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CONTEXTUALIZATION OF GRADE 3 INSTRUCTIONAL MATERIALS: BASIS FOR A DESIGN OF BULACAN TAGALOG-BASED SCIENCE MATERIALS

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APPROVAL

The graduate thesis attached hereto, entitled “CONTEXTUALIZATION OF GRADE 3 INSTRUCTIONAL MATERIALS: BASIS FOR A DESIGN OF BULACAN TAGALOG-BASED SCIENCE MATERIALS,” prepared and submitted by MA. NIÑA INOCENCIO-ADRIANO, in partial fulfilment of the requirements for the degree of Master of Arts in Language and Literacy Education, is hereby accepted.

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BIOGRAPHICAL SKETCH

Ma. Nina I. Adriano is a researcher, writer, instructor, editor, licensed teacher, public speaker, who is passionate about teaching. She has a bachelor's degree in English and a Master of Public Administration degree from Bulacan State University. Currently, she teaches in Bulacan State University under the College of Education.

Prior to joining the academe, she spent 15 years at the Office of the President, National Intelligence Coordinating Agency, as a research analyst. She has assumed various functions in the Office, among which are branch chief of the National Intelligence Training Center's Academic Research Branch, monitoring specialist at the Presidential Situation Room in Malacañang, and operations researcher at the Directorate for Operations.

After retiring from government service, she joined a private university in Baliwag, Bulacan as associate director of publications of the Center for Research and Publication. She was also managing editor of Harvest, the official publication of the University. During her six-year tenure in the university, she taught English courses and research in both the undergraduate and graduate school.

The opportunity to teach in the graduate school led her to pursue further studies in language and literacy education at the University of the Philippines Open University, which she considered as one of the best decisions she has ever made. The course equipped her with the theories she needed to upgrade her knowledge and understanding of language and literacy. Since then, her passion has been to share the knowledge she gained as best she could to her students.

Aside from her regular work, she also works part-time as a scopist under Dalco Reporting based in the United States since 2010. Her research interests are second language acquisition, adult education, mother tongue, and distance learning. She has

presented her research papers in local and international conferences and has published in Scopus and Web of Science journals.

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My journey in completing this course has been a difficult one. I took the ladderized MALLE program in 2014, graduated from the diploma course in 2016, continued the master's program and finished all the academic requirements in February 2019. I successfully defended my thesis proposal and began data gathering in November 2019. As soon as I finished my data gathering, the pandemic hit, and I had no choice but to stop writing and let things settle first. In 2021, I was reminded by the Faculty of Education to complete my thesis and enroll in the course because I stopped for a while. As I began to continue writing my thesis, all six in our family caught COVID-19. I realized I had to prioritize my family first. I set aside my thesis and thought that life is way more important than studies. It was indeed a very difficult time for all of us. But thank God we all survived.

I would not have completed this course without the help and guidance of the Almighty. He is my life. He inspired me to write every time I had no desire anymore to complete the study. He never failed to get me through. I want Him to receive the highest glory and honor because it is only through His strength that I was able to accomplish this.

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DEDICATION

I dedicate this thesis to my husband, Nars,

my children, Aaron, Ishi, Josh, and Arelle,

and most especially to my mom, Nieves.

She would have been very proud of me.

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ABSTRACT

This qualitative research aims to develop a Grade 3 instructional material in science using Bulacan-Tagalog as the medium of instruction. To develop the material, the researcher proposed a framework that will serve as a guide in developing contextualized science instructional materials in the mother tongue. The researcher observed three science classes from three special science public schools in Baliwag and Bustos using the Classroom Observation Rubric (COR) by CREDE, 2011; interviewed the science teachers using a self-made Interview Protocol and conducted document analysis on the instructional materials used in the Grade 3 science lessons using the Level of Contextualization Rubric by Heaslip's (2013). Using the developed 5Is framework, the researcher was able to develop a Grade 3 contextualized science instructional material that is learner-centered and contextualized through the *Iugnay, Isagawa*, and *Ilapat* components of the model. It engages learners in collaborative activities with their classmates, both in online and face-to-face setup under *Ibahagi*, and provides an avenue for learners to use their learning in various context through *Itawid*. The study recommends to use the model in developing instructional materials in science or improve the already existing science materials using the 5Is model. It is further recommended that they extend this study in order to find out if the developed instructional material is effective in improving the level of contextualization in the teaching-learning process.

Keywords: mother-tongue, science instructional materials, 5Is model, contextualization

Chapter I

INTRODUCTION

Background of the Study

The country embarked on a new educational trajectory when it implemented Republic Act 10533, which is an act that aims to enhance the Philippine basic education system. Encompassing this Act is the mandatory one year of kindergarten education and the addition of two years of senior high school, thereby increasing the number of years of basic education from 10 to 12. At the heart of this reform is the enhancement of the basic education curriculum, which supports contextualization through the use of the Mother Tongue-Based Multilingual Education (MTB-MLE) (RA 10533).

The MTB-MLE mandates the use of mother tongue as a content area and as a medium of instruction from kindergarten to Grade 3, thus, reinforcing the need for learners to be educated in a language that they know and understand. In addition, the use of mother tongue not only addresses the physical, intellectual, and psychosocial needs of learners but also their cultural needs. Because language and culture are inseparable, the use of mother tongue in the classrooms effectively strengthens the learner's language and his or her culture.

Moreover, MTB-MLE encourages inclusivity in education and strengthens the country's languages by maintaining their presence. This is necessary because if one's language is not used, it is prone to extinction. This premise is supported by Anderson and Anderson (2005), who claimed that languages in the world are fast disappearing at a pace of two languages lost each month. At this rate, it is expected that more than half of the 6,800 living languages in the world will have become endangered (Gordon, 2005), and about 90-95% of the world's languages may be extinct by 2100 (Skutnabb-Kangas, 1997). The Philippines alone has 191 living languages used as mother

tongue (SIL International, 2019) and about 30 endangered languages, most of which are spoken by indigenous peoples (Headland, 2003).

Headland (2003) stated that out of this number, some 32 indigenous languages are endangered. This report is unfortunate since studies show that there is a close link between language and culture, and that the demise of one may likely affect the other (Mahadi & Jafari, 2012). This is supported by Skutnabb-Kangas (2003) who revealed that linguistic and cultural diversity on the hand and biodiversity on the other hand are correlated. Where one type is high, the other one is too, and vice versa.

Terralingua is a non-profit international organization that investigates this relationship and has devoted its efforts to preserving the world's linguistic diversity and to investigating links between biological and cultural diversity. Conservationist David Harmon, the General Secretary of Terralingua, has investigated correlations between biological and linguistic diversity. Harmon compared endemism of languages and higher vertebrates (mammals, birds, reptiles and amphibians), with the top 25 countries for each type. His study showed that 64% (16 of the 25) of the countries with endemic languages also have high biodiversity. Harmon gets the same results with flowering plants and languages, butterflies and languages, among others, a high correlation between countries with biological and linguistic megadiversity (Harmon, in-press).

New research also presents mounting evidence for the hypothesis that the link between language and culture and biodiversity is not only a correlational relationship, but a causal one, that the two types of diversities seem to mutually enforce and support each other (Maffi, 2000). This means that linguistic and cultural diversity may be decisive mediating variables in sustaining biodiversity itself, and vice versa (Skutnabb-Kangas, 2003). Thus, local nature and people's detailed knowledge about it and use of it have influenced the cultures and languages of the people who have been

dependent on it for their sustenance. This relationship between all kinds of diversities is known to most indigenous peoples.

It can be therefore concluded that the more languages are spoken, the higher the biodiversity, the wider the range of variation in human cultures, knowledge systems, and conceptualizations of the world (Anderson & Anderson, 2005) because encoded in the languages are the huge diversity of human insights, experiences, and value systems. Thus, concomitant to the demise of a language is the loss of human culture, loss of a way of life, and the loss of biodiversity (Ladefoged, 2004; Terralanguage). This establishes the fact that language is not only related to culture but also to science.

To illustrate this point, the Aetas of Zambales were forced to move to resettlement areas in Bulacan and Tarlac following the Mount Pinatubo eruption in June 1991. Along with the transfer, they learned a new language by attending formal education, embarked on farming instead of hunting and gathering food, and shifted to modern clothes instead of the *bahag* (Seitz, 1998). Those who learned to speak Tagalog transmitted the language to their children. Eventually, their ways (culture) became more patterned to the way the people in the plains lived. Along with learning a new language came new ways of thinking and of doing things. Aeta parents teach the new language to their children, until such time that they speak this new language more often, resulting in the subsequent demise of their own native language.

Transmission of language from parent to children is the most important factor in preserving the language. According to Fishman (1991), the key to language preservation is the intergenerational transmission of the language in the home by families. This was supported by Littlebear (1990) who emphasized the importance of family involvement in these efforts. If the schooled Aetas do not speak their own language anymore after learning Tagalog, their native language will become

threatened until finally becoming extinct. Further, when more children gain access to education, and a language foreign to the learners are used in the classroom, the language is not going to survive (Skutnabb-Kangas, 1997). Nettle and Romaine (2000) in their book, “Vanishing Voices” pointed out the direct correlation of language to the preservation of ethnic identity, cultures, and knowledge. When a language dies, these dimensions also disappear.

This is exactly what happened to one of the Aeta languages, the *Ata,* a language spoken in Region 3, which has become extinct in 2007 after recording only two users in 2000 (Ethnologue, 2015). Another language in Luzon, the Aeta language, Ayta Magindi, is now classified as endangered, having only 3,000 documented speakers. Hiber (2012) identified two main reasons why languages die. First is when the younger generation does not learn it; and second is when speakers become bilingual and mix the two. The minor or weaker one eventually loses to the more dominant language.

Another reason why languages die, according to Tan (2015), is due to militarization. This is especially true for indigenous peoples whose languages are threatened by militarization (Tan, 2015). Minining operations, for example, in Lumad communities attract the military in the area that are deployed to protect mining companies. Because their ancestral lands are eventually destroyed through mining, they are forced to leave their lands. Roselle Pineda of the National Commission on Culture and the Arts expressed the same concern that IP languages may be endangered if the organizations and the schools involved are under threat from militarization and if the communities concerned are losing their lands.

One way to preserve the languages is through the use of the mother tongue-based multilingual education (MTB-MLE) as implemented by DepEd (Getuiza, 2013). In order to effectively implement MTB-MLE, the curriculum should be flexible enough

to allow for the contextualization of lessons through learners' respective educational and social contexts. Contextualization of lessons is one of the key features of the K-12 program. It is defined by DepEd Order 35, s. 2016, as "the process of matching the curriculum content and instructional strategies relevant to learners" (p. 7). Because learners are diverse and have different needs, the delivery of the content must be differentiated in lesson planning.

A degree of contextualization that relates learning content specified in the curriculum to local information and materials in the learners' community (DO 35, 2016) is called localization. This concept was based on the premise that by linking new content to the local experiences of learners, learning would be more relevant to them.

Another degree of contextualization is indigenization, which encompasses localization. It refers to the process of enhancing curriculum competencies, education resources, and teaching-learning processes in relation to the bio-geographical, historical, and socio-cultural context of the learners' community (DO 35, 2016).

The concept of contextualization is not new to the Department of Education. In fact, a number of initiatives have been implemented relative to this endeavor such as the Third Elementary Education Project (1998-2006), which aims to develop readers through the use of local stories and to integrate artistic expression and culture in the learning areas; the Basic Education Assistance for Mindanao [BEAM] (2002-2007), which focuses on a tri-people perspective—Muslims, Christians, and Lumads; Strengthening Implementation of Visayas Education [STRIVE] (2005), which is a systematic effort at localization of the region; and the Philippines' Response to Indigenous Peoples and Muslim Education (PRIME), which is an initial attempt at generating the contextualization process.

In addition to this are programs such as Indigenous Peoples Education (IPEd), Special Education (SPED), and Special Interest Programs and ALS, learning areas

such as Araling Panlipunan with its regional profiles, as well as Art and Music that present the cultural artistic expressions of the different regions. Thus, to support contextualized learning, DepEd encourages the use of local traditional songs, poems, dances, painting, and products in a particular community for designing classroom activities that deepen comprehension, integrate new information, and reinforce previous knowledge. This can be achieved by developing contextualized and localized instructional materials.

However, to develop instructional materials that are contextualized, a long process is expected to be observed as indicated in the guidelines from DepEd Region 3. First, teachers or instructional materials writers must set a dialogue with and engage the community. Next, they need to analyze the situation in the community to come up with the community vision, mission, and goals for education. Third, they must conduct education planning with communities. Fourth, they should engage in research for contextualization and learning resources development, which could either be led by the community or by DepEd. Lastly, they should embark on contextualization of the curriculum. In this last stage, the curriculum will be examined; the teaching-learning processes will be established; learning resources will be developed; and the most appropriate classroom assessment will be selected.

This rigorous process in producing contextualized learning materials could be one of the reasons teachers do not develop this important educational tool, resulting in a perennial lack. The country has always been faced with insufficient instructional materials every School Year; and the situation was even aggravated by the need to produce more learning materials that are contextualized given the shift to K to 12. While the Philippines has been right on track in addressing the issue of language preservation and improved educational outcomes through MTB-MLE, the lack of contextualized materials can undermine the success of the program.

With MTB-MLE as an integral component of the K+12 curriculum, the dearth in contextualized materials adds to the challenge for teachers who are expected to teach mother tongue as a content area and to use it as a medium of instruction, particularly in K-3 level. In a linguistically-diverse area, for example, a teacher may handle a class where learners come from different linguistic backgrounds. In the case of Bulacan, a number of Tagalog-speaking teachers handle learners whose mother tongue is not Tagalog or vice-versa since Bulacan is bordered by other provinces like Pampanga, Aurora, Quezon, Rizal and Nueva Ecija. In other classes, the composition of the class may include transferees, whose mother tongue is different from the majority.

This scenario poses a challenge to teachers, learners, and the school that implements the MTB-MLE. If the teacher chooses to use the mother tongue of the majority, children speaking a minority language might be left behind. If this happens, learning will be affected, and the child with a minority language might drop out of school or could face a challenge in his/her studies.

This was the view held by Skutnabb-Kangas (n.d.) who claimed that the education of most indigenous, tribal, minority, and minoritized (ITM) children in various countries use a dominant language as the main medium of instruction in teaching. She argued that the choice of teaching in the dominant language is the direct cause of not only the disappearance of languages, but also of the world's "illiteracy," as most ITM children drop out of school or experience educational failure.

Aside from using the mother tongue as the medium of instruction, the Enhanced Basic Education Act likewise provides that the instruction, teaching materials, and assessment must also be in the mother tongue or the native language of the learners from Kinder to Grade 3. Eight years into its implementation, however, the use of mother tongue both as a medium of instruction and as a content area is still found wanting (Cruz, 2015).

According to Cruz, in the case of Pangasinan, teachers have to contend with modules that are either found inadequate or inappropriate. The presence of inadequate and inappropriate instructional materials can pose a problem on sustainability of language use. Dwyer (2011) suggested that the more varied the materials in the language are used for education, the stronger the language is. Thus, in order to strengthen the language, more materials need to be written and be made available to users.

Given this context, the purpose of this study is to develop contextualized instructional materials in the mother tongue by a) examining the level of contextualization of mother tongue instructional materials and science classes in Grade 3 classrooms in Bulacan, b) investigating the extent of Grade 3 teachers' implementation of the use of mother tongue as medium of instruction in a science subject, and c) developing a framework for instructional materials developers in designing contextualized instructional materials in Grade 3 science in Bulacan-Tagalog.

Statement of the Problem

Given the necessity to develop contextualized instructional materials in the mother tongue, this study aims to answer the following research questions:

1. What is the level of contextualization of Grade 3 science instructional materials and science classes in selected elementary schools in Bulacan?
2. What is the extent of Grade 3 teachers' implementation of mother tongue as a medium of instruction in a science subject?
3. What framework may be used by instructional materials developers in designing contextualized instructional materials in Bulacan-Tagalog?

Significance of the Study

With the goal of developing contextualized instructional material in science, using Bulacan-Tagalog as the medium of instruction, this study would be significant to the following:

Department of Education. The Department has been encouraging educators to produce contextualized instructional materials in the mother tongue due to its limited circulation. The textbooks that are currently available, according to Cruz (2015), are deemed “inappropriate.” This study is in response to this need to produce contextualized mother tongue instructional materials that may be used in Grade 3 classrooms.

Appreciation of Bulacan culture. This study aims to boost learners’ appreciation and awareness of Bulacan culture. This rich culture must be preserved and protected. It must be kept alive in the hearts of its residents through education. Thus, the instructional material would serve as a means to preserve the culture and heritage of Bulacan, and the locales of the study in particular. This material may also contribute to the preservation of culture since the more materials are published in the mother tongue, the higher the chances that the language will be preserved and be in use. Moreover, the fact that Grade 3 children will learn their own language and culture through contextualized materials in science will produce children who have deep appreciation for culture, science, and the arts.

Bulacan teachers. The creation of contextualized instructional materials will benefit Grade 3 teachers who use Bulacan-Tagalog as the medium of instruction and who teach it as a subject. The creation of instructional materials was envisioned to contain culturally-sensitive materials that are reflective of Bulacan heritage.

Instructional material developers. Instructional material developers other than teachers would benefit from this study as this study's output provides a model for instructional material writers to use in developing lessons that are contextualized. The 5Is model that the researcher developed may be used as a template for content writers across K-3 who will design mother-tongue based lessons that are contextualized. This could be used as a pattern for other mother tongues, not only of the Bulacan-Tagalog instructional materials.

Grade 3 learners. The outcome of this study would provide Grade 3 learners in Bulacan with learning rooted in their language and culture. According to Ahmed (2016), the use of contextualized learning materials can facilitate learning and understanding of the lesson. Further, contextualized and culturally sensitive instructional materials provide learners knowledge and appreciation of their cultural heritage.

Scope and Delimitation of the Study

The focus of the study was to develop a Grade 3 instructional material in science using Bulacan-Tagalog as the medium of instruction. The study covered Grade 3 classes and teachers in three elementary schools in Bulacan. The particular grade level was selected because the Grade 3 learners use Bulacan-Tagalog in their science classes and that this grade provides the transition to the next grade level that would eventually use English as medium of instruction (MOI) in science. Involving Grade 3 classes would provide evidence on how well learners have learned the lessons using the mother tongue and can provide an explanation on the ease of transition of learners in the higher grades.

