What are the parts of the pistil? (one S raised hand). Yes Daniela?

S: Style…….(corrects herself) Stigma

T: Let's begin on top, the stigma, followed by the…… (4 S raised hands) style…. That looks like a tube, and at the bottom of the style the……
SS: ovary
T:… do not answer in chorus. And what is inside the ovary? (SS: ovule). Do not answer in chorus, raise your hand. Yes?

S: ovule
T: Ovule! There are how many ovules in this particular flower? *(SS: raised hands).* Yes Carl Jun?

SS: *(speaking in Bicol to each* other)
T: There are….
S: six
T: ovules
S: ovules.
T: so again this is the pistil or the female part of the flower, on top of the stigma which is (inaudible), and then you can see a long tube called the style, at the bottom of the style is the ovary, and inside the ovary are the ovules.
T: Now, what if the pollen drops on the stigma? Who can draw?
SS: (nobody raised hands)
T: A pollen drops on the stigma. Where is the stigma?
S: there
T: where is the stigma?.....here. Looks at the students.
T: I'm asking you, where is the stigma? Who can draw on the board, a pollen that drops on the stigma?
SS: (nobody raised hands).
SS: speaking to each other in Bicol. "ini ang i-draw" (this is what needs to be drawn).
T: Where is the stigma Jerome, come here.
S: (went to the board reluctantly).
T: Where is the stigma first?
S: (Points to the board)
T: (corrects the student) "Etong circle, that is the stigma" (in Filipino). Now you draw a pollen, that drops on the stigma.
S: (draws on the black board)
T: OK. (corrects the student again) You can just place it here, "kasi dumikit sya" (because it looks like it was sticking on the wall).
T: OK. (points to the board) This is a pollen……
SS: grain
T: The pollen drops on the stigma, remember that the stigma is …
SS: sticky
T:.. sticky .. OK? So, here is a pollen, what do you think will happen to the pollen? Once it landed on the stigma? Would it disappear? Would it die? Or would it grow?
SS: (2 *raised their hands)*
T: What will happen? YES? (pointing to the student)
S: It will grow.
T: Yes , it will grow. You draw.
S: (Reluctant to follow. Not sure what to do)
T: What will happen? You just have to add. You just have to add something.
SS: Raised their hands.
S: T (tried to draw, but teacher is not satisfied)
T: Will it look like that?
T: It will grow into what?
SS: Pollen tube.
T: A pollen tube, come here (asking another student to draw). From the pollen, it will grow into a tube.
S: (draws a line representing a tube).
(teacher briefly stops him from drawing down)
T: "Dyan mo lang muna" (just draw there, do not go down too much).

S: (Made some corrections)
SS: (whispering to each other in Bicol language)
T: OK. I want all of you to listen. Why? Because later you're going to explain this. Do you understand?
T: So what is the first step? The pollen landed on the…..
SS: stigma)
T:….the pollen drops on the stigma, let us not forget that stigma is sticky, do you understand?
SS: Yes
T: So the pollen will stay there. Now, the pollen will grow into a tube we call pollen….
SS: tube
T: Tube. What do you call this tube?
SS: pollen tube
T: It will grow into a tube we call pollen tube. For some flowers, once the pollen landed on the stigma, the pollen tube may grow in just a few hours, but for some flowers, the pollen tube my grow fro quite some time, it maybe days or weeks before the pollen tube develops. Do you understand?
SS: Yes
T: But for some flowers, its only a few hours. Once the pollen landed on the stigma, it will automatically grow. So we have here the pollen tube (points to the illustration). Pollen tubes contain what you call…
S: sperm cell
T: sperm….
SS: cell
T: cell. Very good.
T: It has what you call, a sperm cell. And it will go down, this tube will go down into the…..
SS: ovary
T: ovary. This ovule have what you call an….
SS: egg cell
T: Egg cell. It contains an egg cell.
T: So once the tube goes down, it will meet the….
SS: ovule
T: and what do you call that process wherein the sperm cell and the egg cell unite?
SS: Fertilization
T: Very Good! Fertilization
T: Fertilization now takes…
SS: place
T: Do you understand?
SS: Yes
T: Remember, that the pollen tube contains sperm cell. What does it contain? sperm….
SS: Cell
T: That pollen tube will go down, it will go to the ovule that contains an egg cell. So once the sperm cell and the egg cell unite, what happens?
SS: Fertilization
T: Takes….
SS: place

T: So the ovule now will be fertilized. It will be fertilized, and what do you call a fertilized ovule?
SS: Silent.
T: Yes, Carl Joey?
S: zygote
T: Yes, zygote. The fertilized ovule now will become a….
SS: zygote.

APPENDIX F

MGA KATANUNGAN PARA SA MGA ESTUDYANTE
Survey Questionnaire for Students

Paki-sagot ang mga katanungan ng tapat at totoo. Ang Iyong tapat at naayun na sagot ay napakahalaga para sa Aking pag-aaral. Maraming salamat sa Iyong kooperasyon.

Petsa: _____

Pangalan: _____
Edad: _____ Babae:_____ Lalaki: _____ (Lagyan ng tsek)

Pangalan ng Iyong Eskwelahan:

_____
Baitang : _____
Seksyon: _____

Trabaho ng Tatay (Paki-bilugan ang iyong sagot sa ibaba)

Abogado, Guro, Drayber, Karpentero, Kargador, Empleyado, Piloto, Tindero, Magsasaka, Mangingisda, Mangangahoy, Pulis/Sundalo, Guwardiya, Taga-katay sa Palengke, Manager, Mananahi o Sastre, Nars, Doktor, Dentista, Tubero, Inhinyero o Arkitek, Politiko, Walang Trabaho o Nasa Bahay lang,
Iba pa: _____

Trabaho ng Nanay (Paki-bilugan ang iyong sagot sa ibaba)

Abogada, Guro, Drayber, Karpentero, Kargadora, Empleyada, Piloto, Tindera, Magsasaka, Mangingisda, Mangangahoy, Pulis/Sundalo, Guwardiya, Taga-katay sa Palengke, Manager, Mananahi o Sastre, Nars, Doktora, Dentista, Tubero, Inhinyero o Arkitek, Politiko, Walang Trabaho o Nasa Bahay lang,
Iba pa: _____

PANUTO: BILUGAN ANG IYONG SAGOT

1. Ikaw ba at ang iyong pamilya ay tubong Bicol (Taga-Bicol)?
   a. OO b. HINDI c. Hindi ko Alam
   Kung b (Hindi) ang sagot mo, saang probinsya kayo galing ?
   Sagot: _____.

2. Anong wika ang inyong ginagamit sa loob ng inyong bahay?
   a. English b. Filipino c. Bicol d. English at Filipino
   e. English at Bicol f. Filipino at Bicol g. Iba pa:
_____

3. Bilugan ang mga kagamitan na meron kayo sa loob ng inyong bahay. O di kaya ay madalas o paminsan-minsan mong nagagamit.

a. TV
b. Radyo
c. Computer
d. Mga Libro
e. Komiks
f. Magasin
g. Dyaryo
h. Karaoke / Videoke
i. Telepono / Cellphone
j. Gitara o iba pang instrumentong pang musika

4. Kapag nanonood ka ng TV, anong wika ang ginagamit ng palabas na lagi mong pinanonood?

a. English b. Filipino c. Bicol d. English at Filipino
e. English at Bicol f. Filipino at Bicol g. Iba pa: _____
h. Hindi ako mahilig manood ng TV.

5. Kapag nakikinig ka sa Radyo, anong wika ang ginagamit ng programa na lagi mong pinakikinggan?

a. English b. Filipino c. Bicol d. English at Filipino
e. English at Bicol f. Filipino at Bicol g. Iba pa: _____
h. Hindi ako mahilig makinig sa Radyo.

6. Kapag nagbabasa ka ng libro sa loob ng bahay, anong wika ang gamit sa libro?

a. English b. Filipino c. Bicol d. English at Filipino
e. English at Bicol f. Filipino at Bicol g. Iba pa: _____
h. Hindi ako mahilig magbasa ng libro.

7. Kapag nagbabasa ka ng Komiks, anong wika ang gamit sa Komiks na lagi mong binabasa?

a. English b. Filipino c. Bicol d. English at Filipino
e. English at Bicol f. Filipino at Bicol g. Iba pa: _____
h. Hindi ako mahilig magbasa ng Komiks.

8. Para saan ang pag-gamit mo ng Computer?

a. Para sa pag-aaral o pag gawa ng homework
b. Para maglaro ng games
c. Para makausap ang kapamilya sa ibang bansa
d. Iba pa: _____
e. Hindi ako gumagamit ng Computer.

9. Kapag gamit mo ang Computer, anong wika ang gamit mo?

a. English b. Filipino c. Bicol d. English at Filipino
e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

10. Anong wika ang gamit sa Magasin na lagi mong binabasa?

a. English b. Filipino c. Bicol d. English at Filipino
e. English at Bicol f. Filipino at Bicol g. Iba pa: _____
h. Hindi ako mahilig magbasa ng Magasin.

11. Anong wika ang gamit sa Dyaryo na lagi mong binabasa?
    a. English b. Filipino c. Bicol d. English at Filipino
    e. English at Bicol f. Filipino at Bicol g. Iba pa: _____
    h. Hindi ako mahilig magbasa ng Dyaryo.

12. Anong wika ng mga kanta ang kinakanta nyo sa Karaoke o Videoke?
    a. English b. Filipino c. Bicol d. English at Filipino
    e. English at Bicol f. Filipino at Bicol g. Iba pa: _____
    h. Hindi ako mahilig sa Karaoke. Wala kaming karaoke.

13. Kapag may kausap ka sa telepono, anong wika ang gamit ninyo?
    a. English b. Filipino c. Bicol d. English at Filipino
    e. English at Bicol f. Filipino at Bicol g. Iba pa: _____
    h. Hindi ako gumagamit ng telepono/cellphone.

14. Kapag nagkakantahan kayo gamit ang iba't-ibang instrumentong pang musika, anong wika ang gamit nyo?
    a. English b. Filipino c. Bicol d. English at Filipino
    e. English at Bicol f. Filipino at Bicol g. Iba pa: _____
    h. Hindi ako/kami mahilig sa musika.

15. Kapag nagsusulat ka ng liham para sa kapamilya o kaibigan, anong wika ang gamit mo?
    a. English b. Filipino c. Bicol d. English at Filipino
    e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

16. Anong wika ang iyong ginagamit sa labas ng bahay?
    a. English b. Filipino c. Bicol d. English at Filipino
    e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

17. Anong wika ang ginagamit mo kapag nakikipag-usap ka sa iyong mga kaibigan, mga kalaro, o kapitbahay?
    a. English b. Filipino c. Bicol d. English at Filipino
    e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

18. Anong wika ang ginagamit mo kapag nasa isang tindahan o palengke ka?
    a. English b. Filipino c. Bicol d. English at Filipino
    e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

19. Sa pagpasok mo sa eskwelahan, sino ang mga nakakasama mo? At sa anong wika kayo nag-uusap habang papunta ng eskwelahan?

    A. Kasama papunta ng eskwelahan.
    a. Tatay, Nanay o mga Kapatid
    b. Kaibigan o mga Kaklase
    c. Yaya o Drayber o Taga-hatid/sundo

B. Wika na gamit habang nag-uusap.

a. English b. Filipino c. Bicol d. English at Filipino
e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

20. Anong wika ang ginagamit mo kapag nasa eskwelahan ka na?
a. English b. Filipino c. Bicol d. English at Filipino
e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

21. Sa loob ng iyong silid aralan o classroom, anong wika ang iyong kailangang gamitin kapag nakikipag-usap ka sa mga kaklase mo?
a. English b. Filipino c. Bicol d. English at Filipino
e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

22. Sa loob ng iyong silid aralan o classroom, anong wika ang iyong kailangang gamitin kapag nakikipag-usap ka sa iyong guro?
a. English b. Filipino c. Bicol d. English at Filipino
e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

23. Anong wika ang pinaka gusto mong gamitin sa loob ng silid aralan o classroom kapag nakikipag usap ka sa iyong mga kaklase?
a. English b. Filipino c. Bicol d. English at Filipino
e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

24. Anong wika ang pinaka gusto mong gamitin sa loob ng silid aralan o classroom kapag nakikipag usap ka sa iyong guro?
a. English b. Filipino c. Bicol d. English at Filipino
e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

25. Habang ina-aral sa loob ng silid aralan o classroom ang science, anong wika ang kailangang ninyong gamitin?
a. English b. Filipino c. Bicol d. English at Filipino
e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

26. Anong wika ang ginagamit ng iyong guro kapag nagtuturo ng science?
a. English b. Filipino c. Bicol d. English at Filipino
e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

27. Kung English ang gamit ng iyong guro sa pagtuturo ng science, naiintindihan mo ba ang wikang ito?
a. Oo b. Medyo c. Hindi

28. Kung Filipino ang gamit ng iyong guro sa pagtuturo ng science, naiintindihan mo ba ang wikang ito?
a. Oo b. Medyo c. Hindi

29. Kung Bicol ang gamit ng iyong guro sa pagtuturo ng science, naiintindihan mo ba ang wikang ito?
    a. Oo b. Medyo c. Hindi

30. Kung gumagamit ng English, Filipino at Bicol ang iyong guro sa pagtuturo ng science, naiintindihan mo ba ang mga wikang ito?
    a. Oo b. Medyo c. Hindi

31. Sa mga gawain sa klase ng science sa loob at labas ng silid aralan, madali mong naiintindihan at sundin ang direksyon ng iyong teacher kapag ang wikang ito ang kanyang ginagamit.
    a. English b. Filipino c. Bicol d. English at Filipino
    e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

32. Kapag hindi mo/ninyo naiintindihan ang tinuturo ng iyong guro, gumagamit ba sya ng ibang wika para ipaliwanag sa inyo ang hindi nyo naiintindihan?
    a. Oo b. Hindi

Kung Oo ang sagot mo, anong wika ang kanyang ginagamit para mas maintindihan ninyo ang inyong inaaral?
    a. English b. Filipino c. Bicol d. English at Filipino
    e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

33. Anong wika ang mas komportable sa iyo kapag nag-aaral ka ng science sa loob ng silid aralan?
    a. English b. Filipino c. Bicol d. English at Filipino
    e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