One of the limitations of this study was that the instructional material was developed for Grade 3 learners only because it is considered the transition period.

The lesson content is customized for just one unit, particularly on solid, liquid and gas. In addition, only the science instructional material that was used by the learners observed were assessed based on how well these are contextualized.

The study's locale was another delimitation of the study. It gathered data in at least three Bulacan schools only. The particular Bulacan schools were selected based on the purity and consistency by which they use Tagalog as their MOI from Grades 1 to 3 because there are areas in Bulacan where the variety of Tagalog is mixed with other dialects spoken at home.

Chapter II

REVIEW OF RELATED LITERATURE

Introduction

This review of related literature presents studies in three areas: the use of mother tongue in the classroom; challenges in teaching mother tongue, from which the need to develop instructional materials was discussed; and contextualization of instructional materials. This section likewise presents the theories that support contextualization of lessons in teaching and learning.

The Use of Mother Tongue in the Classroom

One of the highlights of the K-12 Law is the use of mother tongue as a medium of instruction from Grades 1 to 3. Mother tongue (MT) is defined by the Implementing Rules and Regulation of RA 10533 or “An Act Enhancing the Philippine Basic Education System by Strengthening its Curriculum and Increasing the Number of Years for Basic Education, Appropriating Funds Therefor for Other Purposes” as:

The language or languages first learned by a child, which he/she identifies with, is identified as a native language, which he/she knows best, or uses most. This includes the Filipino sign language as provided for in RA 11106, which is considered as the national sign language of the Filipino deaf and the official sign language of government in all transactions involving the deaf. The regional or native language refers to the traditional speech variety or variety of Filipino sign language existing in a region, area or place.

In School Year 2012-2013, the Philippines implemented the Mother Tongue-based Multilingual Education (MTB-MLE) program for the first four years of schooling (kinder to Grade 3) through DepEd Order 16, s. 2012. By using MT as a medium of instruction and by teaching it as a subject, DepEd aims to establish a strong academic

foundation and instill excellent academic performance and socio-cultural awareness to the Filipino youth (DO 16, s. 2012).

This national policy was supported by a series of studies that have been conducted to establish the effectiveness of using the mother tongue as a medium of instruction as opposed to using a second language such as English or Filipino. While DepEd has implemented this nationwide language policy to enhance learning, the use of MT as MOI also results in the preservation of the language and culture of the particular language group (Arzadon, Igcalinos, Zubiri, Cortez, Awid, & Gumba, 2016).

A number of experiments conducted throughout the country confirmed that the use of mother tongue improved the performance of learners (McEachern, 2013). These studies are the following:

- The Iloilo experiments (1948-54; 1961-64). This was conducted by a public school superintendent, Dr. Jose Aguilar. It involved the use of Hiligaynon, a major language in the Visayan Region, in teaching Grades 1 and 2 learners.
- Cebu Experiment (pre-1960's). In this study, Cebuano was used in teaching social studies.
- Antique Experiment (1952). This study exposed learners to three vernaculars and compared their gains.
- Rizal Experiment (1960-66). The aim of this study was to determine the best time to introduce English as a subject in Tagalog-speaking classroom.
- First Language Component-Bridging Program [FLC-BP] (1986-93). Led by DepEd Supervisor Dr. Jeronimo Codamon along with consultants from SIL and Translators Association of the Philippines, the study utilized Tuwali as a medium of instruction in Ifugao province.

- Lingua Franca Project (1999-2001). Three main lingua franca Tagalog, Ilokano, or Cebuano were used as medium of instruction in Grades 1 and 2 in 32 schools from all regions.
- Lubuagan MLE Program (1998 to 2012). This was the most well-known MTB-MLE experiment undertaken in several schools in Lubuagan District using the Lilubuagen language.
- Culture-Responsive Curriculum for Indigenous People-Third Elementary Education Project (2003-2007). Targeting the Manobo community in Mindanao, this project implemented an indigenous curriculum and used the Mnanubu indigenous language as MOI.

The findings of these experiments helped strengthen the argument of pro-mother tongue advocates who claimed that the use of mother tongue significantly improves the children's reading ability, making them perform better in math and science, and enabling them to learn the official languages, Filipino and English, more quickly. In addition, they disclosed that using mother tongue also addresses dropout and exclusion in schools.

Thus, in 2012, after a series of discussions among stakeholders, the MTB-MLE was institutionalized (DepEd Order 74, s. 2016). The pro-mother tongue group asserts that the shift from bilingual policy to MTB-MLE would result in the preservation of the many Philippine languages which they believe were long ignored because of the focus on the national language (Arzadon et al., 2016).

The present study does not aim to further strengthen the evidence that the use of mother tongue is effective in improving the academic performance of learners as this has already been established by the mentioned research papers. However, the related studies endeavor to present the most common MTs used in these studies. While Tagalog has been used in the Lingua Franca Project from 1999-2001, the

subvariety of the Tagalog dialect, particularly Bulacan-Tagalog was not given focus. This study seeks to concentrate on the Bulacan-Tagalog variety of the Tagalog language in developing instructional materials in science.

Challenges in Teaching the Mother Tongue

The use of mother tongue as a medium of instruction is said to facilitate the literacy development of learners. However, other factors such as home environment affect the literacy progress of learners. According to a study by McEachern (2013), parents who lack literacy skills themselves (in any language) are limited in their ability to teach their children to read. This problem is common in poor, rural, and minority communities. The same author observed that children of monolingual homes will have more difficulty learning how to read second languages than those who have oral and visual exposure to such languages.

Moreover, children who live in homes with limited reading materials and who lack the time to read are likewise more likely to experience reading difficulties (Abraham-Mella, 2013). The same can be said of children of OFW parents or learners who have no parental figure to guide them as they learn to read. This reveals that parental and home factors impact the language and literacy development of children (Molina-Felix, 2012; Din-Garcia, 2013).

Since children live in diverse home and community environments, it is important that schools close the gap afforded by the lack of literacy-rich environment—particularly in their mother tongues—so the lack of opportunities to read at home can be addressed by providing them with reading materials and sufficient reading experiences for them to practice the skills and develop positive attitudes towards reading as soon as possible (McEachern, 2013).

While this should be the ideal practice, this is not always the case. In fact, the Department of Education, in implementing the MTB-MLE, has faced various

challenges that could undermine the success of this language policy shift. Among these are the following:

Lack of Grade 3 instructional materials. Arzadon et al. (2016) stressed that a major challenge in the MTB-MLE program is the lack of materials or the delay of their delivery to the end users. Aside from this, teachers' guides were also not written in the local language; thus, teachers are also burdened by translating these.

This has been confirmed by the researcher during initial visits to various public schools in Bulacan. The researcher discovered that the instructional materials used by Grade 3 teachers are written in English, while the textbooks used by learners are written in Tagalog. Meanwhile, in two towns visited, not all Grade 3 science classes are taught in Tagalog. Special science sections are taught all subjects in English as the MOI; only regular sections are taught using Tagalog as MOI. This discrepancy further widens the gap of learners who are in the pilot section and the lower sections, as the former is provided advanced topics and used English in all subjects except for the Filipino subject.

Aside from this, some teachers, due to the lack of instructional materials resort to adapting high school materials for elementary learners. According to Mede and Yalcin (2019), textbook adaptation is inevitable in any educational context. This process results in instructional materials that may be of low quality as teachers translate the lesson content to customize to the needs of young learners.

Meanwhile, Arzadon et al. (2016) observed that in schools where instructional materials are available, the language variety used for centrally produced materials for kindergarten up to Grade 3 contains the "deep" variety, which are not commonly used at home and are therefore not familiar to children. These difficult terms used in the learners' materials require additional time to search for the meaning of the words. These words have not been used by many for decades but writers employed by the

Central Office would want to revive them. These also need to be validated and tested so that it will be more user-friendly. They added that ease of language variety must be considered and must be the priority in creating instructional materials, with language preservation issue taking only a secondary significance.

Therefore, language is one of the factors considered in developing the science instructional material in this study. According to Lagata (2016), this factor is important and must be based on the grade level of the learners. Aside from avoiding the deep variety of the language, instructional material developers must also use non-sexist language and must be devoid of stereotypes. It should likewise provide insights on multiculturalism and diversity. Materials and language used must reflect many aspects of target culture, including culturally-based practices and beliefs, encompassing both linguistic and non-linguistic behavior.

Because of the perennial lack of instructional materials that has hounded the Department of Education (Sibayan, 1991), the DepEd has empowered the regional, division, and school units to produce their own localized materials, particularly storybooks. However, the production considerably varied in both quality and quantity as the development of instructional materials are devolved in the regional offices who have their own guidelines and varying budget appropriations (DepEd RM2, s. 2019).

While it is important to provide an equal pupil to book ratio, the quality of the instructional materials must also be considered. As Elley (1996) suggested, providing children with interesting and meaningful texts is more important than simply increasing their number. Sibayan (1991) observes that reading materials in Philippine classrooms are often too hard, too easy, or not engaging enough. This is valid for new instructional materials that are now available as discussed in the foregoing.

To ensure the quality of instructional materials, the work of Smaldino et al. (2012) was used as a guide by instructional materials developers in the evaluation of

the material. It would consider the following criteria in the instructional materials development: a) alignment with DepEd standards, outcomes and objectives; b) accurate and current information; c) age-appropriate language; d) interest level and engagement; e) technical quality; f) ease of use (pupil or teacher); g) bias free; h) user guide and directions; i) variety of media; and j) multisensory experience. The mentioned constructs are the same factors included in DepEd's Evaluation Tool for content, language, and layout in developing modules.

Aside from the mismatch in the level of difficulty of the language and materials used, another concern is errors and readability found in textbooks. Just recently, a public clamor has swept the media, asking DepEd to review serious errors in the textbooks being used by children (Albano, 2019). The following year, Limos (2020) presented glaring errors that he described as typo and content errors that are funny but unforgivable. He cited an example taken from a Grade 1 textbook that says, "Small people are quails, they are cute but terrible." Another example shows bias against Filipino features: "Unlike most Filipinos, she has curly hair that makes her more beautiful. She looks like a mestizo with her pointed nose, and white, fair skin.

In response to this call, DepEd, in its official statement released on August 13, 2019, conducted three workshops involving academicians and DepEd validators to validate learning resources and textbooks from the different regions for Kindergarten to Grade 10. Validated findings, description of errors found, and recommendations on how to correct these will comprise the "notes of teachers" that the Department shall issue through a memorandum to the regions (DepEd Official Statement dated August 13, 2019).

Scarcity of authentic materials. For Alba, Logan, Lutz, and Stults (2002), the major problem in the teaching of mother tongue was identifying and obtaining authentic materials for instructional purposes. In their study, they defined *authentic*

materials as original texts, films, and recordings of language usage, among other media, that accurately reflect how a language community employs its mother tongue, through materials that have not been specifically developed for instructional purposes. Generally, authentic materials are defined as materials not created specifically to be used in the classroom, but they make excellent learning tools for learners precisely because they are authentic (Ianiro, 2007).

They maintained that a dialogue in a language textbook contrived solely to illustrate a certain usage of a verb or exemplify some grammatical structure is an example of non-authentic material, while a recorded oral history carried out by a member of a minority language group with another member of that language group, used to illustrate language use, falls into the "authentic materials" category.

In an experimental multilingual education program conducted in the Lubuagan, Kalinga, Philippines, the inclusion of cultural content in the curriculum was done through incorporating in every lesson the daily experiences of the learners and using those experiences in introducing new content (Dekker & Dumatog, 2004). More specifically, teachers used local stories, literature, arts, crafts, music, and history (which are familiar to the learners) in classroom instruction and in the development of learning materials. This effort of adding local cultural content to the curriculum offered learners a means to link what they already know to what they need to know (Walter & Dekker, 2011).

Authentic and culturally appropriate materials play a vital role in teaching the mother tongue (Ahmed, 2017). They enrich the traditional lessons and can be very interesting to the learners. Usually, the responsibility of creating instructional materials falls on the elementary teachers, especially when these are not available to support learning. Teachers translate classical stories in the mother tongue through the use of

Big Books, along with drawings that serve as visual aids (Llaneta, 2018). The practice may be considered as part of the teachers' improvisation.

Improvisation of instructional materials, which may include stories, songs, poems, and charts written in the children's mother tongue, is common in linguistically and culturally diverse areas like Baguio City. In the study of Lartec, Belisario, Bendanillo, Binas-o, Bucang, and Cammagay (2017), they claimed that instructional materials improve learning and retention of the lesson, aside from sustaining their interest.

Instructional materials are vital to the teaching-learning process. However, to be effective, these learning materials have to be authentic, adequate, relevant (Sunday & Joshua, 2010) and must be written in the mother tongue to achieve consistency. It is also important that the needs of the learners are considered in choosing the poems, songs, and stories. Aside from being familiar to learners, children participate more in class discussions if materials are written in the mother tongue because they can understand the lesson better (Sunday & Joshua, 2010).

Teachers' perception of mother tongue. In the study of Adriano (2021), a survey of teachers' perception of mother tongue revealed that 60% of the teachers have a positive attitude toward MTB-MLE. However, 30% of teachers who showed a negative attitude explained that such disposition resulted from a lack of materials and training. It is worthy to note that even teachers who are supposed to push for this program are still not convinced about the advantage of using the mother tongue as a medium of instruction because they see English as the more pragmatic language to learn.

In the same study, it revealed that teachers may act as a barrier to effective MTB-MLE for various reasons: a) deep-seated attitudes about indigenous languages and their suitability for the classroom, b) perceived extra work in teaching

the mother tongue as a third language in the classroom, c) their own unfamiliarity with the grammatical and orthographic system of their mother tongue, and lack of confidence in teaching reading and writing in that language, d) attitudes and beliefs about the best way to learn to read based on their personal schooling experiences, and e) fear of losing authoritative control in their classroom (Paulson, 2010a; Paulson, 2010b).

Such attitudes and beliefs present a barrier to MTB-MLE, because they have a direct correlation to classroom practice (Metila et al., 2016a & b). If teachers believe that students can learn to read in English through the same methods that they learned to read in English when they were young, they have little motivation to switch to teaching reading in the mother tongue. Therefore, if teachers want to change their practice in the classroom, it is imperative that they first address their attitudes and beliefs.

In a study of Wa-Mbaleka (2014), he said that the negative perception are first, due to instructional materials are not readily available in the majority of local languages. Second, teachers are not trained in the local languages used for instruction where they teach. Third, primary school teachers may not have solid training on L1 or L2 learning research and theories. Fourth, some local languages may not be perceived as important for formal education. Last, parents may see MTB-MLE as a disadvantage for future employability where English is highly valued. All these are factors contributing to the negative perception of teachers and other stakeholders alike on mother tongue.

Bulacan Culture

According to Tejero (2015), Bulacan is the culture capital of the Philippines. She claimed that many products in Bulacan have become parts of our national culture and consciousness such as Baliwag buntal hat; Meycauayan gold filigree; sukang

Paombong; sayaw Obando; Bocaue fluvial parade; Kapitangan Lenten crucifixion; Angat Dam; Baliwag Transit; Barasoain Church; Prince of Tagalog Poets; Malolos Constitution; Pact of Biak-na-Bato; Divine Mercy National Shrine; The Great Propagandist; Philippine Arena; Letter to the Women of Malolos; “Bituing Marikit,” Hero of Tirad Pass, “La Bulaqueña,” among others.

Tejero (2015) added that Bulacan is one of the country’s provinces with the richest culture and history. She claimed that the province has representatives in almost every category of the Order of National Artists: Antonino Buenaventura (Music); Ernani Cuenco (Music); Levi Celerio (Music); Honorata “Atang” de la Rama (Theater); Guillermo Tolentino (Sculpture); Gerardo de Leon (Film); Francisca Reyes Aquino (Dance); José Joya (Visual Arts); Amado V. Hernández (Literature); Virgilio Almario, aka Rio Alma (Literature).

Further, she revealed that other culture heroes from the province like poets Francisco Baltazar (Balagtas) and José Corazon de Jesus (Huseng Batute); comedians Rodolfo Vera Quizon (Dolphy) and Bert “Tawa” Marcelo; kundiman composers Nicanor Abelardo and Francisco Santiago; bodabil artist Katy de la Cruz; musician Francisco Buencamino; writers Valeriano Hernandez Peña and Teodoro Gener; pianist Cecile Licad; filmmaker Mike de Leon; production designer Dez Bautista; playwright and critic Nicanor Tiongson; movie producer Narcisa de Leon (Doña Sisang); entertainer and star-builder German Moreno (Kuya Germs); food historian Mila Enriquez; food artisan Luz Ocampo; chef Teresita Reyes (Mama Sita); fashion designer Josie Natori; jewelry designer Arnel Papa; radio host Dely Magpayo (Tiya Dely); and komiks writer Carlo J. Caparas, to name a few.

Among the political figures who trace their roots in the province are former Presidents Corazon Aquino and Joseph Estrada; former First Lady Imelda Marcos; Senators Juan Ponce Enrile, Blas Ople, and Mar Roxas. Meanwhile, among the

heroes are propagandist Marcelo H. del Pilar and his nephew Gen. Gregorio del Pilar; revolutionary patriots Mariano Ponce, Pio Valenzuela, and Maximo Viola; Gen. Anacleto Enriquez and his brother Vicente; Katipunera Trinidad Tecson; and the 21 Women of Malolos.

Almost every one of Bulacan's three cities (capital Malolos, Meycauayan, San José del Monte) and 21 municipalities is known for someone or something. Notable personalities, distinctive products, high-value crops, native delicacies, fiestas, arts and crafts, built heritage are prevalent. However, this survey is limited only to two towns of Bulacan described in the succeeding paragraphs, which are the locales of this study.

Town 1. The first locale is a first class municipality founded in 1732 by Augustinian friars. According to the 2020 census, it has a population of 168,470 people. The town, a soon-to-be city, has 23 elementary schools, three national high schools, and 34 private schools catering to both elementary and high schools. It has nine higher education institutions, and one university, most of which are private HEIs, except for one polytechnic college run by the municipal government.

The town is known for buntal hats and bone-inlaid furniture. It is popular for its Prusisyon ng mga Santo during the Holy Week, where 96 lavishly decorated floats that move, depicting the Passion, is considered the longest religious procession in the country. Its old municipio, formerly the Joaquin Gonzalez House, was the first municipal hall in the country, established in 1899 at the start of the American regime. It was declared an Important Cultural Property by the National Museum last August 2019, and now houses the town's library and museum.