34. Aling wika ang nahihirapan kang gamitin at maintindihan kapag nag-aaral ng science sa loob ng silid aralan?
    a. English b. Filipino c. Bicol d. English at Filipino
    e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

35. Mas madali mong nababasa at naiintindihan ang pinag-aaralan sa science kung ang wikang ito ang iyong ginagamit.
    a. English b. Filipino c. Bicol d. English at Filipino
    e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

36. Aling wika ang madaling gamitin kapag may recitation o talakayan sa silid aralan?
    a. English b. Filipino c. Bicol d. English at Filipino
    e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

37. Madali mong naiisip at nasasabi ang sagot mo sa tanong ng iyong teacher kung ang wikang ito ang ginagamit mo.
    a. English b. Filipino c. Bicol d. English at Filipino
    e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

38. Nadadalian ka sa eksam kapag ang wikang ito ang gamit.
a. English b. Filipino c. Bicol d. English at Filipino
e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

39. Nahihirapan ka sa eksam kapag ang wikang ito ang gamit.
a. English b. Filipino c. Bicol d. English at Filipino
e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

40. Madali mong nagagawa at naiintindihan ang Takdang Aralin o Homework kung ito ang wika na iyong ginagamit.
a. English b. Filipino c. Bicol d. English at Filipino
e. English at Bicol f. Filipino at Bicol g. Iba pa: _____

MARAMING SALAMAT SA IYONG PAG-SAGOT!

APPENDIX G

TEACHER'S SURVEY QUESTIONNAIRE

A pleasant day! Thank you for participating in this study. This questionnaire aims to gather important information regarding my research on the medium of instruction in science education in the Bicol region. Your honest answers will be highly appreciated and will be kept confidential.

Background Information

Name: _____
Age: _____ MALE : _____ FEMALE: _____
Name of School: _____
Teaching Grade(s) : _____ Number of year(s) in the profession: _____
Educational Attainment: _____
Number of years in teaching science: _____
Number of hours in teaching science: _____

Directions: Please fill out each blank by writing the needed information. In multiple choice items, please encircle the letter of your corresponding answer.

A.

1. Are you from Bicol region?
   a. YES From what province are you from?_____
   b. NO From what province are you from?_____

2. What language do you speak at home?
   a. English b. Filipino c. Bicol d. English and Filipino
   e. English and Bicol f. English, Filipino and Bicol
   g. Others (Pls. specify) _____

3. What language do you use outside your home?

3.1 When talking your neighbors and friends
   a. English b. Filipino c. Bicol d. English and Filipino
   e. English and Bicol f. English, Filipino and Bicol
   g. Others (Pls. specify) _____

3.2 Markets / Stores
   a. English b. Filipino c. Bicol d. English and Filipino

e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

3.3 Town Hall

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

3.4 Banks

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

3.5 Restaurants

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

3.6 Public Transportations

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

3.7 Office of Private Companies

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

4. What language do you use when reading books?

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

5. What is the language of the Newspapers that you usually read?

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

6. What is the language of the TV program that you usually watch?

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

7. What is the language of the Radio program that you usually listen to?

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

B.

8. What language do you use inside the school campus when talking to all students?

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

9. What language do you usually use inside the campus when talking to your students' parents?

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

10. What language do you use inside the school campus when talking to your co-teachers?

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

11. What language do you use inside the school campus when talking to the school principal or supervisor?

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

12. What language do you use when talking to school staff?

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

13. What language do you use inside your classroom when talking to your own students?

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

14. Since English is the medium of instruction for teaching science to primary students, do you also use other language(s) in teaching science?

A. If YES, which of the languages below?

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol

g. Others (Pls. specify) _____

B. If NO, what is the reason?

_____

15. Were you trained to use multiple languages in teaching science when you were a teacher trainee?

A. If Yes, which of the languages below?
a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

B. If NO, why?

_____

_____

16. Were there training opportunities for using the language that students are familiar with in teaching science?

A. If Yes, which of the languages below?
a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others (Pls. specify) _____

B. If NO, why?

_____

_____

17. Are you familiar of the DepEd Order Number 16 s. issued on February 12, 2012 which decreed the use of Mother Tongue-Based-Multilingual Education (MTB-MLE) in all public schools, specifically in Kindergarten, Grades 1, 2 and 3 as part of the K to 12 Basic Education Program?

a. If YES how did you get to know about it?

_____

_____

b. If A Little Bit, why?

_____

_____

c. If NO, why?

_____

_____

C.

18. How did your students' perform in the National Achievement Test in Science?
    a. Excellent
    b. Very Satisfactory
    c. Satisfactory
    d. Unsatisfactory
    e. Others

_____

19. How did your student's perform in your school's science achievement test?
    a. Excellent
    b. Very Satisfactory
    c. Satisfactory
    d. Unsatisfactory
    e. Others

_____

_____

20. Please describe concisely the characteristics of your students. Their strengths and their weaknesses in learning science.

_____
_____
_____
_____
_____
_____
_____
_____
_____

Their overall performance in science.

a. Excellent b. Very Satisfactory c. Satisfactory d. Unsatisfactory

D.

21. Based on your experiences and observations, what are the reason(s) or factors why public school primary students do not perform well in science class? Please encircle the letter of your answer.

21.1 Lack of school facilities
a. Strongly Agree b. Agree c. Neither Agree or Disagree
d. Disagree e. Strongly Disagree

21.2 Lack of qualified teachers
a. Strongly Agree b. Agree c. Neither Agree or Disagree
d. Disagree e. Strongly Disagree

21.3 Lack of training for science teachers
a. Strongly Agree b. Agree c. Neither Agree or Disagree
d. Disagree e. Strongly Disagree

21.4 Lack of science textbooks for students
a. Strongly Agree b. Agree c. Neither Agree or Disagree
d. Disagree e. Strongly Disagree

21.5 Difficulty in the use of language
a. Strongly Agree b. Agree c. Neither Agree or Disagree
d. Disagree e. Strongly Disagree

21.6 Lack of funds from the government
a. Strongly Agree b. Agree c. Neither Agree or Disagree
d. Disagree e. Strongly Disagree

21.7 Too much science content to be taught
a. Strongly Agree b. Agree c. Neither Agree or Disagree
d. Disagree e. Strongly Disagree

21.8 Lack of basic school materials
a. Strongly Agree b. Agree c. Neither Agree or Disagree
d. Disagree e. Strongly Disagree

21.9 Difficult science contents
a. Strongly Agree b. Agree c. Neither Agree or Disagree
d. Disagree e. Strongly Disagree

21.10 Less time to teach science

a. Strongly Agree b. Agree c. Neither Agree or Disagree
d. Disagree e. Strongly Disagree

21.11 Too many students to handle in one class

a. Strongly Agree b. Agree c. Neither Agree or Disagree
d. Disagree e. Strongly Disagree

21.11 Other factors

_____
_____

E.

22. According to your experience and observation, students are able to have a better understanding of science concepts when explained in which language?

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others _____

23. According to your experience and observation, students can best explain science concepts in their own words in which language?

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others _____

24. According to your experience, students can immediately follow instructions during science class activities when you speak in:

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others _____

25. According to your experience, students find it easy to read when using this language.

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others _____

26. According to your experience, students are more comfortable and confident during recitation when using this language.

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others _____

27. According to your experience, when your students don't comprehend what you teach using the common language used in science, you had to switch to this language in order to make your students understand the concept.