Town 2. The second locale is a second class municipality with a population of 77,199 people as of 2020 and consisting of 14 barangays, 6 urban and eight rural. Having existed for 105 years, the self-sufficient community has some 20 structures,

most of them vividly painted and elaborately decorated, but the most distinctive are the five guest houses constructed in the style of the Ivatan house. The town hosts 13 public elementary schools, three national high schools, nine private schools catering to both elementary and secondary levels, and one state university.

The town is known for its dam, the longest rubber dam in Asia and second in the world. It is also famous for minasa, a rich cookie of cassava flour, egg yolk and butter. This delicacy is showcased in the town's annual minasa festival. This rich culture must be preserved and protected. It must be kept alive in the hearts of its residents through education. Thus, the instructional material would serve as a means to instill into the learners awareness of their rich cultural heritage, thus boost their appreciation for their language and culture.

Bulacan-Tagalog Variety

In this study, Bulacan-Tagalog is the variety of language that was used as MOI in the developed science instructional material. Tagalog is the language spoken in Bulacan as well as by about 24 million Filipinos. It is the first language of a quarter of the population of the Philippines (particularly in Central and Southern Luzon) and a second language of the majority. Even with such a huge number of speakers, the adoption of Tagalog in 1937 as the basis for a national language is not without its own controversies.

In 1939, the national language was designated as *Wikang Pambansa* (national language) and not specified as Tagalog. It was then renamed by then Secretary of Education José Romero as *Pilipino* in 1959 to give it a national rather than ethnic label and connotation. With the change, non-Tagalogs, especially Cebuanos still had not accepted it (Sundita, 2006).

During the 1971 Constitutional Convention, the national language issue was revived. Majority of the delegates were even in favor of scrapping the idea of a

"national language" altogether. However, a compromise deal was worked out for the national language to be called *Filipino* rather than *Pilipino*, with no mention of Tagalog in the 1973 constitution. In 1987, when a new constitution was formed, it named Filipino as the national language. It specified that as the Filipino language evolves, it shall be further developed and enriched on the basis of existing Philippine and other languages. However, after more than two decades, there seems to be little difference, if any, between Tagalog and Filipino.

Upon the issuance of Executive Order No. 134, Tagalog was declared as basis of the national language. On 12 April 1940, Executive No. 263 was issued ordering the teaching of the national language in all public and private schools in the country. Article XIV, Section 7 of the 1987 Constitution of the Philippines specifies, in part:

Subject to provisions of law and as the Congress may deem appropriate, the Government shall take steps to initiate and sustain the use of Filipino as a medium of official communication and as language of instruction in the educational system. The regional languages are the auxiliary official languages in the regions and shall serve as auxiliary media of instruction.

In School Year 2012-2013, the Department of Education implemented the mother-tongue based multilingual education (MLE), wherein the medium of instruction is the pupil's mother tongue until Grade 3, with additional languages such as Filipino and English to be introduced as separate subjects not earlier than Grade 2. In secondary school, Filipino and English are the primary languages of instruction, with the learner's mother tongue taking on a supporting role. After pilot tests in selected schools, the MLE program was implemented nationwide from School Year (SY) 2012-2013.

Because Tagalog is the language spoken by a vast number of Filipinos, many instructional materials were written using the language. However, Tagalog has several

subvarieties, each of which has nuances that are distinguishable in various speakers according to their geographical location.

Tagalog varieties. Sundita (2206) claimed that, currently, no comprehensive study of the dialect has been done in the Tagalog-speaking regions, although differences in the different Tagalog dialects are described in the form of dictionaries and grammars books. The Ethnologue lists the following geographical areas as using the Tagalog dialect: Manila, Lubang, Marinduque, Bataan (Western Central Luzon), Batangas, Bulacan (Eastern Central Luzon), Tanay-Paete (Rizal-Laguna), and Tayabas (Quezon). However, there are four main dialects, of which the aforementioned are a part: Northern (exemplified by the Bulacan dialect), Central (including Manila), Southern (exemplified by Batangas), and Marinduque

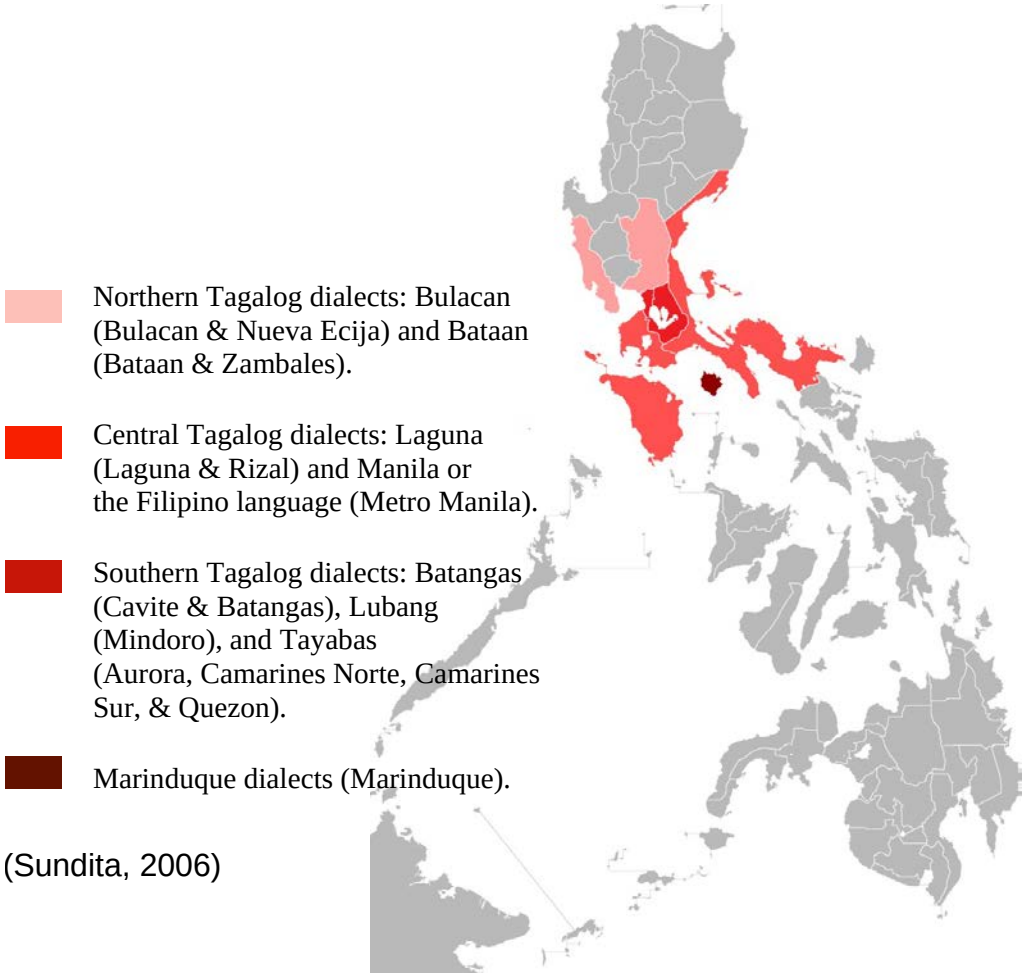


Figure 1. Distribution of Tagalog dialects in the Philippines.

The color-schemes represent the four dialect zones of the language: Northern, Central, Southern and Marinduque. While the majority of residents in Camarines Norte and Camarines Sur traditionally speak Bikol as their first language, these provinces nonetheless have significant Tagalog minorities. In addition, Tagalog is used as a second language throughout the country. (Source: Sundita, 2006).

Some examples of these differences are provided by Sundita (2006) in his article, *The Tagalog Language*:

- Many Tagalog dialects, particularly those in the south, preserve the glottal stop found after consonants and before vowels. This has been lost in standard Tagalog. For example, standard Tagalog *ngayón* (now, today), *sinigáng* (broth stew), *gabí* (night) *matamís* (sweet), are pronounced and written *ngay-on*, *sinig-ang*, *gab-i*, and *matam-is* in other dialects.
- In Teresian-Morong Tagalog, [r] is usually preferred over [d]. For example, *bundók*, *dagat*, *dingdíng*, and *isdâ* become *bunrók*, *ragat*, *ringríng*, and *isrâ*, e.g. "sandók sa dingdíng" becoming "sanrók sa ringríng".
- In many southern dialects, the progressive aspect infix of *-um-* verbs is *na-*. For example, standard Tagalog *kumakain* (eating) is *nákáin* in Quezon and Batangas Tagalog. This is the butt of some jokes by other Tagalog speakers, for should a Southern Tagalog ask *nákáin ka ba ng patíng?* ("Do you eat shark?"), he would be understood as saying "Has a shark eaten you?" by speakers of the Manila dialect.
- Some dialects have interjections which are considered a regional trademark. For example, the interjection *ala e!* usually identifies someone from Batangas as does *hane?!* in Rizal and Quezon provinces.

Soberano (1980) claims that the most divergent Tagalog dialects are probably those spoken in Marinduque. She identifies two dialects, western and eastern, with the former being closer to the Tagalog dialects spoken in the provinces of Batangas and Quezon.

One example is the verb conjugation paradigms. While some of the affixes are different, Marinduque also preserves the imperative affixes, also found in Visayan and Bikol languages, that have mostly disappeared from most Tagalog early in the 20th century; they have since merged with the infinitive (Sundita, 2006).

With a number of Tagalog varieties mentioned, this study highlights the Bulacan-Tagalog variety in developing a science instructional material for Grade 3, one that is not too deep and that can easily be understood by learners. This is in response to the challenge presented by Arzadon et al. (2016) that while schools use instructional materials in the mother tongue, the language variety used for kindergarten up to Grade 3 contains the “deep” variety, which are not familiar to children.

Development of Instructional Materials

From 2010 to 2014, several instructional materials such as reading primers, big books, lesson exemplars and other materials in mother tongue have been developed in different regions. There had been regional MTB-MLE trainings, finalization of orthographies, development of teachers’ guides, and distribution of these learning materials (Arzadon et al., 2016).

Concomitant to these changes was the preparation for two additional senior high years to the 10-year basic education program. Because of these simultaneous events, lapses in the implementation of mother tongue as MOI were observed along the way. According to Arzadon et al. (2016), there was a time when Grade 1 classes were already using the mother tongue but Kindergarten classes were using English.

During its piloting, teachers went ahead with their classes without being provided the teachers' guides and the complete set of materials. In addition, the schools piloted MTB-MLE on their own without sufficient coaching and monitoring.

After one year of piloting, no adequate evaluation and planning were conducted because more materials had to be developed and thousands of teachers had to be trained. When materials were developed, there was not enough time for development (especially pilot-testing) of materials, including reproduction and delivery, especially to schools in far-flung areas. Some teachers even claimed that there were mistakes in the produced materials. Moreover, there is a constant change of teacher assignments in DepEd, aside from shifts in subjects they handle. In the interview the researcher conducted with Grade 3 science teachers, two of them have been teaching for more than 20 years and yet taught science subject only for five or six years. This means that in previous years, they were teaching subjects other than science.

It was also observed that a specific local language was assigned as medium of instruction (MOI) for each particular division without careful and thorough language mapping. As a result, there were reports of mismatch between the designated MOI and what the learners actually speak. In other places, the choice for MOI rested on the school. All these lapses, coupled with a lack of a solid program for advocacy and social preparation, resulted in resistance from teachers, schools administrators, parents, and the community (Arzadon et al., 2016).

Arzadon et al. (2016) revealed that to address the lack of and non-delivery of teachers' guides and learning materials, digital copies have been uploaded in Learning Resource Management and Development System (LRMDS). LRMDS is an online clearinghouse and repository of learning, teaching, and professional development resources. Regional and division offices likewise created their online databases where contextualized materials may be uploaded for their own use.

Despite efforts to address the problem, still a number of issues were raised against the MTB-MLE. Thus, in 2015, DepEd began to implement a more systematic process. Language mapping was done, and an information system was introduced. Teachers' trainings are now based on research and even smaller languages (that were not included in the 19 supported languages) are being addressed through the Indigenous People Education Program (Arzadon et al., 2016).

This present study aims to address many of the issues that were observed in the produced instructional materials by DepEd in terms of contextualization. Moreover, the current study may be also uploaded in the LRMDS for teachers to use and to provide an exemplar for others who want to do a similar instructional material using another mother tongue.

Contextualized instructional materials. The implementation of the MTB-MLE does not only require the use of mother tongue as MOI but also the development of instructional materials that would support instruction (RA 10533). Thus, in 2012, the first 12 priority languages were selected that included Tagalog, Kapampangan, Pangasinense, Iloko, Bikol, Cebuano, Hiligaynon, Waray, Tausug, Maguindanaoan, Maranao, Chabacano. Seven other languages were added to the list in 2013: Ibanag, Ivatan, Sambal, Aklanon, Kinaray-a, Yakan, and Surigaonon (DepEd DO No. 16 s. 2012; DepEd DO No. 28, s.2013).

Other languages not included in the list may also be used as MOI in the school provided it will be supported by instructional materials in the same language. Instructional materials development is also supported by NGOs and colleges/universities in the regions. In a regional training in 2012, there were at least 50 languages that were used. Later, in 2015, the increased DepEd support for Indigenous Education Program allowed the development of MTB-MLE materials in more IP languages.

While there have been support from DepEd, developing contextualized instructional materials is not without challenges. The study of Mangila (2018) who examined the extent of cultural relevance of the instructional materials used by elementary teachers in mother tongue revealed that instructional materials used by teachers in teaching the mother tongue subject are not culturally relevant as inconsistencies exist on the cultural messages contained in them. This was supported by Moran (2001) who claimed that some of these textbooks are not even culturally relevant to students.

Because developing culturally relevant instructional materials is one of the primary goals of the MTB-MLE Program, contextualization is necessary. Thus, involvement of and the support from community members such as elders, educators, parents, and local “experts” are regarded in creating culturally relevant instructional materials (Ball, 2010; UNESCO, 2003). Furthermore, learners’ knowledge, skills, stories, songs, and culture can also be conceived as educational resources (Malone, 2007).

One benefit of using contextualized materials is the use of whole-brain learning approaches in the transfer of cultural knowledge. According to Saurman and Stallsmith (n.d.), folklore, music, drama, and dance are forms of communication that naturally provide a variety of activities for different learning styles. They claimed that these cultural expressions also encourage the use of the local language, thereby providing learners with opportunities for using the first language that can aid the acquisition of the second language. They added that cultural art forms, such as songs, poems, dances, dramas and visual arts, are usually integrated into classroom-based contextualized lessons.

In addition to providing effective whole-brain learning strategies, they believed that these are also the means for intergenerational transmission of values, beliefs, and

history. They likewise concluded that local songs and performances can also function as mnemonic devices for learning, memorization, and integration of important cultural or life information. This integration is only possible with the support of the community and other stakeholders in the effort to gather and create instructional materials that contain these.

According to Sumarmi (2012), constructivist strategies must be used to contextualize learning. Contextual approach prepares learners and develops their own understanding and comprehension of new experiences based on prior knowledge. Constructivist approach emphasizes the process, a bottom-up instead of top down, cooperative learning, discovery learning, critical thinking and asking. Learners will learn very well when they learn actively, using a holistic approach, direct experience, integrated and practical with the guidance of teachers.

According to Henson (2003), the learning conditions must be created by teachers so that learners are free to build knowledge, feel comfortable, get interested, and challenged. Therefore, constructivist learning should be encouraged including teaching materials which are designed based on constructivism.

Research by Faisal (2005) and Rohati (2011) proved that learners who use teaching materials developed by REACT strategy (Relating, Experiencing, Applying, Cooperating, Transferring) are able to bring a new atmosphere to learning. In fact, learners are motivated to enrich the learning experience so that learning outcomes increase. Koohang (2009) stated that teaching materials developed using constructivist design provide opportunities for learners to undertake activities to get new information and participate in more diverse learning activities because it is designed for projects, field study, presentation and reflection, as well as problem solving and group interaction.

REACT strategy as a contextual learning is at the core of the constructivism principles. Crawford (2001), Sumarmi (2012), and CORD (1999) describe the REACT strategy component in learning, namely:

Relating. Learning in the context of life experience. It is the kind of contextual learning that typically occurs with very young children. As children grow older, however, providing this meaningful context for learning becomes more difficult. The curriculum that attempts to place learning in the context of life experiences must, first, call the pupil's attention to everyday sights, events, and conditions. It must then relate everyday situations to new information to be absorbed or for a problem to be solved.

Experiencing. Experiencing learning in the context of exploration, discovery, and invention is the heart of contextual learning. However motivated or tuned-in learners may become, as a result of other instructional strategies such as video, narrative, or text-based activities, passive. And learning appears to "take" far more quickly when learners are able to manipulate equipment and materials and to do other forms of active research.

Applying. Applying concepts and information in a useful context often projects learners into an imagined future (a possible career) or into an unfamiliar location (a workplace). In contextual learning, applications are often based on occupational activities. This happens most commonly through text, video, labs, and activities. In many schools, contextual learning experiences are followed up with firsthand experiences such as plant tours, mentoring arrangements, and internships.

Collaborating. Collaborating is practiced in the context of sharing, responding, and communicating with other learners. It is a primary instructional strategy in contextual teaching. The experience of cooperating not only helps the majority of learners learn the material. It also is consistent with the real-world focus of contextual teaching. Employers espouse that employees who can communicate effectively, who

share information freely, and who can work comfortably in a team setting are highly valued in the workplace. Thus, teachers should encourage learners to develop collaborative skills in the classroom. Also learners must cooperate to complete small-group activities. Partnering can be a particularly effective strategy for encouraging learners to cooperate.

Transferring. Learning in the context of existing knowledge, or transferring, uses and builds upon what the pupil already knows. Such an approach is similar to Relating, in that it calls upon the familiar. Most traditionally taught learners, however, rarely have the luxury of avoiding new learning situations; they are confronted with them every day. Teachers can help them retain their sense of dignity and develop confidence if they make a point of building new learning experiences on what the learners already know.

Thus, instructional materials must be developed in consideration of this REACT strategy to make it contextualized.

Community involvement. Aside from the teachers and schools, the local community of the public schools, such as local government agencies, educational institutions, and families of learners must contribute in developing the instructional materials. In fact, areas perform better where there is strong support from the community, which shows that the community can be a resource for the development of the MTB-MLE program.

One form of support from the community, according to Arzadon et al. (2016), is the production of teaching materials such as big books and instructional materials by local government units and private press. This support addresses the challenge of the lack of instructional materials in the mother tongue.

In the same study, the Municipality of Buguias provided support for the reproduction of materials. In another instance, printing presses in Iloilo and in Antique

(Panay Islands) produced instructional materials written in Hiligaynon and Kinaray-a. The same is observed in MTB-MLE communities in Bukidnon and Zamboanga, where materials were developed and produced through the collective efforts of the school, parents, and the community. The whole community served as a resource and support in the process of educating the children in the community.

In Bukidnon, the community organized the Language Education and Development (LEAD), a people's organization and support group composed of stakeholders who desire to pursue and support MTB-MLE. The group includes parents, tribal and political leaders, teachers and principals, businessmen, artists and constituents from teacher education institutions. The group plans to produce more materials not just in Higaonon but in the other languages in Bukidnon. They are in the process of collecting more local stories and recording histories from different areas and in different languages (Arzadon et a., 2016).

Another area of MTB-MLE where the community must be involved is in orthography development. Due to the need to contextualize learning materials, the language must be written using a widely-acceptable spelling system because word usage, whether spoken or written, varies from one community to another within the same province or region. The more acceptable form of developing language orthography is to not to have an expert or linguist decide on the standard; instead, allow the speakers of the language in the community come together to discuss both the linguistic and non-linguistic issues associated with orthography development such as standardization, representation, transparency, acceptability (Yoder, 2017).

Factors to consider in preparing instructional materials for young learners. There are various frameworks being followed in developing instructional materials for young learners such as Marzano's (1984) theoretical framework for an instructional model of higher order thinking skills, Universal design for learning,

Ambrose's et al. (2013) contextualization framework, the Philippine Science Framework for Basic Education (2011), the DepEd framework for contextualized learning resources for LRMDS (2011), the IPED Framework under Key Elements of an Indigenous Peoples Education Curriculum (DepEd Order No. 32 S. 2015) and the DepEd Region 3 contextualization framework (2016), among others.

For example, in preparing instructional materials for science, the framework used is organized around three interlocking components, namely: (1) inquiry skills, (2) scientific attitudes, and (3) content and connections. Being interrelated, these components are woven together in order to support the holistic development of a scientifically literate individual. Its basic purpose is to provide a structure around which educators, curriculum developers, textbook writers, and teachers can develop instructional materials incorporating coherent learning activities and experiences that prepare learners to become scientifically literate in a dynamic, rapidly changing, and increasingly technological society.

In developing instructional materials in language, on the other hand, authentic materials are preferred over developed materials. In this study, because the instructional material to be developed is in science, authenticity will be given its place. These types of materials not only provide authentic cultural information about the target language, but they also have a positive effect on learner motivation because they are intrinsically more interesting and motivating than developed materials (Phillips & Shettlesworth, 1978; Clarke, 1989; Peacock, 1997).

The following are the factors to consider in developing instructional materials for young learners, according to Lagata (2016) and DepEd's Evaluation Rating Tool for Developing Modules:

Size. It is a must that the material is big enough to be seen by the farthest learners in the classroom. If it is a reading material, the font size and font style to be

used must be appropriate to the age of the learners. Font style for Grades 1 to 4, based on Deped's Evaluation Rating Tool for Layout and Design should be 12-14. The lower the grade level, the higher the font size.

Color and layout. Learners are more interested with materials which are colorful and beautiful. Young learners are more attracted to bright colors because it easily catches their attention and thus facilitates the learning process. Layout must also be attractive, with balanced illustrations.

Durability. Developers must meet the criteria on durability. Instructional materials are not made for one session only. They must last for many years so that it can be reused. Durable materials are also cost-effective in that they do not require printing often.

Language. It should use non-sexist language and must be devoid of stereotypes. It should provide insights on multiculturalism and diversity. Likewise, subject matter, language content to be covered, and the skills to be acquired through the content must be explicit.

Technical details. Extra textual components like cartoons and other graphics must be included to make it more appealing to young learners.

Aside from these factors, it also considered flexible approaches to instruction and content presentation based on universal design for learning (UDL), which make it easier for students to customize and adjust content to suit their individual learning needs. For instance, learners were given various options to learn the lesson. Embedded in the material are video links that learners can watch. However, in case learners do not have internet access, alternative forms are provided such as handouts, illustrations, and detailed explanations that would compensate for lack of access to video lessons. The video lesson, as anchored on UDL, aims to target learners who have particular needs related to sensory, physical, and/or cognitive impairments.

Moreover, instructional materials are accessible in various formats such as hard copies, soft copies, and handouts in the form of modules to give way for flexible learning models.

One of the research questions that this study aims to answer is to identify a framework that may be used to design contextualized instructional materials in Bulacan-Tagalog. In addition to using the DepEd's proposed process and combining it with Valdriz's (2016) framework, this study also considered the aesthetic factors and other technical details to make the instructional materials appealing to young learners.

Science Curriculum Framework for Basic Education in the Philippines

The Philippine Science Curriculum Framework for basic education is a product of a series of brainstorming and marathon sessions of the Science Education Institute of the Department of Science and Technology (SEI-DOST) and the University of the Philippines National Institute for Science and Mathematics Education Development (UP NISMED). The goal of this group is to meet the technological demands of science education for Grades 1-10. It aims to produce scientifically literate citizens and decision makers through carefully crafted lesson goals and content in the subject. "It takes into account emerging social and global issues and concerns, new international trends in curriculum planning and design, and other pedagogical developments" (SEI-DOST & UP NISMED, 2011, p. 3).

This curriculum framework serves as a resource for curriculum developers, faculty of teacher education institutions, teachers, school administrators, and policy makers to design, implement, and assess the content of the science curricula. It can also help schools, teachers, and instructional materials developers in addressing the needs of learners to prepare them for the world of work, for pursuing their interest in science and related fields, and to become responsible citizens.

This literature is included in this study because its basic purpose is to provide a structure around which educators, curriculum developers, textbook writers, and teachers can develop instructional materials incorporating coherent learning activities and experiences that prepare learners to become scientifically literate. This is accomplished by focusing on the science framework of the SEI-DOST and UP NISMED (2011), which are exemplified in the developed instructional material in science: (1) inquiry skills, (2) scientific attitudes, and (3) content and connections. Each component is essential in supporting the holistic development of a scientifically literate individual.

The following are the Guiding Principles of the Science Curriculum Framework, which are applied in the developed science instructional material:

Science is for everyone. This principle recognizes the proactive relationship between science and society. This means putting science into the service of individuals and society. Science education should aim for scientific literacy that is operational in understanding oneself, common human welfare, social, and civic affairs. Science is valued by society because the application of scientific knowledge helps to satisfy many basic human needs and improve living standards. Finding a cure for cancer and a clean form of energy are just two topical examples (Rull, 2014). The concepts taught in science, therefore, aims to equip individuals on how to effectively function in a society. This is emphasized in the developed instructional material through the *Iugnay* domain.

Science is both content and process. Science content and science processes are intertwined. The value of science processes is to advance content or the body of knowledge. Without content, learners will have difficulty utilizing the science process skills. Science processes cannot exist in a vacuum. They are learned in context. School science should emphasize depth rather breadth, coherence rather

than fragmentation, and use of evidence in constructing explanation. In the developed instructional material, science content is taught by allowing learners to experience the process itself. They are provided the context for learning, whether at home, in the school setting, or in their own communities. Learners are not just taught scientific knowledge, but are provided with a basic understanding of how science can be applied in everyday situations. This is exemplified through the Isagawa part of the developed instructional material.

School science should be relevant and useful. To be relevant and useful, the teaching of science should be organized around situations, problems or projects that engage the learners both as an individual and a member of a team. This principle highlights contextualization particularly in the aspect of *Ilapat* and *Ibahagi*. The activities provided in the developed science instructional material exemplifies the relevance and practicality of science concepts taught through experiments and real world applications at home and in the community.

School science should nurture interest in learning. Learners are generally interested in problems that puzzle them. They have a natural urge to find solutions. Organizing the curriculum around problems or phenomena that puzzle learners helps motivate them to learn. Rather than relying solely on textbooks, teachers are encouraged to use hands-on learning activities to develop learners' interest and let them become active learners. This is another principle addressed in the developed instructional material. In all lessons, learners are asked to solve problems through experiments that provide them avenues to discover and engage in activities that could develop their curiosity through the *Isagawa* and *Itawid* stage .

School science should demonstrate a commitment to the development of a culture of science. A culture of science is characterized by excellence, integrity, hard work, and discipline. School science should promote the strong link between

science and technology, including indigenous technology. This aspect is highlighted in all the parts of the instructional material. In the *Iugnay* part, learners are linked to technology through watching provided videos. The tasks and activities provided in the material also allow them to hone their technological skills through the use of computer, internet, and social media in accomplishing the activities under the *Isagawa* and *Itawid* part of the instructional material.

School science should recognize that science and technology reflect, influence, and shape our culture. The science curriculum should recognize the place of science and technology in everyday human affairs. It should integrate science and technology in the civic, personal, social, economic, and the values and ethical aspects of life. These guiding principles for the science curriculum framework, proposed by SEI-DOST and UP NISMED (2011), were reflected in the developed science instructional material for Grade 3 learners. All parts of the proposed framework, the 5Is model, exemplifies all science principles from the Iugnay to Itawid stage.

By incorporating the guiding principles of the science curriculum framework in developing science instructional materials in the mother tongue, learners will have more opportunities to learn how to read, write, and discuss science as they learn to use the core ideas, cross-cutting concepts, and practices of science to develop explanations for natural phenomena or to solve problems (Callahan, Sampson, & Rivale, 2019). Moreover, teaching science using the mother tongue, learners may participate in the practices of science while strengthening both their mother tongue and scientific literacy skills. This type of language-intensive instructional approach can also help learners develop and maintain scientific attitudes (Callahanet al., 2019).

Because learners are linguistically and culturally diverse, science teachers must be prepared to face such diversity to teach effectively (Bruna, Vann, & Escudero,

2007). One way to teach science in such a challenging context is to integrate its teaching with literacy (Carrier, 2005; Lee & Buxton, 2013; Lee & Fradd, 1998; Stoddart et al., 2002). Research has indicated that this combination has a much stronger impact on achievement than when either is taught singly (Amaral, Garrison, & Klentschy, 2002; Bravo & Garcia, 2014). Learners become capable speakers of a language when participating in using it for some purpose rather than for its own sake (Roth, 2005). Therefore, integrating science literacy and language learning has considerable positive impacts in science education (Bruna et al., 2007; Cuevas, Lee, Hart, & Deaktor, 2005).

According to the National Council of Teachers of English (NCTE), literacies are "multiple, dynamic, and malleable" (2013, para. 1) and includes verb usage like that of science inquiry skills such as solve, design, analyze, create, and critique. Therefore, integrating science inquiry and literacy is not at odds pedagogically or in practice. (Reid, Smith-Walters, Mangione, Dorris, & Tharp, 2019)

The concept of integrating science inquiry and literacy is supported by eight local studies namely, the Iloilo experiments (1948-54; 1961-64), Cebu Experiment (pre-1960s), Antique Experiment (1952), Rizal Experiment (1960-66), First Language Component-Bridging Program (1986-93), Lingua Franca Project (1999-2001), Lubuagan MLE Program (1998 to 2012), and Culture-Responsive Curriculum for Indigenous People-Third Elementary Education Project (2003-2007), which established that the use of mother tongue significantly improves learners' reading ability, making them perform better in math and science, and enabling them to learn the official languages, Filipino and English, more quickly.

Again this correlation is highlighted in the 2019 result of the Trends in International Mathematics and Science Study (TIMSS) by the International Association for the Evaluation of Educational Achievement. Results revealed that 13

percent of Filipino Grade 4 learners were in the low benchmark in science, which means that students show limited understanding of scientific concepts and limited knowledge of foundational science facts (Bernardo, 2020). Eighty-one percent of Filipino students did not even reach this level. Meanwhile, five percent were under the intermediate benchmark, which means they have demonstrated " knowledge and understanding of some aspects of science," while only 1 percent can "communicate and apply knowledge of life, physical and Earth sciences," under the high benchmark.

In mathematics, 19 percent of Filipino students reached the low benchmark, which means they are able to "have some basic mathematical knowledge." Seventy-four percent did not even manage to achieve this level. Only six percent of students "can apply basic mathematical knowledge in simple situations," falling under intermediate benchmark, while only one percent falls under the high benchmark, which enables them to "apply conceptual understanding to solve problems." Prior to this, Filipino students ranked last among 79 countries when it came to reading comprehension in 2018 (Mendoza, 2020).

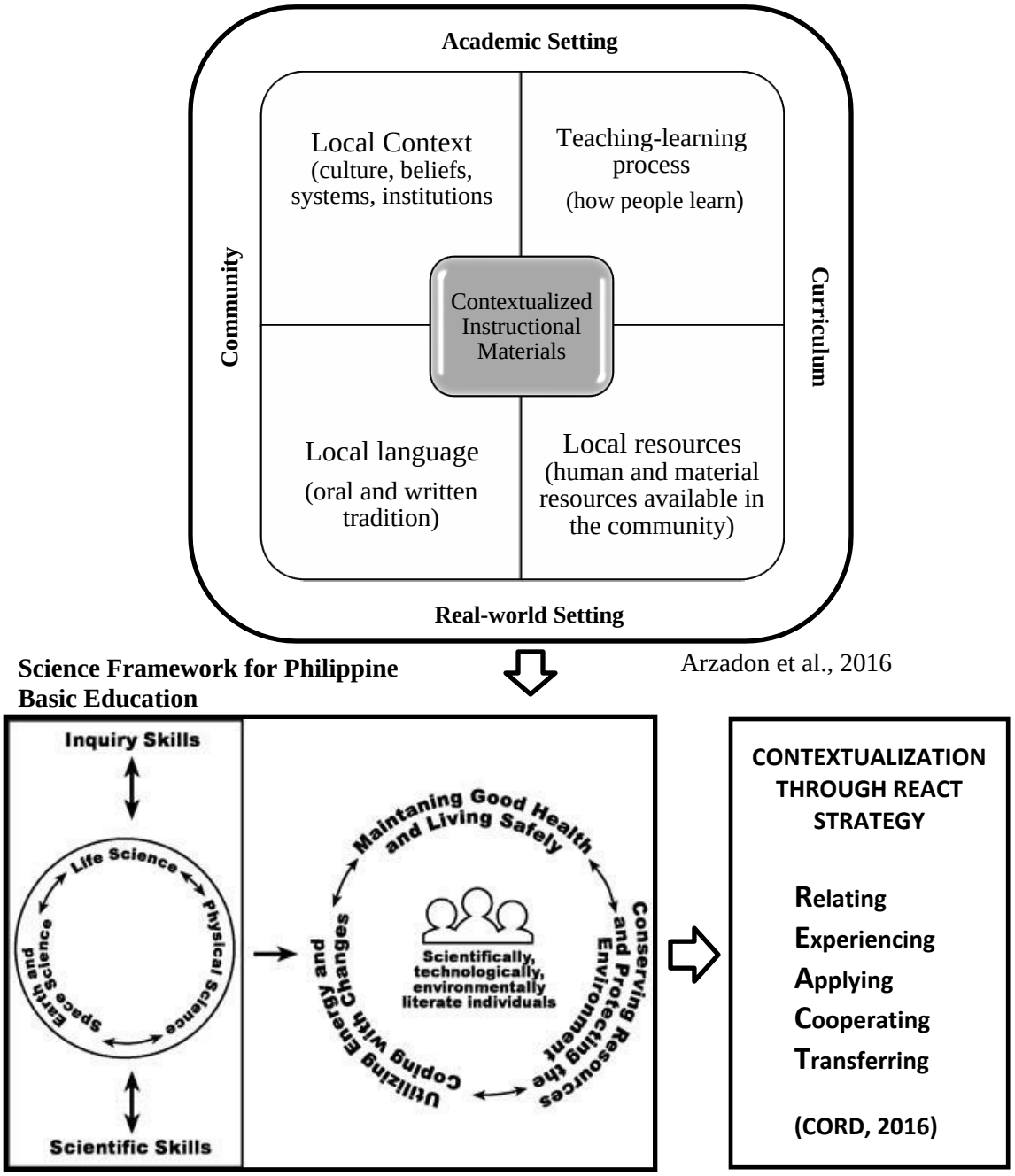
Again, this exemplies the connection between science, math, and reading. The poor performance in literacy (reading) could also spell poor performance in other literacies such a scientific literacy and numeracy as this argument has established. The link between science, numeracy, language, and culture cannot be undermined. Thus, it is crucial to link literacy with science content in teaching science especially for young learners.

This survey of literature revealed the importance to develop contextualized instructional materials in mother tongue for the early grades, particularly Grade 3 learners. While DepEd has produced instructional materials in the mother tongue, these are still limited (Alberto, Gabinete, & Rañola, 2016). Because not all Grade 3

teachers have the appropriate educational background to produce contextualized learning materials, providing an exemplar would help meet this need.

This study focused on developing contextualized science instructional material for Grade 3 learners using the Bulacan-Tagalog as the medium of instruction that aim to develop scientific skills in learners. This study likewise aims to contribute to the dearth of contextualized sources of instructional materials, having established in the literature that aside from the lack of instructional materials, those that are existent are not fully contextualized (Cruz, 2015).

Conceptual Framework



Sources: DepEd Region 3's Proposed Framework for Developing Instructional Materials (Valorize, 2016), Science Framework for Philippine Basic Education by SEI-DOST and UP NISMED (2011), and the REACT Strategy by CORD.

Figure 2. Combined frameworks of Arzadon et al.'s (2016) Elements in the Localization of the Curriculum, Science Framework for Philippine Basic Education (2011), and the REACT Strategy (CORD, 2016).

Figure 2 shows the proposed framework of the researcher in developing contextualized Grade 3 science instructional materials in Bulacan-Tagalog. The top

box was adapted from Arzadon et al.'s (2016) Elements in the Localization of the Curriculum that considers the academic setting, the community, curriculum, and real-world setting in designing learning teaching-learning process. As shown in the figure, the framework highlights the four contexts in developing the materials. According to DepEd, in learning content, the use of local information (upper-left quadrant), local resources (lower-right quadrant), local stories (lower-left quadrant), in contextualizing the teaching-learning process (upper-right quadrant) must all be considered. In developing the instructional materials, these four quadrants must be present:

Local context (upper-left quadrant). In analyzing the instructional materials used by Grade 3, examples used in lessons should start with those in the locality or the community. The two towns as described under the locale of this study were considered. Thus, the culture of these towns are reflected in the activities and examples provided in the developed instructional material. For example, in preparing breakfast under Unit 1, *Ilapat*, "longganisang bawang" was given as an example for which Town 1 was famous for.