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others _____

28. According to your experience and observation, your students could easily think and process the science concept when using this language.

a. English b. Filipino c. Bicol d. English and Filipino
e. English and Bicol f. English, Filipino and Bicol
g. Others _____

29. In your opinion and based on your experience, is Language one of the main factors why primary students (particularly students in this province) are performing well in science?

a. YES b. NO

Why ? _____
_____
_____

_____
_____
_____

30. Are you in favor of using the students' mother language as a bridge or the main language in teaching science which is normally taught using English?

b. YES b. NO

Why ? _____
_____
_____
_____
_____
_____

31. In your opinion and based on your experience, which language(s) do you think is/are the most appropriate for students (In this province) in teaching and learning science? Why?

_____
_____
_____
_____
_____
_____

32. Since the use of students' mother language in teaching science and other subjects is now being implemented, would you be willing to undergo training or series of workshop in order to understand and gain skills necessary in order to teach science using the language your students are familiar with?

a. YES b. NO

Why ?

_____
_____
_____
_____

_____
_____

33. Among your students, who will benefit from the implementation of mother language in teaching and learning science? Why?

_____
_____
_____
_____
_____
_____
_____
_____
_____

THANK YOU VERY MUCH FOR YOUR TIME!

APPENDIX H

INITIAL LIST OF THE COMMON WORDS USED IN SCIENCE	
1. Perform	26. Remove
2. Scoop	27. Loosen
3. Use	28. Hammer
4. Learn	29. Pour
5. Study	30. Dispose
6. Face	31. Dip
7. Turn away	32. Strike
8. Rubbing/rub	33. Squeeze
9. Vibrate	34. Throw
10. Injured/injure	35. Wear
11. Smell	36. Harvest
12. Press	37. Plow
13. Breath	38. Hang
14. Swab	39. Collect
15. Communicate	40. List
16. Observe	41. Lift
17. Stick out	42. Scatter
18. Swallow	43. Spread
19. Compare	44. Explain
20. Move about	45. Release
21. Alight	46. Stir
22. Transmit	47. Push
23. Leave	48. Pull
24. Measure	49. Describe
25. Propagate	

APPENDIX I

[Bicol]

VOCABULARY TEST ON COMMON WORDS IN SCIENCE

Pangalan:_____ Petsa:_____

Edad:_____ Lalaki:____ Babayi:_____

Eskwelahan:_____

Ika-tulong Grado Seksyon:_____

Grupo:_____

Test A.

Direksiyon: Basahon ning parinas ang mga tataramon. Tawan ning pansin ang tataramon na igwa ning linya.Tapos hanapon buda bilugan ◯ ang letra ning tataramon na pareho ang gustong sabihon o pareho ang kahulugan.

Halimbawa:

Habang gabasa ning libro, <u>iitaas</u> ang saimong mga mata hari sa pahina ning libro paminsan-minsan.

a. Labuhon anf saimong mga mata paminsan-minsan pag gabasa ning libro.
b. Ipilok ang saimong mga mata ning dakol na beses habang gabasa.
c. Maghiling sa itaas o sa halayo paminsan-minsan habang gabasa ning libro.
d. Ikahang sa itaas ang saimong mga mata pag gabasa ning libro.

Simbag: ◯c. Maghiling sa itaas o sa halayo paminsan-minsan habang gabasa ning libro.

MAGPOON SA MASUNOD NA PAHINA:

1. <u>Harion</u> ang saladay na insekto na ga-istar sa mga sanga o dahon ning mga tinanom/tanaman.

a. Iluwas ang saladay na insekto hari sa tinanom/tanaman.
b. Putulon ang saladay na insekto hari sa mga tinanom/tanaman.
c. Ula-an ning tubig ang saladay na insekto sa mga tinanom/tanaman.
d. Sulu-on/sunugon ang saladay na insekto sa mga tinanom/tanaman.

2. Piga-kusit kang lambang estudyante so mata ning nilutong sila/isda tanganing adalan ang korte kaini..

a. Piga-paris kang lambang estudyante ang mata hari sa sila/isda.
b. Piga-hugasan kang lambang estudyante ang mata ning sila/isda.
c. Piga-pabuhos/ilig kang lambang estudyante ang mata ning sila/isda.
d. Piga-hari/piga-tangkas ning lambang estudyante ang mata ning sila/isda.

3. Ang pag-pilisipos sa saimong mata ning maating kamot o panyo pwedeng poonan o maging dahilan ning impeksyon.

a. Pwedeng poonan o maging dahilan ning impeksyon ning saimong mata ang pag-duot ning kamot o panyo.
b. Ang pagpunas/pahid sa mata ning maating kamot o panyo pwedeng puunan ning impeksyon.
c. Ang pagkagaw sa saimong mata ning maating kamot o panyo pwedeng puunan ning impeksyon.
d. Ang pag gamit ning alcohol sa mata pwedeng puunan ning impeksyon.

4. Ang tunog kang mga drums ga-tanyog sa laog kang bulwagan.

a. Madadangog mo ang tanog sa laog ning bulwagan.
b. Piga-bangga ning tanog ang bulwagan.
c. Piga-poonan ini ning rinog/linog sa laog kang bulwagan.
d. Nayuyugyog ang bulwagan dahil sa tanog.

5. Tibaad makulugan ang saimong taringa kung magamit ka ning matalum o mapanas nan a bagay pag pinurbahan mong limpyahan ini.

a. Sensitibo ang saimong mga taringa sa anumang bagay.
b. Marinas ang saimong taringa pag nag-gamit ka ning matalum o mapanas na bagay.
c. Tibaad ma-lugadan an saimong taringa ning matalum o mapanas na bagay.
d. Dai ka maka-dangog ning maski ano pag nag-gamit ka ning matalum na bagay.

6. Pinarinas kang mga estudyante buda maestra ang mga basura sa paagi ning pagbulag-bulag o pag grupo-grupo kaini.

a. Piglaog ninda ang basura o awot sa mga kahon.
b. Pigsabod ninda ang mga basura o awot sa paagi ning paburulag-bulag o pag grupo kang lambang basura.
c. Pig-sulo/sinunog ninda ang mga basura o awot.
d. Piglubong ninda ang mga basura o awot.

7. Ang mga ulod/urod nakatabang na maging mataba ang daga sa paagi ning pag-arado sa ilalom kaini..

a. Ga tabang sinda sa pagbugtak ning mga pisog sa daga buda sa pagpatubo kaini.
b. Ga tabang sinda sa pag baribhi ning tubig sa daga na kaipuhan ning tinanum.
c. Naka tao sinda sa daganing sidling ning aldaw buda rimpoy na nakatabang sa marinas na pagtubo kang mga tinanom.
d. Natabangan ninda ang daga sa paagi ning pag gibo ning mga espasyo budal saindang lungga na nagiging agihan ning hangin buda tubig na kaipuhan ning mga tinanom.

8. Ga-hubon ang bagyo ning dakulang uyag sa banwa.

a. Nahulog ang mga dahon pagkatapos ning bagyo.
b. Gabaryo sa ibang banwa ang bagyo.
c. Piga-uyag ning bagyo ang dakol na bagay sa banwa.
d. Nagdulag so bagyo papunta sa ibang banwa.