Local resources (lower-right quadrant). Local materials are used as often as possible in making instructional materials. In addition, local stories, songs, art, personalities, among others, are used in the language learning areas. For science classes, examples that can be found in the local setting should be used. For instance, in the designed instructional materials, local resources utilized were those found at home. Examples for liquids were cooking oil, soy sauce, and vinegar, among others.

Teaching-learning process (upper-right quadrant). The K to 12 curriculum framework highlights the importance of context in shaping the curriculum, and consequently, the teaching-learning process. Classroom lessons will be incorporated with actual visits to the community to make learning more meaningful to the learners.

Local language (lower-left quadrant). Because the particular instructional material is for science that uses the local language as the medium of instruction, Bulacan-Tagalog, the local language or the mother tongue spoken in the community will be considered, both oral and written.

Contextualized teaching and learning. Contextualized teaching and learning (CTL), also known as contextualized instruction, is defined as a "diverse family of instructional strategies designed to more seamlessly link the learning of foundational skills and academic or occupational content by focusing teaching and learning squarely on concrete applications in a specific context that is of interest to the pupil" (Mazzeo, 2008, p. 3; see also Medrich, Calderon, & Hoachlander, 2003). In other words, CTL is a process built on the recognition that some learners learn more effectively when they are taught in a hands-on, real-world context rather than in an abstract manner (Baker, Hope, & Karandjeff, 2009; Bond, 2004; Predmore, 2005).

The primary goal of CTL is to utilize the "context supported by traditional academics to drive instruction" thus engaging learners in active learning to assist them in making meaning (Badway, 2010). Bond (2004) outlines the characteristics of CTL, as opposed to traditional academic models: focuses on concrete skills and knowledge needed in work and life; combines academic learning with workplace applications; personalizes instruction for each pupil; presents abstract ideas through the senses; indicates utility or usefulness of information; provides factual information during hands-on experiences so that it immediately makes sense; and presents information in small increments instead of large chunks or thick books.

Contextualization of the Curriculum

RA 10533 is not the first law that attempts to contextualize the basic education curriculum. In fact, the idea was already introduced through RA 9155, or The Governance of Basic Education Act of 2001. The Act mandates schools and learning

centers to reflect the values, needs, and aspirations of a school community in the program of education. It likewise empowers schools and learning centers to make decisions on what is best for the learners they serve.

Concomitant to the new K to12 curriculum, regional and division offices have been tasked to develop the Curriculum and Learning Management (CLM) System to support the implementation of the new curriculum. The system sets standards, processes, and tools to facilitate the implementation of the program. The steps in the process involved are curriculum contextualization, proper programming (planning, advocacy, piloting, region-wide implementation and assessment), provision of technical assistance, utilization of the LRMDS, research, and monitoring and evaluation.

Curriculum contextualization, a major component of the CLM System, is described as a means to enhance the standardized curriculum and make it culturally responsive through the use of local learning systems with local content, language, resources and learning processes with an end of improving learners' performance, taking pride in one's culture, and developing a strong commitment to the community.

In contextualizing the curriculum, it is important that localized instructional materials are used to support it. The contextualization process involves the communities and other stakeholders in developing the mother tongue-based materials. It also considers the local, geographical, political, and socio-cultural contexts along with the local content (concepts, ideas, cultural practices, and belief), local language, indigenous learning process (how they learn like thru oral or expressive arts) and local resources. All these are integrated with the national curriculum and become the basis for the development of instructional materials and teachers' training.

Materials (soft and/or hard copies) produced in the contextualization process are curated, catalogued, and archived in the web-based repository called Learning Resource Management and Development System (LRMDS). The site bears information on quantity and quality of materials (title, function and language used) and where these materials (printed and digitized form) are located. LRMDS also provides standards and guidelines in the evaluation, modification, production, storage, publication, and delivery of materials.

Building on the Science Framework for Philippine Basic Education developed by the University of the Philippines National Institute for Science and Mathematics Education Development as its overall framework, the contextualization framework used for designing contextualized materials is the REACT strategy.

The Science Framework is built around three interlocking components, namely: (1) inquiry, (2) scientific attitudes, and (3) content and connections. Being interrelated, these components are woven together in order to support the holistic development of a scientifically literate individual.

Inquiry skills. Science is a way of thinking about and investigating the world in which we live. This component addresses those skills scientists use to discover and explain physical phenomena. These skills include *asking questions about the world*, *designing and conducting investigations, employing different strategies to obtain information, and communicating results*. Activities such as scientific investigations, experiments, project work, field work, group discussion, and debates allow learners to be actively engaged in the following processes.

Scientific attitudes. Another component of the Science Curriculum Framework involves the development of certain attitudes in learners. These refer to values and habits of mind which are especially important in science and are necessary if learners are to become lifelong learners and productive citizens such as critical

thinking, curiosity, creativity, intellectual honesty, accuracy, objectivity, independent thinking, active listening, assuming responsibility, taking initiative, and perseverance. Such attitudes should be developed in learners as they are crucial in helping learners appreciate the pleasure of learning to learn and to reduce their dependence on transmission of knowledge.

Content and connections. None of the basic process skills associated with science such as observing, measuring, classifying and inferring, is unique to science. However, in science, these process skills are given meaning by the context of the subject matter under investigation. The content areas in the framework give such context. In this Science framework, there are three content areas covered: (1) life science; (2) physical science; and (3) earth and space science.

This framework does not cover every science content in a school science curriculum. Rather, it is organized around core or big ideas, which are broad, important understandings that learners should understand and retain long after they have completed their basic education. These big ideas link seemingly different, isolated, and unrelated facts and phenomena to a coherent whole. They help unify the curriculum to avoid a loosely connected array of topic-driven lessons. Moreover, skills learned in science content must also be transferrable to other subjects and must be applied to new knowledge.

These three components are integrated in the developed instructional materials. In terms of contextualization, the REACT strategy is used. Curricula and instruction based on contextual learning strategies should be structured to encourage five essential engagement strategies: relating, experiencing, applying, cooperating, and transferring. These strategies guide teachers to create learning experiences that would require their active participation. In this strategy, learners are taught how to carefully observe and record data, for example, or how to communicate effectively as

part of a group, which is aligned with the Science Framework. The REACT strategies are designed to help learners build new skills and knowledge regardless of their starting point.

Relating. This strategy allows learners to learn in the context of life experience—everyday sights, events, and conditions—so that they can relate those familiar situations to new information to be processed or problems to be solved.

Experiencing. This scheme provides opportunities to learn in the context of exploration, discovery, and invention, which is the heart of contextual learning. However motivated learners are as a result of other instructional strategies such as video- or text-based activities, these remain relatively passive forms of learning. And learning is much more reinforced if learners are able to manipulate equipment and materials.

Applying. This is exemplified by using new concepts and information in a useful context that allows learners to envision future success in careers and postsecondary education. In contextual learning courses, applications are often based on occupational activities—ideally authentic, non-contrived, real-world tasks. These contextual learning experiences may be supplemented with presentations by guest speakers and followed up with firsthand experiences such as plant tours, mentoring arrangements, and internships.

Cooperating. This strategy provides learners opportunities to learn in the context of sharing, responding, and communicating with others, which is considered the primary instructional strategy in contextual teaching. The experience of cooperating not only helps the majority of learners learn the material, but it also is consistent with the real-world focus of contextual teaching. Employers value employees who can communicate effectively, who share information freely, and who can work comfortably in a team setting. It is therefore the responsibility of teachers to

encourage learners to develop these cooperative skills while they are still in the classroom and can facilitate the process.

Transferring. Learning in the context of existing knowledge, or transferring, uses and builds upon what the learner already knows. Learning to transfer familiar information to new contexts helps learners approach unfamiliar situations and problems with confidence.

Theories Associated with Contextualized Instruction

The different theories considered in this study are problem-centered learning, social learning theory, and learning styles.

Problem-centered learning. This theory addresses learners' engagement with real-world problem-solving to develop a "deep foundation of factual knowledge and understand that knowledge in the context of a conceptual framework…and finally to facilitate the development of metacognitive skills" (Massa, 2008). The five components to an effectively designed problem-centered learning experience, as suggested by Merrill and Gilbert (2008, p. 207) are the following: a) engagement of learners in a progression of tasks leading to a logical conclusion, b) integration of new information with an everyday life skill and demonstration of that new knowledge c) activation of existing cognitive structures of recall and experience, enhanced through collaboration and demonstration, d) application of new knowledge followed by "intrinsic or corrective" feedback, and e) learner observation of skills and connection to concepts being learned, including peer discussion and demonstration.

This theory is relevant to this study because in contextualized instruction, the learning materials used provide concepts that integrate everyday life skills to new knowledge. It uses real-life examples and authentic materials that could activate learners' recall.

Social learning theory. The research on the effectiveness of contextualized teaching-learning strategies is well supported by theories involving collaborative learning. Collaborative learning, in turn, rests on social cognitive theories that claim learners learn better through peer interaction and connection. According to Gerlach (1994), learners learn within a social context rather than within the solitary confines of their own studying or by just listening to the instructor. This theory is related to the present study as contextualized learning encourages actual visits to the community, exchange of experiences, and peer interaction.

Learning styles. While learning is a social phenomenon, instruction must be differentiated based on learners' individual learning styles. Because learners have a wide variety of traits, experiences, and preferences to the learning task, effective instruction must consider these differences in which learners learn. Researchers tend to agree that there are some specific differences among learners that significantly impact the learning process. First and foremost is the role that prior knowledge and experience play in that process.

According to Svinicki (2004), "prior knowledge impacts what learners pay attention to, how they perceive and interpret what they are experiencing, and how they store new information based on what they already know" (p.185). This prior knowledge is not limited to what learners bring to the particular discipline, but also their cultural orientation and personal view of themselves and the world. In addition, differences in motivational factors also shape learning.

In order to accommodate the different learning style of learners, teachers resort to differentiated instruction. Differentiated instruction means giving students choices about how to learn and how to demonstrate their learning, evening the playing field for everyone. It is the way in which a teacher anticipates and responds to a variety of students' needs in the classroom. To meet students' needs, teachers differentiate by

modifying the content (what is being taught), the process (how it is taught) and the product (how students demonstrate their learning). Having choice helps boost student engagement in the task (Carlson, 2021).

Operational Definition of Terms

To provide clarity and understanding to the readers as they are using this study, the following terms are defined.

Authentic materials. Authentic texts have been defined as "…real-life texts, not written for pedagogic purposes" (Wallace, 1992, p. 145). They are therefore written for native speakers and contain "real" language. They are "…materials that have been produced to fulfill some social purpose in the language community." (Peacock, 1997, p. 2), in contrast to non-authentic texts that are especially designed for language learning purposes.

Contextualization. It refers to curriculum content and instructional strategies relevant to learners (DepEd Order 35, s. 2016, p. 7). Degrees of contextualization are localization and indigenization.

Deep language variety. Deep language variety is operationally defined in this study as the choice of words that are not generally used in conversational settings but are more used in formal settings. Azardon et al. (2016) defines "deep variety" as difficult terms used in the learners' materials that require additional time to search for the meaning of the words. These words have not been used by many for decades but DepEd instructional materials writers would want to revive them. Thus, they use these words in the instructional materials in the mother tongue. In the case of Bulacan Tagalog, deep language variety are words that are seldom used at home but are prolific in traditional literature. These are longer and more formal words, whose meanings are not easily understood without looking up the meaning in the dictionary.

Development. The creation and production of contextualized instructional materials.

Indigenization. It refers to the process of enhancing curriculum competencies, education resources, and related refers to the educational process of relating the curriculum to a particular setting, situation or area of application to make the competencies relevant, meaningful, and useful to all learners. As defined in this study, it is the “the process of matching the processes in relation to the bio-geographical, historical and socio-cultural context of the learners’ community (DO 35, 2016).

Language. Language is a formal system of signs governed by grammatical rules of combination to communicate meaning. This definition stresses that human languages can be described as closed structural systems consisting of rules that relate particular signs to particular meanings (Trask, 2007).

Learning Resource Management and Development System (LRMDS). It is an online clearinghouse and repository of learning, teaching, and professional development resources of the Department of Education. It also provides standards and guidelines in the evaluation, modification, production, storage, publication, and delivery of materials. At present, when the site is searched for MTB-MLE resources, it yields a total of 1,000 entries.

Localization. It refers to the process of relating learning content specified in the curriculum to local information and materials in the learners’ community (DO 35, 2016).

Medium of instruction (MOI). It refers to the language used to mediate teaching and learning the contents in both the schools and in the alternative learning system (ALS). It is also known as the language of learning and teaching. In this study, the MOI refers to Bulacan-Tagalog.

Mother tongue. Also known as the first language (L1), home language, native language or vernacular, refers to the language first learned by a child; which he or she identifies with or is identified as a native speaker of by others; or which he or she knows best and uses most. In the MTB-MLE Program, *mother tongue* gained an administrative meaning. It may now refer to a new subject area in grades one to three which is called *Mother Tongue* or MT. It can also mean the language assigned to a school to be the medium of instruction in Mother Tongue and various subject areas from Kindergarten to Grade three. In this study, it refers to the Bulacan–Tagalog language, which is the mother tongue in Bulacan.

Mother tongue instruction. It generally refers to the use of the learner's mother tongue as a medium of instruction for teaching and learning and is used to also mean mother tongue as a subject of instruction.

Mother tongue based multilingual education (MTB-MLE). It refers to the use of more than two languages for literacy and instruction. It starts from where the learners are, and from what they already know. This means learning to read and write in their first language or L1, and also teaching subjects like mathematics, science, health and social studies in the L1.

Official language. The official languages of the Philippines are Filipino and English. Other languages enjoy official status to a certain degree. Ilokano is an official language of the province of La Union. In this study, it refers to the 19 official languages of the mother tongue based multilingual education program. These are Tagalog, Bulacan, Pangasinense, Iloko, Bikol, Cebuano, Hiligaynon, Waray, Tausug, Maguindanaoan, Maranao, Chabacano, Ibanag, Ivatan, Sambal, Aklanon, Kinaray-a, Yakan, and Surigaonon.

Pure language. "Purism" is a concept that is characterized by the following: there is a pure language variety; its purity must be maintained; and purists are often

uncompromising in their attitudes toward language (Brousseau, 2011). In this study, however, pure language refers to a variety of language used dominantly by speakers at the heart of the region where the language is spoken. This is the language spoken in the area that is not mixed with other languages due to proximity in other provincial borders or regions.

Second language. It refers to a language or languages learned by a person after his/her mother tongue (L2).

Variety. A language variety, also called an isolect or lect, is a specific form of a language or language cluster. This may include languages, dialects, registers, styles, or other forms of language, as well as a standard variety (Meecham, Rees-Miller, 2001).

The use of the word *variety* to refer to the different forms avoids the use of the term *language*, which many people associate only with the standard language, and the term *dialect*, which is often associated with non-standard varieties thought of as less prestigious or "correct" than the standard (Schilling-Estes, 2006).

Dialect. A regional or social variety of a language characterized by its own phonological, syntactic, and lexical properties. A variety spoken in a particular region is called a regional dialect (O'Grady et al., 2001).

Registers. A *register* (sometimes called a *style*) is a variety of language used in a particular social setting. Settings may be defined in terms of greater or lesser formality, or in terms of socially recognized events, such as baby talk, which is used in many western cultures to talk to small children or as a joking register used in teasing or playing. There are also registers associated with particular professions or interest groups; jargon refers specifically to the vocabulary associated with such registers (Ottenheimer, 2006).

Chapter III

METHODOLOGY

This part of the study presents the research design, research participants, research locale, research instruments, data gathering procedures, data analysis procedures, theoretical and conceptual framework of the study, operational definition of terms and method of data analysis. Table 1 shows the summary of the methods used in this study:

Table 1

Summary of Research Methodology

Research Questions	**Research Instrument**	**Data Gathering Procedure**	**Data Analysis and Statistical Treatment**
1. What is the level of contextualization of Grade 3 science instructional materials and the science classes in selected elementary schools in Bulacan?	Level of Contextualization Rubric based on Heaslip's (2013) Standard for Effective Pedagogy and the REACT strategy. (Appendix B)	The researcher collected the data for the level of contextualization of the science instructional material through content analysis while the level of contextualization of science classes was	Using the instrument, the content analysis and observations were analyzed descriptively.

		gathered through classroom observations.	
2. What is the extent of Grade 3 teachers' implementation of mother tongue as a medium of instruction in a science subject?	Classroom Observation Rubric (COR) (CREDE, 2011) – Appendix C and Interview Protocol – Appendix D	Coordination with the school principal was made to schedule the observations. One day was scheduled for classroom observations. Moreover, the three teachers were interviewed regarding their practices at using mother tongue in teaching science.	The observation data were analyzed descriptively. This was followed by the interview data that were transcribed and analyzed using qualitative content analysis (Elo & Kyngas, 2008; Graneheim & Lundman, 2004; Hsieh & Shannon, 2005).
3. What framework may be used to design contextualized instructional materials in Bulacan-Tagalog?	Philippine Science Framework and the REACT strategy	In the conduct of the study, it followed the conceptual framework in	The appropriateness of the framework was analyzed according to the

		developing the instructional material based on the Science Framework for Philippine Basic Education by the University of the Philippines National Institute for Science and Mathematics Education and the REACT strategy	process that was observed by the researcher. The developed instructional material was then rated against DepEd's Evaluation Tool for Learning Modules. The REACT strategy was made parallel to the developed 5Is model.

Research Design

This study used qualitative research design. Qualitative research is a holistic approach that involves discovery. It is also described as an unfolding model that occurs in a natural setting that enables the researcher to develop a level of detail from high involvement in the actual experiences (Creswell, 1994). This design is deemed appropriate by the researcher as the aim of this study is to develop contextualized Grade 3 instructional materials in science using Bulacan-Tagalog as the medium of instruction through a model or framework that will be developed by the researcher.

Prior to developing this material, an in-depth study of existing Grade 3 science materials were analyzed and evaluated using Heaslip's (2013) Standard for Effective Pedagogy based on the Center for Research on Education, Diversity, and Excellence (CREDE) and the REACT evaluation tool. Grade 3 science classes were also observed to determine the level of contextualization in their classes. In addition, these science teachers were also interviewed after the observation to gain insight on their experiences at implementing contextualized lesson in their science classes.

This study used data triangulation to ensure the validity of the findings. The document analysis and the classroom observations served to validate the theory and practice and serve to inform one as well as the other. These were made the bases for developing science instructional materials that use Bulacan-Tagalog MOI.

Research Participants and Locale

This study was conducted during the first semester of School Year 2019-2020 in Bulacan, the mother tongue of which is the Bulacan-Tagalog variety. Town 1 and Town 2 were chosen as the locales of the study. Of all the mentioned towns, these towns were chosen since there are many unique cultural and historical sites that have yet to be explored and are unknown to many. Moreover, these towns use a pure variety of Bulacan-Tagalog. Pure variety means that these two towns are situated at the heart of Bulacan, and that there are no other language-speaking towns or provinces bordering these two towns that could produce a mixed use of two different languages.

There are areas in Town 1 that border Pampanga. The barangays near this border use a mixture of Bulacan-Tagalog and Kapampangan. This is what the researcher wants to avoid; thus, the choice of the towns. In addition, these towns are also rich in culture, being known for buntal hats and minasa, respectively. This is also a way of promoting their culture by showcasing them in the developed instructional

material. With Bulacan's rich culture, it would be easy to contextualize the instructional materials as there would be varied resources, personalities, events, and culture that can be easily connected and referred to in classroom discussions.

The respondents of the study were Grade 3 science teachers from three public elementary schools in Bulacan. The three schools that accepted the request for observation were ES1, ES2, and ES3. The time and locale of the study are reflected below:

Name of School	**Date/Time**	**Location**	**Lesson**
Elementary School (ES) 1	Nov. 15, 2019 9:30-10:30	Town 1	Different Parts of a Plant
Elementary School (ES) 2	Nov. 18, 2019 11:00-12:00	Town 1	Mga Hayop sa Kapaligiran
Elementary School (ES) 3	Nov. 22, 2019 8:30-9:30	Town 2	Mga Hayop Ayon sa Kanilang Pook Tirahan

Research Instruments

The Grade 3 instructional science material used by the teachers during the classroom observation was analyzed using Heaslip's (2013) Standard for Effective Pedagogy based on the Center for Research on Education, Diversity, and Excellence (CREDE) and the REACT evaluation tool, an instrument modified by the researcher which was then validated by a former director of research of a private university in Bulacan. (Appendix B).

These two instruments are the most appropriate to this study because they measure the level of contextualization in the science classroom and in the instructional materials. Since the study aims to measure the level of contextualization for Grade 3

science instructional material and in the science classes, then this instrument is sufficient to measure what it is intended to measure.

The instrument consisted of 17 statements on contextualization divided under five dimensions: Relating (1-4 statements, e.g. statement 1, “New concepts are presented in real-life situations and experiences that are familiar to the pupil.”); Experiencing (5-7 statements, e.g. statement 5, “learners gather and analyze their own data as they are guided in discovery of the important concepts.”); Applying (8-11 statements, e.g. statement 8, “Examples and pupil exercises include many real, believable, problem-solving situations that learners can recognize as important to their current and future lives.”); Collaborating (12-14 statements, e.g. statement 12, “learners are expected regularly in interactive groups where sharing, communicating, and responding to the important concepts and decision-making occur.”); Transferring (15-17 statements, e.g. “Lessons, exercises, and labs improve learners’ written and oral communication skills in addition to mathematical reasoning and achievement”).

All three classes were observed by the researcher using the Classroom Observation Rubric (CREDE, 2011), an observational tool used to rate teachers’ contextualization of lessons in the classroom (Appendix C). This instrument was developed by CREDE-Hawai’i researchers from its original form, known as the Standards Performance Continuum (Hilberg, Doherty, Epaloose, & Tharp, 2004), which was used in observational research on culturally and linguistically diverse classrooms for more than a decade.

In this study, the Classroom Observation Rubric was used to rate teacher performance on actual classroom observations. The COR is designed as a continuum ranging from: Not observed (0) – Emerging (1) – Developing (2) – Advancing (3) – Enacting (4) – Exemplary (5). Only those lessons (observed) that were scored for

Contextualization at a level of Enacting (4) or Exemplary (5) were considered contextualized. To score at the Enacting (4) level, teachers must integrate learners' background into the design of the lesson. The description on the COR reads: The teacher designs and enacts instructional activities that integrate knowledge of what learners know from their home, community, or school (not just building on current unit of instruction). The teacher assesses and assists learners in making an academic connection to their experiences.

At the Exemplary (5) level, teachers must meet this requirement with the addition of having "a clear goal of helping learners to reach a conceptual/abstract understanding." Because both scores require the integration of learners' background knowledge, levels 4 and 5 were judged as having a sophisticated level of implementation.

After the classroom interview, the science teachers observed were interviewed using an interview protocol (Appendix D). However, the interview was conducted through email due to the limitations afforded by the pandemic, which has opened new methods of data collection. According to Dicks (2011), interview methods have evolved to accommodate the unique needs of the time. In this study, interview questions were sent to the emails of the three science teachers, to which they responded in written, narrative format. The email interview responses were returned within one to two weeks after the interview questions were sent.

Bowden et al. (2015) also recommend the use of email interviews. They suggest that as Internet usage becomes more commonplace, researchers are beginning to explore the use of email interviews. Email interviews should be implemented when: 1) researchers can justify email interviews are useful to a research project; 2) there is evidence that the target population will be open to email

interviewing as a form of data collection; and 3) the justification of the email interview supports the researchers' theoretical perspective (Bowden et al. (2015).

In developing the instructional materials, it followed the Science Framework for Philippine Basic Education by the University of the Philippines National Institute for Science and Mathematics Education Development as its overall framework, while the framework used in the development of contextualized instructional materials is the REACT strategy (Appendix E).

Data Gathering Procedures

To develop contextualized instructional-materials in science using Bulacan-Tagalog as a medium of instruction, the researcher purposefully selected the locale and participants for the study. She chose three public elementary schools in Bulacan located in two towns. These towns were selected because they speak the pure Bulacan-Tagalog variety since they lie at the heart of the province.

The researcher wants to avoid a mixture of two languages due to the proximity of towns to other provinces that speak a different mother tongue. There are areas in Town 1 that border Pampanga which result in a combination of Tagalog and Kapampangan mother tongues. In addition, the towns chosen have many unique cultural and historical sites that have yet to be explored and are unknown to many. Moreover, they were the ones that granted permission to the researcher to conduct the study.

Two other schools were initially considered as participants of the study. However, the principals denied the request, citing their busy schedules and because the observation schedule coincided with their third grading test. Thus, only three schools gained the approval from the respective school principals.

Once the principal's approval was gained, one Grade 3 science class was

assigned by the principal for observation a week later. The researcher then came back for observation at the scheduled date. She asked the teachers to sign the consent forms and then proceeded with the observation. Each class was observed for one hour each, from the beginning to the end of the lesson to capture everything that happens inside a Grade 3 science classroom.

The research collected the first set of data through classroom observations. During the observation, the researcher was given a seat at the back. She used the Level of Contextualization Rubric by Heaslip (2013) and the REACT strategy (Appendix B). The result of the classroom observation provided evidence whether the instructional materials used by these schools in teaching science are contextualized.

Using the Level of Contextualization Rubric, the researcher rated the level of contextualization of the science class based on observations of the five contextualization dimensions of *relating, experiencing, applying, collaborating,* and *transferring*. This she did for the three separate observations. After determining the level of contextualization of the science classes based on observations, the researcher proceeded to use the Classroom Observation Rubric (CREDE, 2011). With the observation notes and the just-concluded science class, the researcher then filled out the COR based on the initial observation in order to find out the extent of implementation of mother tongue in these classes.

Thus, the first instrument used in the class observation was the Level of Contextualization Rubric. After accomplishing the form, the Classroom Observation Rubric was used. When the observation was done using two instruments, level of contextualization rubric and classroom observation rubric, the researcher then proceeded to conduct content analysis of the Grade 3 instructional material used using the same instrument, the Level of Contextualization Rubric by Heaslip (2013) and the REACT strategy. The results of the observation and the content analysis were then

compared and served to validate or support the findings of another.

Once the level of contextualization was determined for the science classroom and the instructional material used, the compared data were set aside. The researcher then asked permission from the principal to interview the science teachers. The copy of the interview protocol was shown for the principal's perusal. When the approval was granted, the researcher requested for the email addresses of the science teachers. She then sent the interview questions through email. The interview was not done face to face nor through Google Meet or Zoom interview due to the limitations afforded by the pandemic (Dicks, 2011; Bowden, 2015).

One to two weeks later, the interview responses were returned to the researcher through email. Based on the three sets of data gathered, the result of the observation, the analysis of the instructional material, and the interview responses, the researcher began to develop a Grade 3 science instructional material using Bulacan-Tagalog as the MOI.

In designing the material, the researcher integrated the use of technology in presenting the lessons as proposed by Science Framework for Philippine Basic Education. The researcher then proceeded to make adjustments on the designed material to determine the most appropriate framework to use in designing contextualized instructional materials, which would also serve as an exemplar in designing Grade 3 science instructional material in Bulacan-Tagalog.

Ethical Considerations

Informed consent. Consent forms were sent to principals of the three schools observed, which detailed their agreement to allow Grade 3 science classes to be observed. Meanwhile, classroom teachers who were observed were given consent forms that they completed and signed, manifesting their agreement to the activity. The

form showed acknowledgment that the participants' rights would be protected during the data collection (Creswell, 2003).

The researcher explained to them verbally the purpose and goals of the research and answered their queries pertaining to the study, such as how long the observation would last and if the observations would be recorded and how anonymity would be exercised. The researcher assured the teachers that the observed class would not be recorded nor would their names appear on the study. Further, it was made clear to participants that their involvement was voluntary and that they were free to withdraw their consent at any time.

Anonymity and confidentiality. The identities of the respondents were kept confidential. During the request for observation, it was not explicitly requested by either party nor was anything mentioned about revealing the identity of the schools. Nevertheless, in compliance with the research ethics, the identities of the schools were kept confidential. Codes were used first to identify the town, Town 1 and Town 2. The codes for schools were Elementary School 1, 2, and 3 or ES1, ES2, ES3. For teacher codes, Teacher 1, Teacher 2, and Teacher 3 were used. The researcher did this to protect the identities of the towns, schools, and the teachers.

Honesty, sympathy, and respect. The researcher ensured that participants were treated with honesty, sympathy, and respect. These guiding principles were followed to ensure ethical research, knowing that these are the minimum requirements for creating rapport between the interviewer and respondents (National Research Council, 2002).

Data Analysis Procedures

This section presents the methods used in analyzing both qualitative and quantitative data. The specific data analysis used for every research question was discussed.

1. To analyze the data gathered from classroom observations that determined the level of contextualization of Grade 3 science instructional materials used by DepEd in Bulacan, a revised instrument adopted from Heaslip's (2013) and the REACT strategy was used. To determine the level of contextualization of the science classes, the same instrument by Heaslip (2013) was used. The ratings used to determine the level of contextualization of instructional materials and the science classes were tallied and quantitatively and qualitatively described. The results of the analysis served as the basis for developing instructional materials that are contextualized.

2. To analyze the extent of Grade 3 teachers' implementation of mother tongue as a medium of instruction in a science subject, classroom observations and interview were conducted. The findings of the classroom observation rubric were analyzed to learn the extent of implementation of mother tongue in the science classes. In addition, the science teacher for each class was interviewed using a semi-structured interview protocol. The interview responses were descriptively evaluated and were compared with the findings of the observations.

The observation was followed by the interview data that were transcribed and analyzed using qualitative content analysis (Creswell & Creswell, 2018). It followed the following steps:

Step 1. *Organize and prepare the data for analysis*. Interview data were transcribed, field notes were typed, and visual material was catalogued. This was followed by sorting and arranging the data into different types depending on the

sources of information.

Step 2. *Read or look at all the data*. This step entails looking at the data to infer overall meaning. It looks at what the general ideas of the participants are, the tone of their responses, and the impression of the overall depth, credibility, and use of the information. From this step, a form of ideas can begin to take shape.

Step 3. *Start coding all of the data*. Coding is the process of organizing the data by bracketing chunks (or text or image segments) and writing a word representing a category in the margins (Rossman & Rallis, 2012). It involves taking text data or pictures gathered during data collection, segmenting sentences (or paragraphs) or images into categories, and labeling those categories with a term, often based in the actual language of the participant (called an *in vivo* term).

In developing the instructional materials, the researcher followed the Science Framework for Philippine Basic Education by the University of the Philippines National Institute for Science and Mathematics Education Development as its overall framework, while the framework used in the development of contextualized instructional materials is the 5Is model developed by the researcher, which was patterned after the REACT strategy. It used the guide developed by science framework for Philippine basic education (2011) in developing contextualized instructional materials that incorporated digital learning environments, engaging learners with digital devices, teaching at a distance, enhancing learning with multimedia.

Chapter IV

RESULTS AND DISCUSSION

This chapter presents the findings and analysis derived from the survey and observations. The results are presented chronologically, according to how the statements of the problem are presented. This chapter solely focuses on presenting the gathered data in a meaningful way to facilitate the discussion, which will be presented in the next chapter.

This chapter, at the outset, provides information on the level of contextualization of the current Grade 3 science instructional materials used in selected schools in Bulacan. This is followed by the extent of Grade 3 teachers' implementation of mother tongue as a medium of instruction in a science subject. Lastly, it proposes a framework that may be used to design contextualized instructional materials in Bulacan-Tagalog. The result begins with the first statement of the problem.

Research Question 1: What is the level of contextualization of the Grade 3 instructional material and science classes in selected elementary schools in Bulacan:

Table 2

Level of Contextualization of Grade 3 Instructional Material

Relating	**Mga Hayop Ayon sa Pook Tirahan**	**Mga Hayop sa Kapaligiran**	**Parts of Plant**	**Mean**	**Level of Contextualization**
	1.0	**1.00**	**1.00**	**1.00**	**Not observed**
1. New concepts are presented in real-life situations and experiences that are familiar to the pupil.	1	1	1	1.0	Not observed
2. Concepts in examples and pupil exercises are based on learners' own culture.	1	1	1	1.0	Not observed
3. New concepts are presented in the context of what the pupil already knows.	1	1	1	1.0	Not observed
4. Authentic locally made materials or materials available in the community are maximized/used.	1	1	1	1.0	Not observed
Experiencing				**Mean**	**Not observed**
	1.0	**1.00**	**1.00**	**1.00**	
5. Learners gather and analyze th eir own data as they are guided in discovery of the important concepts.	1	1	1	1.00	Not observed
6. Learners learn by doing, hands-on, simulation, among others	1	1	1	1.00	Not observed
7. Opportunities are presented for learners to gather and analyze their own data for enrichment and extension (community visits, immersion, field trips, experiential learning)	1	1	1	1.00	Not observed
Applying				**Mean**	**Not observed**
	1.00	**1.00**	**1.00**	**1.00**	
8. Examples and pupil exercises in clude many real, believable problem-solving situations that learners can recognize as important to their current and future lives.	1	1	1	1.00	Not observed
9. Examples and pupil exercises c ultivate an attitude that says, I need to learn this."	1	1	1	1.00	Not observed

10. Lessons and activities encourage the pupil to apply concepts and information in useful contexts, projecting the learners into imagined futures (eg. possible careers) and unfamiliar locations (e.g. workplaces)	1	1	1	1.00	Not observed
11. Assessment tools and performance tasks integrate contextualization to make it more relevant for learners.	1	1	1	1.00	Not observed
Collaborating	**1.00**	**1.00**	**1.00**	**Mean 1.00**	**Not observed**
12. Learners are expected regularly in interactive groups where sharing, communicating, and responding to the important concepts and decision-making occur.	1	1	1	1.00	Not observed
13. Activities are carefully selected to encourage shy and non-participative learners to be included in discussions and activities through small groups.	1	1	1	1.00	Not observed
14. Activities are designed in such a way that learners are encouraged to interact with one another, with each member assigned a task to work on.	1	1	1	1.00	Not observed
Transferring	**1.00**	**1.00**	**1.00**	**Mean 1.00**	**Not Observed**
15. Lessons and exercises improve not only the knowledge of learners in the actual subject matter but also their written oral and communication skills in addition to mathematical reasoning and achievement.	1	1	1	1	Not observed
16. Learners use knowledge in a new context or in novel situations.	1	1	1	1	Not observed
17. The knowledge gained by learners is practical and can be used in contexts outside of the classroom or in the real world	1	1	1	1	Not observed
Overall Level of Contextualization	**1.00**	**1.00**	**1.00**	**1.00**	**Not Observed**

Table 2 shows the level of contextualization of Grade 3 instructional material. The Grade 3 instructional material used by Grade 3 is entitled, “Science: Kagamitan ng Mag-aaral (Tagalog).” The researcher analyzed the three lesson topics that were taught during the class observation, namely, *Mga Hayop Ayon sa Pook Tirahan, Mga Hayop sa Kapaligiran*, and Different Parts of a Plant. The third lesson, however, was analyzed using the Tagalog instructional material for pupils, thus, the topic was Mga Bahagi ng Halaman. It should be noted that the instructional material used by teachers are written in Tagalog while those used by learners are written in Tagalog. The instructional material analyzed in this instance is the one used by learners, thus, written in Tagalog. Figure 2 shows the book cover and the cover.