9. Luway-luway na isison/isisun ang saring pidasong malinig asin malambot na tela sa saimong dila.

a. Punasan ning padampi ang saimong dila gamit ang tela.
b. Itulon ang pidaso ning tela.
c. Pakiramdaman ang sa imong dila gamit ang tela.
d. Igudgod ang tela sa saimong dila.

10. Ilublob an sabon asin pidaso ning kahoy sa tubig buda obserbahan.

a. Ikahang an sabon asin pidaso ning kahoy sa tubig.
b. I-palangoy an sabon buda pidaso ning kahoy sa tubig.
c. Hayaan na mahulog/mag-dive an sabon asin oidaso ning kahoy sa tubig.
d. I-angat an sabon buda pidaso ning kahoy hale sa tubig.

Test B.

Panuto:Ipaliwanag sa sadiling tataramon ang manungod sabihon ning ng mga tatramon na igwang kurit na linya.

Halimbawa: Mag-gibo ning pagadal manugod sa pagkakaigwa ning sulo sa bukid/pungko

Simbag. Isihun ang mga dahilan ning pagka sulo sa bukid/pungko.

11. Dakulang tuwang sa mga para-ha-got (magsasaka) asin mga hardinero an mga urud ta pigapa-luwag ninda an daga na nakakapag-pataba kaito.

_____
_____
_____

12. Magpunta ka sa garden tapos obserbahan mo ang mga masetas.

_____
_____
_____

13. Itulon muna ang piga-kaon bago mag-taram.

_____
_____
_____

14. An mga insekto arug kang langaw ga-dala ning mikrobyo sa mga tawo.

_____
_____
_____

15. Pagkumparahon ang pagkakaiba kan mga tao buda mga hayop

_____
_____
_____

MABALOS SA PAG SIMBAG!

APPENDIX J

[Filipino]

VOCABULARY TEST ON COMMON WORDS IN SCIENCE

Pangalan:_____Petsa:_____

Edad:_____Kasarian: Lalaki:____ Babae:_____

Paaralan:_____

Grade at Seksyon:_____

Grupo:_____

Pagsusulit A.

Panuto: Basahing mabuti ang mga pangungusap sa bawat bilang. Bigyang-pansin ang mga salitang may salungguhit. Pagkatapos, hanapin at bilugan ○ ang titik ng pangungusap n amay kaparehong kahulugan.

Halimbawa:

Kapag nagbabasa ng aklat, itaas/i-angat ang iyong mga mata mula sa pagtitig sa pahina paminsan-minsan.

a. Basain ang iyong mga mata paminsan-minsan kapag nagbabasa.
b. Ikurap ang iyong mga mata nang maraming beses kapag nagbabasa.
c. Tumingin sa itaas o sa mga nakikinig paminsan-minsan habang nagbabasa.
d. Ilagay sa itaas ang iyong mga mata kapag nagbabasa ng aklat.

Sagot: c. Tumingin sa itaas o sa mga nakikinig paminsan-minsan habang nagbabasa.

MAGSIMULA DITO:

1. Alisin ang maliliit na insekto na nakatira sa mga sanga o dahon ng halaman.
    a. Tanggalin ang maliliit na insektong naninirahan sa mga halaman.
    b. Putulin ang maliliit nainsektong naninirahan sa mga halaman.
    c. Buhusan ng tubig ang maliliit na insektong naninirahan sa mga halaman.
    d. Sunugin ang mga maliliit na insektong naninirahan sa mga halaman.

2. Sinusungkit ng bawat mag-aaral ang mga mata ng lutong isda upang pag-aralan ang hugis nito.
    a. Ibinubuhos ng bawat mag-aaral ang mga mata ng isda.
    b. Hinuhugasan ng bawat mag-aarala ng mga mata ng isda.
    c. Pinapaagos ng bawat mag-aaral ang mga mata mula sa isda.
    d. Tinatanggal ng bawat mag-aaral ang mga mata ng isda.

3. Ang pagkuskos ng iyong mga mata gamit ang maruming daliri o panyo ay maaring pagmulan ng impeksyon.
    a. Maaring pagmulan ng impeksiyon sa iyong mga mata ang pagdampi ng maruming daliri o panyo.
    b. Ang pagpunas sa iyong mga mata ng maruming daliri o panyo ay maaring pagmulan ng impeksiyon.
    c. Ang pagkamot sa iyong mga mata gamit ang maruming daliri o panyo ay maaring pagmulan ng impeksiyon.
    d. Ang pagpapatak ng alcohol sa iyong mga mata ay maaring pagmulan ng impeksiyon.

4. Ang tunog ng mga tambol ay yumanig sa loob ng bulwagan.
    a. Maririnig mo ang tunog ng mga tambol sa loob ng bulwagan.
    b. Binubundol-bundol ng tunog ng mga tambol ang bulwagan.
    c. Pinagmumulan ng lindol ang tunog ng mga tambol sa loob ng bulwagan.
    d. Umuga ang bulwagan dahil sa tunog ng mga tambol.

5. Maaring masaktan ang iyong tainga ng matalim o matulis na bagay pag sinubukan mong linisin gamit ito.
    a. Sensitibo ang iyong mga tainga sa lahat ng mga bagay na matalim o matutulis.
    b. Bubuti ang iyong tainga pag gumamit ka ng matalim o matulis na bagay.
    c. Baka masugatan ang iyong tainga kapag gumamit ng matalim o matulis na bagay.
    d. Wala kang maririnig na anuman kapag gumamit ka ng matalim o matulis na bagay.

6. Inayos nang mabuti n gmga mag-aaral at guro ang mga basura sa pamamagitan na pagbubukod-bukod ng mga ito.
    a. Isinilid nila ang mga pinaghiwa-hiwalay na basura sa kahon.
    b. Itinapon nila ang mga basura sa pamamagitan ng paghihiwa-hiwalay at pag-uuri ng mga ito.
    c. Sinunog nila ang mga basura pagkatapos na mapangkat-pangkat ang mga ito.
    d. Ibinaon nila ang mga nakakalat na mga basura sa lupa.

7. Ang mga uod ay nakatutulong na mapayaman ang lupa sa pamamagitan ng pag-aararo sa ilalim nito.
    a. Tumutulong sila sa paglalagay ng mga buto sa lupa, sa pagpapatubo at sa pagpapalago sa mga ito.
    b. Tumutulong sila sa pagdidilig ng tubig sa lupa na kailangan ng mga halaman para tumubo at lumago.
    c. Nakapagbibigay sila ng sikat ng araw at lilim sa lupa. Ito`y nakatutulong sa pagtubo nang maayos ng mga halaman.
    d. Natutulungan nila ang lupa sa pamamagitan ng paggawa ng mga tunnel o lungga sa ilalim nito. Ito`y nagsisilbing daluyan ng hangin at tubig na kailangan ng mga ugat ng mga halaman.

8. Nag-iiwan ang bagyo ng malaking pinsala sa kabayanan.
    a. Nahuhulog ang mga dahon pagkatapos ng bagyo.
    b. Lumilipat sa ibang bayan ang bagyo.
    c. Sinisira ng bagyo ang maraming bagay sa bayan.
    d. Tumakas ang bagyo mula sa kabayanan.

9. Marahang kuskusin ang iyong dila ng isang piraso ng malambot at malinis na basing tela.
    a. Hulugan ng tubig ang dila galing sa basang tela.
    b. Lumunok ng isang piraso ng tela na may tubig.
    c. Pakiramdaman ang iyong dila gamit ang isang piraso ng tela.

d. Punasan ang iyong dila gamit ang isang piraso ng tela.

10. Ilublob ang sabon at piraso ng kahoy sa tubig at obserbahan ang mangyayari.
    a. Ibabad ang sabon at piraso ng kahoy sa tubig.
    b. Palutangin ang sabon at piraso ng kahoy sa tubig.
    c. Patalunin ang sabon at piraso ng kahoy sa tubig.
    d. Iangat ang sabon at piraso ng kahoy mula sa tubig.

PAGSUSULIT B.

Panuto:Ipaliwanag sa sariling salita ang ibig sabihin ng mga salitang may salungguhit at pangungusap sa bawat aytem.
Halimbawa:Gumawa ng pananaliksik tungkol sa pagkakaroon ng sunog sa gubat.

Mga Posibleng Sagot:
1. Pag-aralan ang tungkol sa pagkakaroon ng sunog sa gubat.
2. Magbasa ng mga libro tungkol sa dahilan sa pagkakaroon ng sunog sa gubat.

MAGSIMULA DITO:

11. Gusto ng mga magsasaka at hardinero ang mga uod dahil binubuhaghag at pinatataba nito ang lupa.

Sagot:_____
_____
_____

12. Pumunta sa hardin at obserbahan ang iba`tibang uri ng halaman.

Sagot:_____
_____
_____

13. Lunukin muna ang pagkain na nasa loob ng iyong bibig bago magsalita.

Sagot: _____

_____

_____

14. Ang mga insektong kagaya ng langaw, ipis at lamok ay nagdadala ng iba`tibang mikrobyo sa mga tao.

Sagot: _____

_____

_____

15. Paghambingin ang mga gawain ng mga tao at hayop.

Sagot: _____

_____

_____

Tapos na.

Maraming Salamat!

APPENDIX K

[English]

VOCABULARY TEST ON COMMON WORDS IN SCIENCE

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, <u>raise</u> 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. <u>Remove</u> 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 out 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:_____

_____

_____

THANK YOU VERY MUCH!

APPENDIX L

BANGHAY ARALIN (LESSON PLAN)

SUBECT	**SCIENCE III**
PAKSA ***(Topic)***	HAYOP (Animals) Taking care of animals and being Safe with them Tamang pag-aalaga at pag-iingat sa mga Hayop
Target Learners ***Mga Mag-aaral***	Grade 3 *(Ikatlong Baitang)*
Instructional Setting ***Sakop na mga Mag-aaral***	I Section/Class *Isang Seksyon*
Class Duration **Tagal ng pagtuturo**	1-2 meetings (maximum 3 meetings) Isa hanggang dalawang beses na pagkikita/pag aaral (maaaring umabot sa tatlong beses na pagkikita/pag aaral)
Language to be used ***Wika/Linguwahe na gagamitin***	FILIPINO (Tagalog-based) Language *Wikang Filipino*
Objectives **Mga Layunin**	1. Students will be able to demonstrate how to care for animals. 2. Students will be able to identify which animals are safe and which animals are harmful. 3. Students will be able to know when to touch, play and when to stay away from animals. 1. Ang mga mag-aaral ay makakapag-pamalas ng kakayahang ipakita kung paano mag–alaga ng mga hayop. 2. Ang mga mag-aaral ay magkakaroon ng kakayahang kilalanin ang mga hayop na ligtas at mga hayop na delikado sa mga tao. 3. Ang mga mag-aaral ay magkakaroon ng kaalaman kung kelan pupuwedeng

	mahahawakan, makakalaro ang mga hayop at kung kelan kailangang umiiwas o lumayo sa kanila.
Instructional Materials ***Mga Kagamitan sa Pagtuturo***	**A.** Pictures, images, illustrations, cut out images of local animals. (Dogs, Cats, Carabao's, Goats etc) **B. I bag (plastic or paper bag)** Animal Care Items (pictures or illustrations of different kinds of food, shelter/home, activities for animals etc) **C. Pictures** Showing different kinds of state/behavior of sample animals (barking dog, sleeping dog, dog with puppies, dog having his/her meal, happy dog, dog wagging its tail, sleeping cat, cat having meal, hiding cat etc.) **A.** Larawan, imahe, guhit, ginupit na imahe ng local na hayop/ hayop na likas sa ating kapaligiran (Aso, Pusa, Manok, Kalabaw, Kambing atb.) **B. Isang bag (plastic.paper bag) (MGA PANGANGAILANGAN SA PAG-ALALAGA SA HAYOP)** Mga bagay na nagpapakita ng mga pangangailangan ng mga hayop (iba-ibang pagkain para sa iba-ibang hayop, tirahan ng mga halimbawa na hayop, mga gawain/laro na para sa mga hayop atb.) **C. Larawan/Guhit/Imahe** Nagpapakita ng iba-ibang pag-uugali ng mga hayop (tumatahol na aso, natutulog na aso, aso na may tuta, kumakain na aso, masayahing aso, aso na ang buntot ay malikot/magalaw, natutulog na pusa, pusang kumakain, nagtatago na pusa atb.)
Instructional and Activity Guideline / Mga Patnubay sa Pagtuturo	
A. TAMANG PAG-AALAGA SA MGA HAYOP Simulan ang lesson/talakayan sa pamamagitan ng pagtanong sa mga bata kung ano ang kailangan ng mga tao para mabuhay (pagkain, tubig, tirahan). At mga hindi bagay na nakakapag-pasaya sa atin (Tv, candy, chocolate, pakikipag laro sa mga kaibigan etc.) Himukin ang mga bata na isipin kung alin din sa mga ito ang kailangan ng mga hayop.	

Magbigay ng halimbawa ng mga hayop na likas sa ating kapaligiran, lalo na an gating karaniwang mga alagang hayop (aso, pusa, kalabaw,manok. Baboy, kabing etc.)

Magtanong sa mga Bata

Kailangan ba ng mga hayop ang pagkain, tubig, tirahan, pag-aaruga? (*Opo!)

Ipaliwanag sa mga bata:

Ang mga hayop sa gubat ay nakakahanap na sarili nilang pagkain, tubug at matitirhan. Samantalang ang mga alagang hayop ay binibigyan ng mga pangangailangan ng mga taong kanilang tagapag-alaga.

Magtanong: Meron pa bang ilang pangangailangan ang mga alagang hayp, bukod sa pagkain, tubig at tirahan?

Ang mga alagang hayop ay nilalaro, nilalambing pinaliliguan, at inilalakad sa labas ng bahay at pinaliliguan, bukod sa nirerehistro at dinadala din sa beterinaryo. Tinuturuan din sila na mabuting asal/respeto sa mga tao.