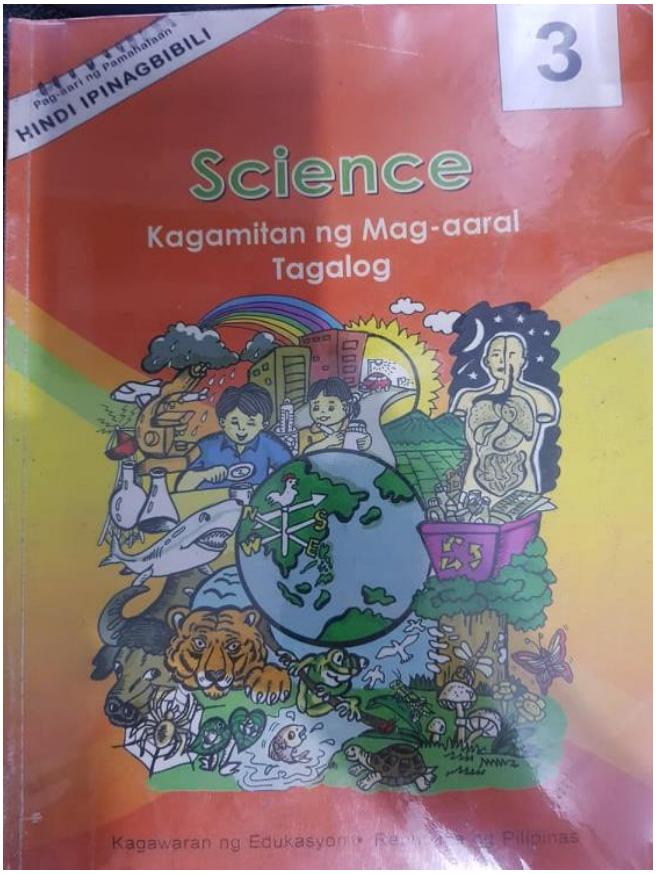
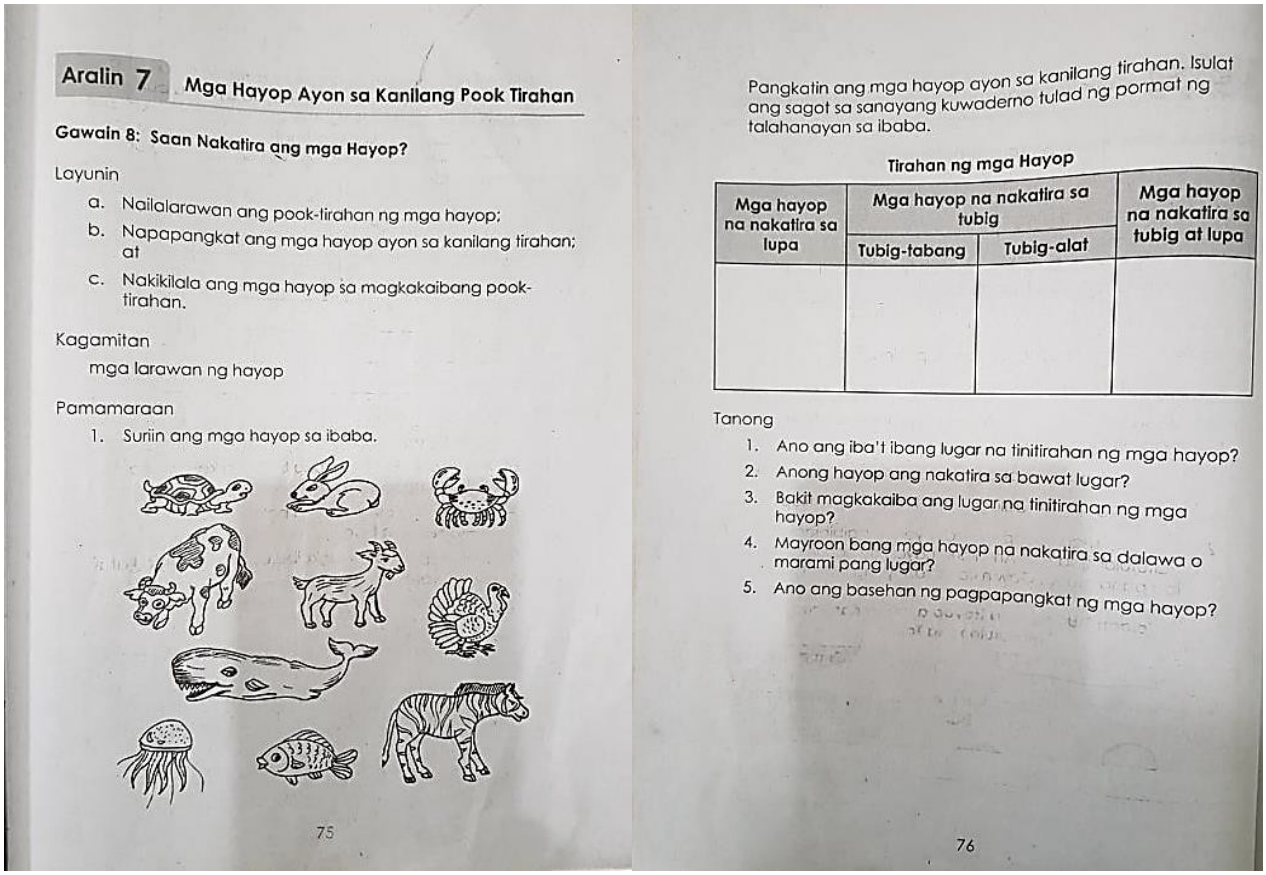


Figure 3. Grade 3 Science Instructional Material

As shown in Table 2, for the lesson, *Mga Hayop Ayon sa Pook Tirahan*, all contextualization dimensions of relating, experiencing, applying, cooperating, and transferring, all yielded a mean of 1.0 interpreted as not observed. As can be seen in Figure 3 that illustrates the entire content of the lesson, the pages consist only of a single page, back to back. At the beginning of the lesson, there was no attempt to connect the lesson to prior knowledge as required under *relating*. There were no motivation questions that are familiar to learners' contexts. The lesson immediately opened with the question: Suriin ang mga hayop sa ibaba.



Aralin 7 Mga Hayop Ayon sa Kanilang Pook Tirahan

Gawain 8: Saan Nakatira ang mga Hayop?

Layunin

a. Nailalarawan ang pook-tirahan ng mga hayop;
b. Napapangkat ang mga hayop ayon sa kanilang tirahan; at
c. Nakikilala ang mga hayop sa magkakaibang pook-tirahan.

Kagamitan

mga larawan ng hayop

Pamamaraan

1. Suriin ang mga hayop sa ibaba.

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Pangkatin ang mga hayop ayon sa kanilang tirahan. Isulat ang sagot sa sanayang kuwaderno tulad ng pormat ng talahanayan sa ibaba.

Tirahan ng mga Hayop

Mga hayop na nakatira sa lupa	Mga hayop na nakatira sa tubig		Mga hayop na nakatira sa tubig at lupa
	Tubig-tabang	Tubig-alat	

Tanong

1. Ano ang iba't ibang lugar na tinitirahan ng mga hayop?
2. Anong hayop ang nakatira sa bawat lugar?
3. Bakit magkakaiba ang lugar na tinitirahan ng mga hayop?
4. Mayroon bang mga hayop na nakatira sa dalawa o marami pang lugar?
5. Ano ang basehan ng pagpapangkat ng mga hayop?

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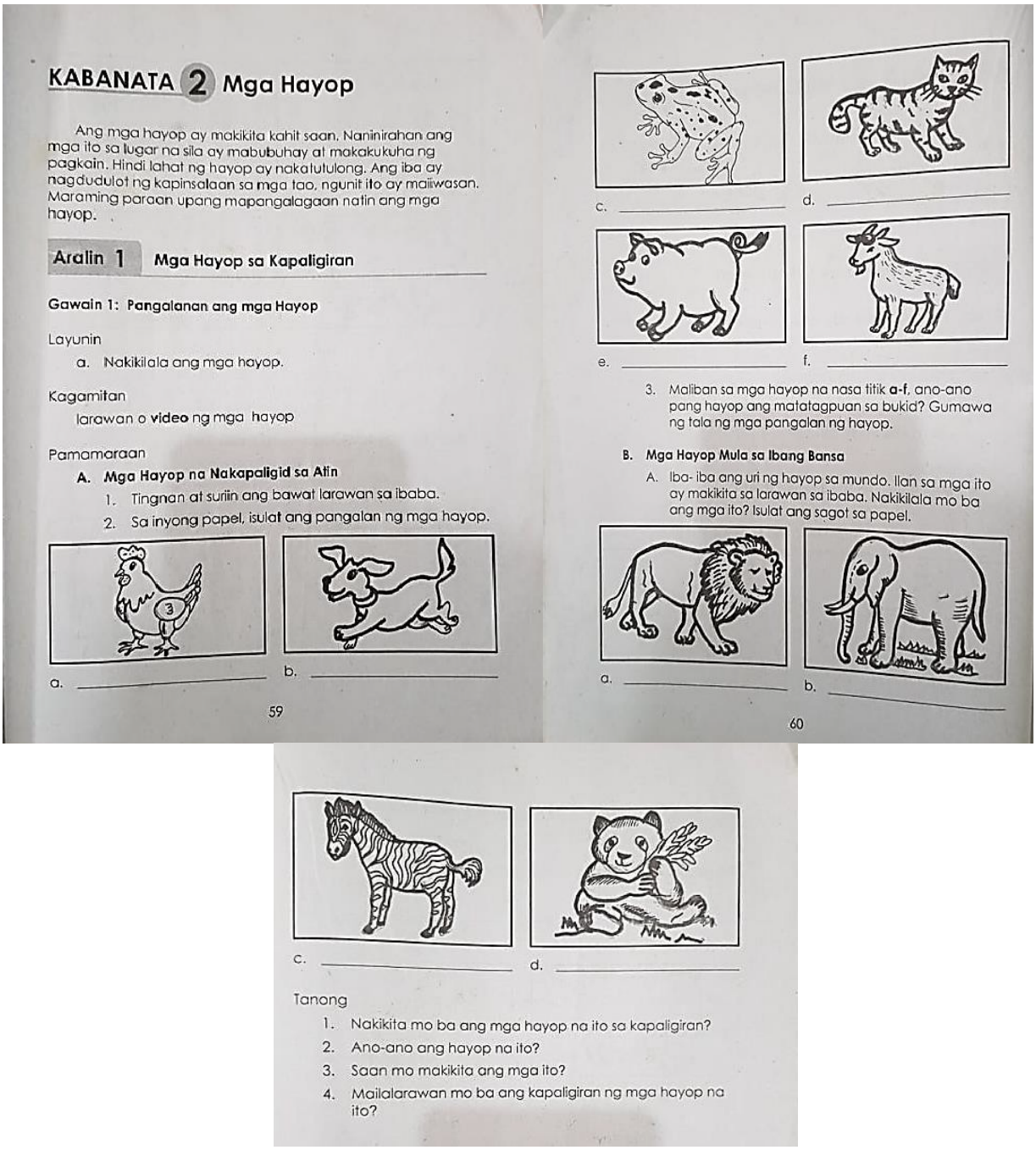
Figure 4. Lesson Entitled "Mga Hayop Ayon sa Kanilang Pook Tirahan"

To contextualize the lesson, questions should focus on animals that learners see in their environment so as to connect to what they already know. Again, as can be seen in the Figure 4, learners were just presented with pictures of animals.

Moreover, no activity called for learners' cooperation or collaboration or in working towards a project. The same is true for the other contextualization dimensions. There was no *experiencing, applying,* and *transferring* dimensions to the lesson. The lesson ended with five more questions that learners must answer based on the discussion.

It should be noted that Figure 4 is the actual instructional material that learners use and that they bring home. The material, based on its overall level of contextualization of 1.0, means that there is much more to improve to contextualize the material in terms of the number and quality of activities, conversational tone, arousing the interest of learners, providing collaborative tasks, connecting to prior knowledge and to presenting information familiar to learners, and introducing the relevance of the topic to learners' everyday lives.

Figure 5 illustrates the second lesson that was analyzed based on the level of contextualization. Overall level of contextualization for this lesson is 1.0, interpreted as *not observed*.



KABANATA 2 Mga Hayop

Ang mga hayop ay makikita kahit saan. Naninirahan ang mga ito sa lugar na sila ay mabubuhay at makakukuha ng pagkain. Hindi lahat ng hayop ay nakatutulong. Ang iba ay nagdudulot ng kapinsalaan sa mga tao, ngunit ito ay maiiwasan. Maraming paraan upang mapangalagaan natin ang mga hayop.

Aralin 1 Mga Hayop sa Kapaligiran

Gawain 1: Pangalanan ang mga Hayop

Layunin

a. Nakikilala ang mga hayop.

Kagamitan

larawan o **video** ng mga hayop

Pamamaraan

A. Mga Hayop na Nakapaligid sa Atin

1. Tingnan at suriin ang bawat larawan sa ibaba.
2. Sa inyong papel, isulat ang pangalan ng mga hayop.

a. _____ b. _____

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c. _____ d. _____

e. _____ f. _____

3. Maliban sa mga hayop na nasa titik **a-f**, ano-ano pang hayop ang matatagpuan sa bukid? Gumawa ng tala ng mga pangalan ng hayop.

B. Mga Hayop Mula sa Ibang Bansa

A. Iba- iba ang uri ng hayop sa mundo. Ilan sa mga ito ay makikita sa larawan sa ibaba. Nakikilala mo ba ang mga ito? Isulat ang sagot sa papel.

a. _____ b. _____

60

c. _____ d. _____

Tanong

1. Nakikita mo ba ang mga hayop na ito sa kapaligiran?
2. Ano-ano ang hayop na ito?
3. Saan mo makikita ang mga ito?
4. Mailalarawan mo ba ang kapaligiran ng mga hayop na ito?

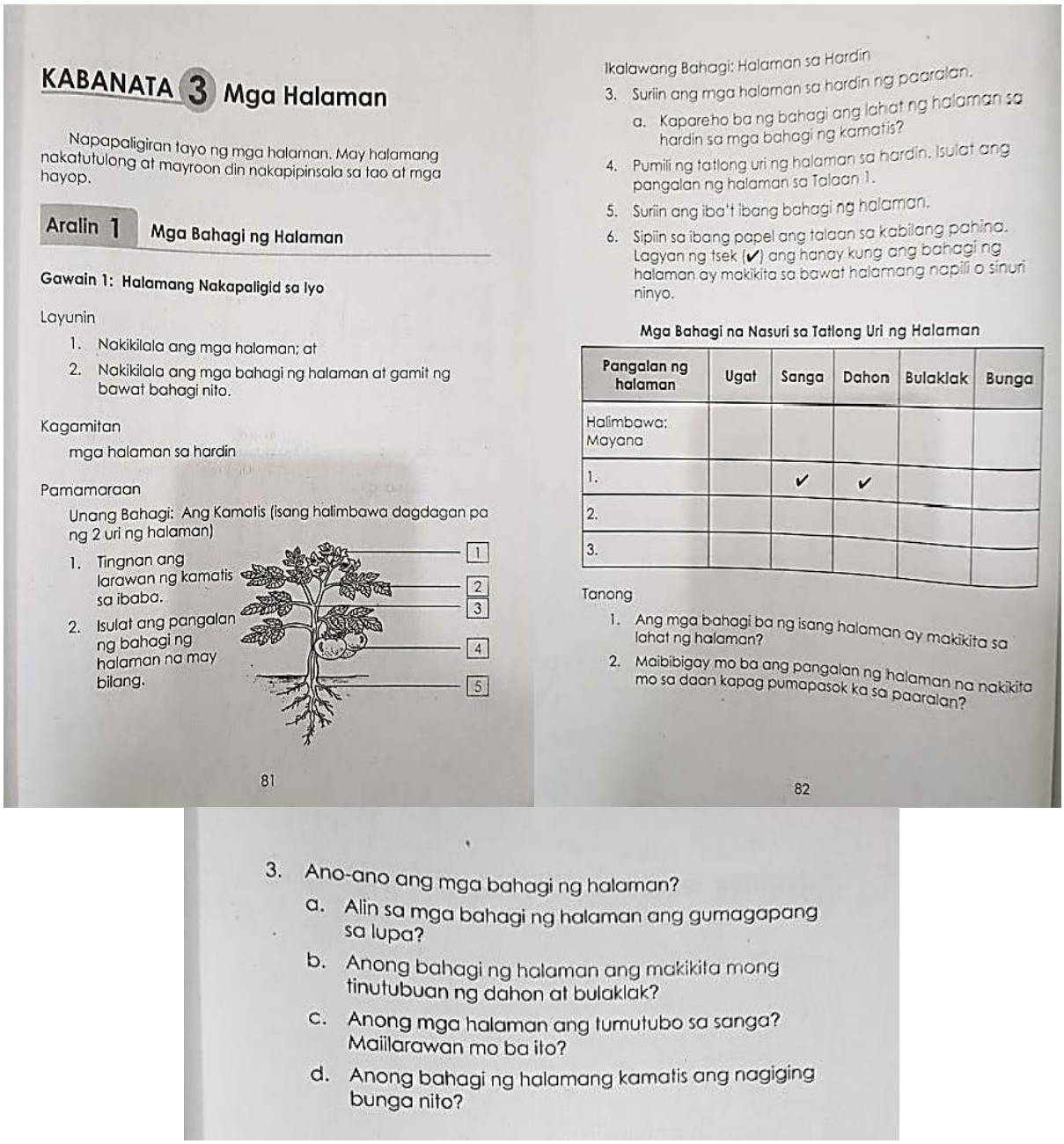
Figure 5. Lesson Entitled “Mga Hayop sa Kapaligiran”

As shown in Figure 5, the lesson always starts with “Suriin ang bawat larawan sa ibaba.” This serves to limit what learners know in terms of what they see illustrated in the instructional material. There was no attempt to discuss or enrich the lesson

based on what learners know in terms of the animals they see in their surroundings. In this design, there is less interaction and participation from learners.

Moreover, in question number 3, p. 60 as reflected in the figure, it asked, “Anu-ano pang hayop ang matatagpuan sa bukid?” This question seems insufficient to describe the variety of animal habitats since it is not only in farms that animals live. The question should be exhaustive in order to provide learners with a complete understanding about the different animal habitats. Because of this inadequacy of concept presented, the researcher believes that children might be shortchanged when it comes to learning if teachers will just base their instruction in this science material. Again, as in the lesson presented in Figure 3, there were no meaningful activities that would arouse the curiosity of learners and that would engage them to discover and be immersed in the topic.

The same was observed in the analysis done for the third lesson entitled “Mga Bahagi ng Halaman” (Different Parts of a Plant). Figure 5 shows the lesson taken from the Grade 3 science instructional material. Just like the two other lesson taken from the same instructional material, the overall level of contextualization for this lesson is 1.0, interpreted as *not observed*.



KABANATA 3 Mga Halaman

Napapaligiran tayo ng mga halaman. May halamang nakatutulong at mayroon din nakapipinsala sa tao at mga hayop.