Mga gagawin ng Mag-aaral

1. Maglagay ng mga larawang sampol ng mga pamilyar ng hayop sa mga bata sa blackboard (ex. Aso, pusa, manok, kalabaw, kambing, atb.)
2. Ilagay sa harapan ang isa, dalawa o tatlong plastic bag o paper bag na naglalaman ng mga larawan nagpapakita ng mga iba't-ibang pangangailangan ng mga hayop.
3. Isa-sang papuntahin sa harap ang mga mag-aaral at ipaliwanag sa kanila na i-dikit sa isa sa mga hayop sa blackboard ang kanilang nakuhang larawan mula sa plastic bag o paper bag. Hayaan silang magpaliwanag kung bakit nila idinikit sa isang hayop ang kanilang nakuhang imahe. Magtanong sa buong klase tungkol sa kanilang opinyon sa pagtutugma ng mga hayop at ng kanilang mga pangangailangan.
4. Magkaroon ng talakayan tungkol sa mga larawan/imahe na hindi pupuwede sa ilang mga hayop o kaya sa lahat ng mga hayop.
5. Mag-balik Aral

B. TAMANG PAG-IINGAT SA MGA HAYOP

Simulan ang talakayan sa pagbabalik aral sa naunang aralin na tinalakay nang nagdaang araw ng pagkaklase.

Simulang magtanong sa mga mag-aaral kung gusto nila ang aso,pusa, kalabaw o ibang hayop. (para maintindihan kung sino sa kanila ang takot o maganda o hindi kanais-nais karanasan sa mga hayop, at kung ilan sa kanila ang mayroong alagang mga hayop sa bahay.

Magtanong:

Ilan sa inyo ang nakaka-alam kung kailan pupuwedeng hawakan at laruin ang aso o pusa at kailan sila delikado at di pupuwedeng hawakan o lapitan man lang?

Ipaliwanag sa mga bata na ang mga hayop ay hindi basta basta puwedeng hawakan o di kaya ay hindi rin sila basta bastang lalapit nalang sa mga tao. Ang mga hayop gaya ng aso ay gumagamit ng kanilang mata, ilong at tainga sa pagsalubong sa mga tao.

Ipakita (umarteng hayop gaya ng aso o pusa) sa mga bata kung pano ang gawi ng mga aso sa pag-kilala sa mga tao.
Magtanong sa mga bata (lalo na sa mga may alagang hayop) kung paano sila kinikilala at nilalapitan ng kanilang alagang hayop. Yayain at himukin ang mga bata na ipakita sa pamamagitan ng pag-aarte kung paano ang gawi ng kanilang alagang hayop.

Magtanong sa mga bata kung naranasan na ba nila na sila ay tinaholan o hinabol ng aso o nang ibang hayop?

Tanungin ang buong klase kung ano sa tingin nila ang mga dahilan kung bakit nagiging agresibo ang mga alagang hayop.

Pagkatapos mapakinggan ang kani-kanilang mga paliwanag, isa isahin ang ang mga sumusunod na posibleng dahilan kung bakit delikado ang mga hayop kahit na alaga nila.

Mga dahilan kung bakit delikado ang hayop
(Ipakita ang mga larawan/guhit/imahe ng mga sumusunod)

1. maysakit
2. natutulog
3. nabigla
4. kumakain
5. natatakot
6. kapag bagong panganak
7. kapag nakalabas ang ngipin
8. kapag ang mga tainga ay nakaposisyon sa likod o mga balahibong tumitindig
9. maingay na tunog
10. kapag ginagalit/kinukulit
11. nakatali
12. sobrang pagkakahigpit ng pagyakap sa kanya
13. kapag hinawakan ang maselang parte ng katawan kagaya ng buntot, tiyan atb.
14. Matatakutin sa mga tao
15. Takot sa mga taong may hawak na mahahabang bagay gaya ng pamalo, tungkod atb.
16. Kapag tinititigan sa mata
17. Kapag mayroon ibang hayop na malapit sa kanya

Mga gagawin ng mga Mag-aaral

(staying safe from animals card)

1. Ihanda ang mga larawan na nagpapakita ng iba't-ibang pag-uugali ng mga hayop. Bigyan ng card na may markang O at X sa magkabilang pahina ang mga bata. Ibig sabihin ng O ay lalapitan ang hayop samantalang ang X ay nagsasabing iiwasan ang hayop.
2. Ilagay ang mga kards (larawan) ng hayop sa mga mesa ng mga mag aaral. Ang mga larawan ay mga hayop na pwedeng lapitan o hawakan, at mga hayop na hindi pupuwedeng lapitan o hawakan.
3. Mula sa labas ng silid/kuwarto, papilahin ang mga bata at paisa-isahin papasukin at puntahan ang mga mesang mayroong larawan ng mga hayop. Ipaliwanag sa kanila na sa pag tapat sa naturang mesa ay gamitin ang kanilang card para ipakita kung ano ang kanilang sagot base sa nakita nilang larawan ng hayop. (halimbawa: kung ang larawan ng hayop ay galit o may mga tuta, ang dapat na ipakita sa card nila ay X na ang ibig sabihin ay hindi puwedenf lapitan).
4. Pagkatapos ng gawain, magkaroon ng talakayan sa mga natutunan ng mga bata ukol sa napag-aralan.
5. Magbalik aral. Ipa-alala ang mga mahahalagang kaalaman sa paksa na itinuro sa mga mag-aaral.

PAGSUSULIT

Magbigay ng pagsusulit sa mga bata.

Ang layunin ay para malaman kung ano ang antas ng kanilang natutunan mula sa mga pinag-aralan tungkol sa tamang pag-aalaga at tamang pag-iingat sa mga hayop.

1. Aabot ng 10-15 o kaya ay 10-20 aytems ang naturang pagsusulit.
2. Mga 10 o kaya ay 10-15 aytems ang may pagpipiliang sagot (a. b. c. at d. o Tama o Mali)
3. Mga 5 aytems ay sasagutan ng mga bata ng sarili nilang pangungusap sa wikang Filipino.
4. Bigyan ang mga bata ng hindi bababa sa 40 minuto o mas mahaba-haba ng konti, sa pagsagot sa pagsusulit.
5. Magbigay din na papel para sa kanilang reaksyon sa pinag-aralan. Layunin nito ay malaman kung hanggang saan ang natutunan ng mga bata at aling paksa ang marami o kokonti lang ang kanilang natutunan. Ito ay magigibg basehan na rin ng pagpapaunlad ng lesson plan na ito.

APPENDIX M

READING MATERIAL FOR THE ASSESSMENT TEST

Tamang Pag-aalaga at Pag-iingat sa mga Hayop

Kailangang matutunan ang tamang pag-aalaga at pag-iingat sa mga hayop.

Tulad ng tao, ang mga hayop ay nangangailangan din ng pagkain, tubig at tirahan para mabuhay. Ang mga alagang hayop gaya ng aso o pusa ay marapat din na bigyan ng sapat na pag-aaruga gaya ng pagpapaligo, ehersisyo at paglalaro o paglalambing.

Maging maingat sa pagpapakain sa bagong panganak na hayop. Ang inahin ay mahigpit sa pagpoprotekta sa kanyang mga anak. maari ka nyang saktan kapag lumapit ka o kapag hinawakan mo ang mga anak nya.

Iwasang magalit ang alagang hayop. Maaaring mangagat at maka-sakit ang isang galit na hayop. Iwasan ding pag-laruan at galitin ang hayop dahil baka ikaw ay makalmot, ma-tuka o ma-kagat.

Ilan sa mga dahilan ung bakit dapat iwasan ang mga hayop ay: kapag may sakit, ginugulat sila habang natutulog, kapag ginagalit o kinukulit, kapag bagong panganak, iniistorbo habang kumakain at kapag sila ay natatakot.

Bigyan ng sapat at maayos na tirahan ang mga alagang hayop. Sa pamamagitan nito ay magkakaroon ng sapat na distansya sa kanila.

Ilan sa mga hayop ay nagdadala ng mikrobyo at parasites.
Iwasang mapa-dikit sila sa inyong katawan. Mag-hugas ng inyong kamay sakaling mahawakan nyo sila.

Malalayo kayo sa kapahamakan kung maayos nyong alagaan at tratohin ang mga hayop.

ASSESSMENT TEST ITEMS

PAGSUSULIT (Test)

Pangalan:_____ Petsa_____
Edad: _____ Kasarian: Lalaki:_____ Babae:_____
Paaralan:_____
Baitang:_____
Seksyon:_____

A. Panuto: Bilugan ang letra ng pinakamabuting sagot
1.Bakit nagagalit ang ina ng bagong silang na hayop?

a. Siya ay pagod at natutulog
b. Mapagtanggol ang ina sa anak
c. Nagugutom at naiinitan ang ina

2 Anu-ano ang mga pangangailang ng mga hayop para mabuhay?

d. TV, radyo, cellphone
e. kotse, traysikel, barko
f. pagkain, tubig at tirahan

3 Paano tayo magiging ligtas sa mga alagang hayop?

g. Lumayo sa kanila
h. Manatili lang sa loob ng bahay
i. Ilagay sila sa kanilang tahanan

4. Alin sa mga ito ang iba pang pangangailangan ng mga hayop mula sa mga taong nag-aalaga sa kanila?

a. Pakikipaglaro at pagbibigay ng ehersisyo
b. Pagbibigay ng tirahan at gatas
c. Paglalagay ng kadena sa leeg at pagkukulong

5. Bakit kailangang huwag basta-bastang humawak ng mga hayop?

a. Baka sila matakot
b. Ang ilan sa kanila ay may dalang mga mikrobyo
c. Mahal ang presyo nila

6. Kinakailangang iwasan ang isang hayop kapag ito ay:

a. Masaya
b. Nakikipaglaro
c. Kumakain

E. Panuto: Tama o Mali

Sa patlang bago ang bawat bilang, isulat ang T kung Tama at M kung Mali ang sagot.

_____ 7. Ang ilan sa mga hayop ay nagdadala ng mga mikrobyo at dumi.

_____ 8. Huwag hahawak sa mga hayop na nagdadala ng mikrobyo.

_____ 9. Maghugas ng kamay pagkatapos humawak sa mga hayop na nagdadala ng mga mikrobyo.

_____10. Ang panunukso at pagbibiro sa mga hayop ay nakapagpapasaya sa kanila.

F. Isulat ang inyong sagot sa patlang pagkatapos ng mga tanong.

11 Bakit kailangang maging maingat kung magpapakain ng mga bagong silang na alagang hayop?

_____

_____

_____

_____

12 Ano ang nakakapagpagalit sa alagang hayop?

_____

_____

_____

_____

13 Kung nagagalit ang iyong alagang hayop ano ang maaring gawin niya sayo?

_____

_____

_____

_____

14 Paano mo aalagaan ang iyong aso o pusa?

_____

_____

_____

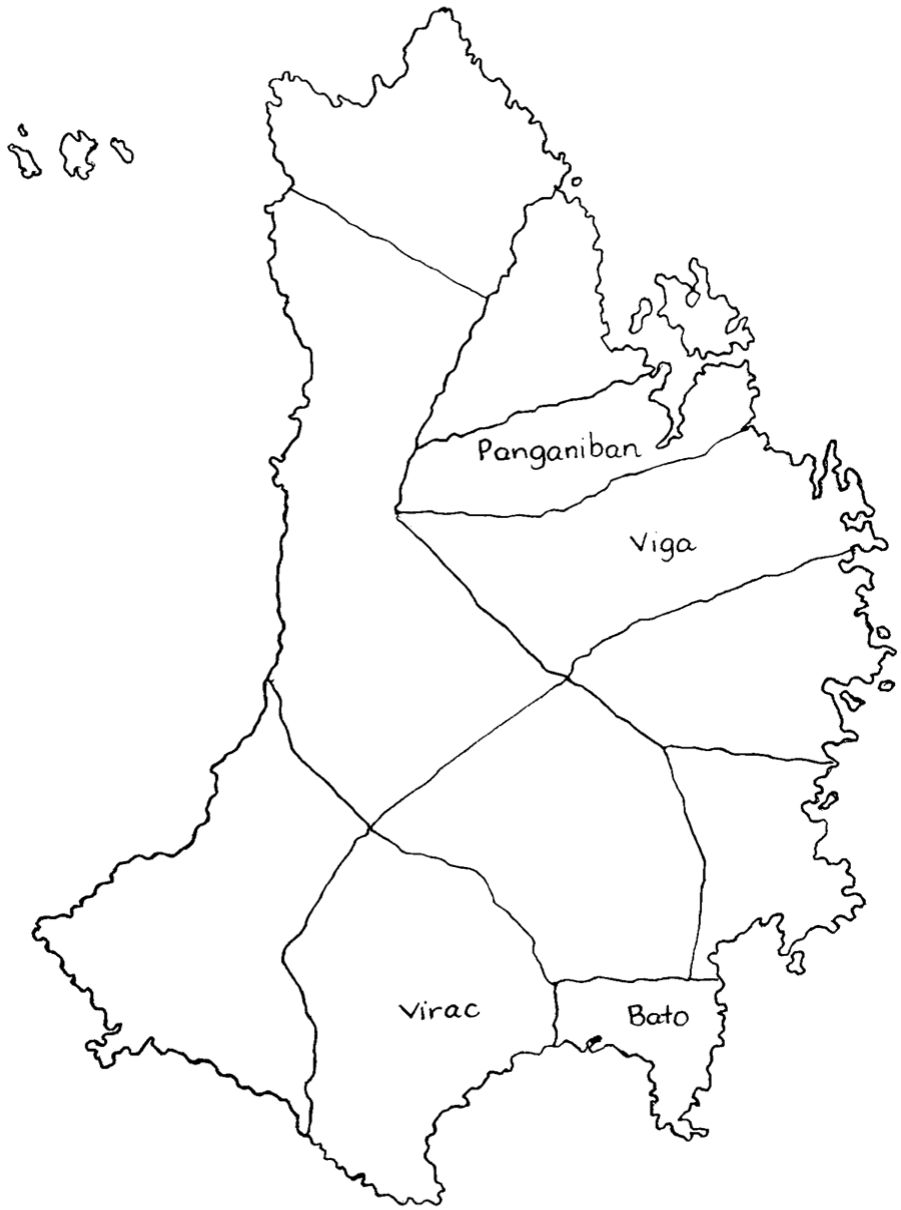
_____

15. Ipaliwanag kung ang hayop na nasa larawan ay lalapitan mo o iiwasan mo.

Maraming salamat sa iyong pag-sagot!

APPENDIX N

MAP OF CATANDUANES



APPENDIX O

PHOTOGRAPHS TAKEN DURING THE FIELD RESEARCH

APPENDIX P

PHOTOGRAPHS TAKEN DURING THE IMPLEMENTATION OF SCIENCE LESSON IN THREE LANGUAGES