Aralin 1 Mga Bahagi ng Halaman

Gawain 1: Halamang Nakapaligid sa Iyo

Layunin

1. Nakikilala ang mga halaman; at
2. Nakikilala ang mga bahagi ng halaman at gamit ng bawat bahagi nito.

Kagamitan

mga halaman sa hardin

Pamamaraan

Unang Bahagi: Ang Kamatis (isang halimbawa dagdagan pa ng 2 uri ng halaman)

1. Tingnan ang larawan ng kamatis sa ibaba.
2. Isulat ang pangalan ng bahagi ng halaman na may bilang.

1
2
3
4
5

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Ikalawang Bahagi: Halaman sa Hardin

3. Suriin ang mga halaman sa hardin ng paaralan.
   a. Kapareho ba ng bahagi ang lahat ng halaman sa hardin sa mga bahagi ng kamatis?
4. Pumili ng tatlong uri ng halaman sa hardin. Isulat ang pangalan ng halaman sa Talaan 1.
5. Suriin ang iba't ibang bahagi ng halaman.
6. Sipiin sa ibang papel ang talaan sa kabilang pahina. Lagyan ng tsek (✔) ang hanay kung ang bahagi ng halaman ay makikita sa bawat halamang napili o sinuri ninyo.

Mga Bahagi na Nasuri sa Tatlong Uri ng Halaman

Pangalan ng halaman	Ugat	Sanga	Dahon	Bulaklak	Bunga
Halimbawa: Mayana					
1.		✔	✔		
2.					
3.					

Tanong

1. Ang mga bahagi ba ng isang halaman ay makikita sa lahat ng halaman?
2. Maibibigay mo ba ang pangalan ng halaman na nakikita mo sa daan kapag pumapasok ka sa paaralan?

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3. Ano-ano ang mga bahagi ng halaman?
   a. Alin sa mga bahagi ng halaman ang gumagapang sa lupa?
   b. Anong bahagi ng halaman ang makikita mong tinutubuan ng dahon at bulaklak?
   c. Anong mga halaman ang tumutubo sa sanga? Maiilarawan mo ba ito?
   d. Anong bahagi ng halamang kamatis ang nagiging bunga nito?

Figure 6. Lesson Entitled “Mga Bahagi ng Halaman”

As shown in Figure 6, the lesson again opened with an instruction: “Tingnan ang larawan ng kamatis sa ibaba.” To arouse interest and the topic to learners’ prior knowledge and to information that is familiar to them, the learners may be asked to bring an actual fruit bearing plant, bring a picture, or draw one. There are many ways to make the topic interesting to learners but this was not presented nor explored.

While this part allows learners to “experience” learning when they are asked to go out to the school garden to examine a plant (Question 3a of Figure 5), there was

no interaction between learner to learner, or learner to teacher. Pupils were just asked to write the names from the tree plants from the garden and compare the parts of the tomato to the parts of the plant in the school garden. This could have been an enjoyable and meaningful experience for learners in which they could collaborate and interact with each other. However, this opportunity was not provided to them.

The lesson likewise ended with a series of questions as it did in the two other lessons. The questions however were not discussed and simply attempts to draw from what the learners already know, although the context was not provided. It seems to the researcher that the instructional material lacks the appeal to get learners to be interested in what they are learning. According to Eshiwani (1984), the absence or inadequacy of an instructional material affects teachers' handling of the subjects often resulting in an abstract manner of presenting the lesson, portraying it as dry and non-exciting.

Tety (2016) stated that instructional materials are a powerful strategy to bring about effective teaching and learning. However, instructional materials must be adequate and of high quality for effective learning to take place. He further added that the availability, adequacy and relevance of instructional materials can influence the quality of teaching, which can have positive effect on students' learning and academic performance. Because instructional materials provided to learners are usually brought home to assist them in their learning, the content of these materials must be adequate to meet the relative needs of learners so that they can learn at their own pace.

Table 3

Level of Contextualization of Science Classes in Selected Public Elementary Schools

Relating	**ES1**	**ES2**	**ES3**	**Mean**	**Level of Contextualization**
	1.75	**1.75**	**1.75**	**1.80**	**Not observed**
1. New concepts are presented in real-life situations and experiences that are familiar to the pupil.	2	2	2	2.0	Emerging
2. Concepts in examples and pupil exercises are based on learners' own culture.	2	2	2	2.0	Emerging
3. New concepts are presented in the context of what the pupil already knows.	2	2	2	2.0	Emerging
4. Authentic locally made materials or materials available in the community are maximized/used.	1	1	1	1.0	Not observed
Experiencing				**Mean**	**Not observed**
	1.33	**1.00**	**1.00**	**1.11**	
5. Learners gather and analyze their own data as they are guided in discovery of the important concepts.	1	1	1	1.00	Not observed
6. learners learn by doing, hands-on, simulation, among others	2	1	1	1.33	Not observed
7. Opportunities are presented for learners to gather and analyze their own data for enrichment and extension (community visits, immersion, field trips, experiential learning)	1	1	1	1.00	Not observed
Applying				**Mean**	**Not observed**
	1.00	**1.5 0**	**1.00**	**1.17**	
8. Examples and pupil exercises include many real, believable problem-solving situations that learners can recognize as important to their current and future lives.	1	1	1	1.0	Not observed
9. Examples and pupil exercises cultivate an attitude that says, "I need to learn this."	1	2	1	1.33	Not observed

10. Lessons and activities encourage the pupil to apply concepts and information in useful contexts, projecting the learners into imagined futures (eg. possible careers) and unfamiliar locations (e.g. workplaces)	1	1	1	1.00	Not observed
11. Assessment tools and performance tasks integrate contextualization to make it more relevant for learners.	1	2	1	1.33	Not observed
Collaborating	**2.00**	**2.33**	**2.00**	**Mean 2.11**	**Emerging**
12. learners are expected regularly in interactive groups where sharing, communicating, and responding to the important concepts and decision-making occur.	2	2	2	2.00	Emerging
13. Activities are carefully selected to encourage shy and non-participative learners to be included in discussions and activities through small groups.	2	3	2	2.33	Not Observed
14. Activities are designed in such a way that learners are encouraged to interact with one another, with each member assigned a task to work on.	2	2	2	2.00	Emerging
Transferring	**1.33**	**1.33**	**1.33**	**Mean 1.33**	**Not Observed**
15. Lessons and exercises improve not only the knowledge of learners in the actual subject matter but also their written oral and communication skills in addition to mathematical reasoning and achievement.	1	1	1	1	Not observed
16. Learners use knowledge in a new context or in novel situations.	1	1	1	1	Not observed
17. The knowledge gained by learners are practical and can be used in contexts outside of the classroom or in the real world.	2	2	2	2	Not observed
Overall Level of Contextualization	**1.47**	**1.59**	**1.41**	**1.49**	**Not Observed**

Note: Heaslip's (2013) Standard for Effective Pedagogy and DepEd Contextualization Monitoring Tool (Range of interpretation: 1.0-1.80 – not observed;

1.81-2.60 – emerging; 2.61-3.40 – developing; 3.41-4.20 – enacting; 4.21-5.0 – integrating)

Table 3 shows the mean result of the level of contextualization of the three schools observed during science classes, namely: ES1, ES2, and ES3. As observed, the three schools adopted only one science instructional material for Grade 3, titled *Science 3: Teachers' Guide* provided by the Department of Education. The material provided to teachers is written in English, while the reference material used by learners is written in Tagalog and is titled, "Science: Kagamitan ng Mag-aaral (Tagalog). Thus, teachers need to translate everything written in the guide to align it with the material learners are using, or use the learners' instructional material as their teaching reference.

As shown in Table 3, ES2 in Town 1 yielded the highest mean of 1.59, followed by ES1 at 1.41, and ES3, 1.41. While ES2 had the highest mean, the descriptive interpretation does not differ with the two other schools, which is *not observed*. This means that during the conducted observation, the contextualization of the lesson was not observed for the three schools.

When compared with the analysis done on the material, the mean rating for all three schools was 1, which is also not observed. This means that the execution of lesson in the science classroom is an improved version of what can be seen in the book.

When taken per dimension, however, *collaboration* posted the highest mean of 2.11, interpreted as *emerging*. The emerging level is evident when a pair of small group of children contributes individual work (e.g.: turn-taking) to a task, but not requiring collaboration to a joint product. Children work independently without teacher involvement. As observed, science teachers provide opportunities for learners to collaborate at this level. In two out of three science classes observed, learners are

given group activities. For example, in Grade 3-A of ES2, the teacher grouped the learners into three (according to their rows). She handed them an envelope that contained an animal puzzle that learners have to put together. Once complete, each group was asked to name the animal, state its habitat, and mimic its sound.

Moreover, in Grade 3-Science ES1, towards the end of the lesson, the teacher also gave three separate envelopes to learners that contained the different parts of the plants written in labels. They were asked to place the labels in their proper parts. Each group was given the same activity, after which the leader was asked to present the plant with its proper parts. Based on what was observed, collaboration was still in the early or emerging stages. In ES2, however, there was no evidence of collaborative activity performed by learners during or after the lesson.

In terms of the level of collaboration as evidenced in the instructional material used, a mean rating of 1 was posted. There were no activities presented ion the material that encourage collaboration. All tasks could be accomplished individually. This shows that teachers went out of their way to provide opportunities for collaboration even if the instructional material does not contain any. Teachers want to enrich learners' classroom experiences by coming up with collaborative activities pertinent to the lesson. Again, this shows the need for more collaborative activities to be reflected in the instructional material for richer learning experiences of learners.

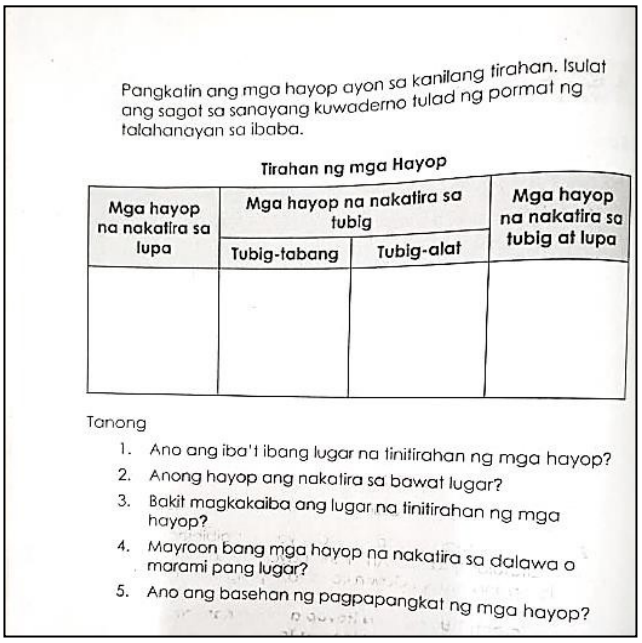
The lowest mean for contextualization was gained by e*xperiencing* at 1.11, interpreted as *not observed. Experiencing* provides learners the opportunity to explore, discover, and invent. A classroom environment that cultivates this aspect allows learners to manipulate equipment and materials and engage learners in active learning. This aspect was not evident in the three science classrooms observed. Learners were confined in the classrooms while the lesson was ongoing, with the teacher conveying all information that learners need to learn about the lesson. While

there are question and answer portions, most questions are close-ended and answers are one-liners. Thus, learners generally learn passively.

In the context of a Grade 3 classroom, active learning can be achieved through exploring the surroundings, conducting field trips, and presenting manipulatives, among others (Brame, 2016). While the observation is limited, this score was observed for all three Science classes in that there was no opportunity provided for learners to further explore the concepts presented in the lesson. Learning about the topic was confined in the classroom and perhaps due to time limits, no room for extending the learning experience outside of the classroom was provided to learners.

In addition, unlike in other countries where teachers are assisted by teacher aides or assistants, in the Philippines, the protection of all learners, rests under the responsibility of just one teacher. It is also a cultural thing that teachers have some apprehension in allowing students to go out for fear of accidents that may be encountered by learners while outside, which could be blamed on them.

In the content analysis done, the instructional material does not suggest experiential learning activities that learners can engage in, thus, the mean rating for experiencing for all three lessons was 1, interpreted as not observed. The way lesson are reinforced were only through questions. For example, the only activity provided in the lesson under *Mga Hayop Ayon sa Kanilang Pook Tirahan* was filling out a chart in learners' notebooks that they have to copy. See Figure 7.



Pangkatin ang mga hayop ayon sa kanilang tirahan. Isulat ang sagot sa sanayang kuwaderno tulad ng pormat ng talahanayan sa ibaba.

Tirahan ng mga Hayop

Mga hayop na nakatira sa lupa	Mga hayop na nakatira sa tubig		Mga hayop na nakatira sa tubig at lupa
	Tubig-tabang	Tubig-alat	

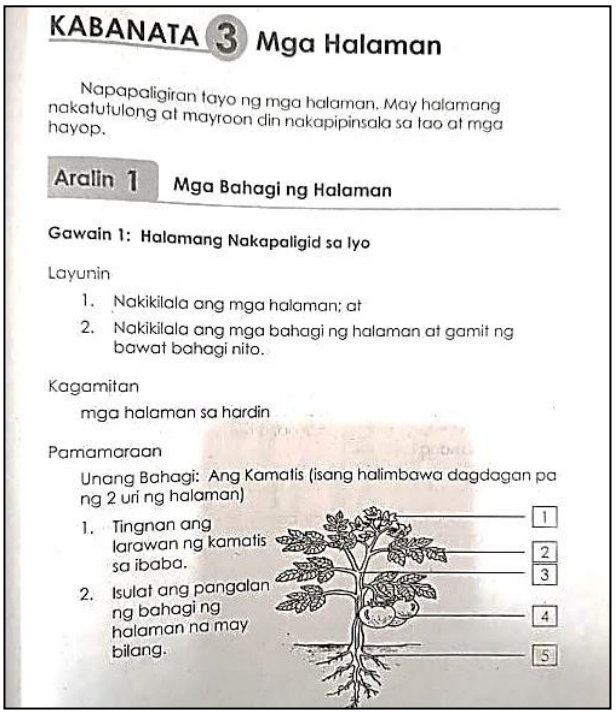
Tanong

1. Ano ang iba't ibang lugar na tinitirahan ng mga hayop?
2. Anong hayop ang nakatira sa bawat lugar?
3. Bakit magkakaiba ang lugar na tinitirahan ng mga hayop?
4. Mayroon bang mga hayop na nakatira sa dalawa o marami pang lugar?
5. Ano ang basehan ng pagpapangkat ng mga hayop?

Figure 7. ES 3 Lesson Activity

In terms of *relating*, where learning is placed in the context of life experience—everyday sights, events, and conditions—allows learners to relate familiar situations to new information to be processed or problems to be solved. Based on the observations, the mean for all three schools was 1.75, with an interpretation of *not observed* for all three science classes. The topics discussed during the three-day observations were *Mga Hayop Ayon sa Kanilang Pook Tirahan*, Different Parts of a Plant, and *Mga Hayop sa Kapaligiran*. While these new ideas are easy to relate to prior information, there was no apparent attempt to connect the information to everyday life.

Even in the instructional material analyzed, there was also no attempt to connect new information to prior knowledge. For instance, in introducing the lesson, Parts of a Plant in ES3, the lesson began with “Tingnan ang larawan ng kamatis sa ibaba” (See Figure 8). There was no motivation questions asked or a question that would arouse the interest of learners in the lesson.



KABANATA 3 Mga Halaman

Napapaligiran tayo ng mga halaman. May halamang nakatutulong at mayroon din nakapipinsala sa tao at mga hayop.

Aralin 1 Mga Bahagi ng Halaman

Gawain 1: Halamang Nakapaligid sa Iyo

Layunin

1. Nakikilala ang mga halaman; at
2. Nakikilala ang mga bahagi ng halaman at gamit ng bawat bahagi nito.

Kagamitan

mga halaman sa hardin

Pamamaraan

Unang Bahagi: Ang Kamatis (isang halimbawa dagdagan pa ng 2 uri ng halaman)

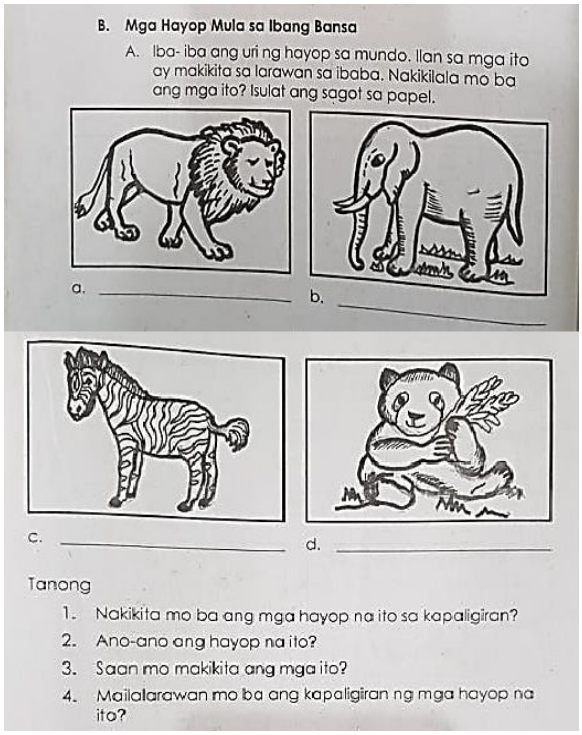
1. Tingnan ang larawan ng kamatis sa ibaba.
2. Isulat ang pangalan ng bahagi ng halaman na may bilang.

1
2
3
4
5

Figure 8. Lesson Introduction for Parts of a Plant.

Applying, on the other hand, got a mean score of 1.17 for all three schools, with ES2 getting the highest mean of 1.5. The other two schools got a rating of 1.0, with all three getting the same interpretation of *not observed*. This means that the learners were not provided opportunities to apply the concepts learned in real-world tasks. While there are recitations throughout the lesson that informally assess learners' learning, there was no deeper level of application provided.

As shown in Figure 9 in the analysis of instructional materials, the application part consists of writing down the names of animals that can be found in various places. Moreover, the questions are also limited to the four animals that are illustrated in the material. There was no attempt to explore learners' knowledge of various animals. The presentation including the questions are very limited and do not tap into what the learners already know or what they could contribute to the lesson. Thus in terms of application part, the instructional material had a mean rating of 1, which is interpreted as not observed.



B. Mga Hayop Mula sa Ibang Bansa

A. Iba- iba ang uri ng hayop sa mundo. Ilan sa mga ito ay makikita sa larawan sa ibaba. Nakikilala mo ba ang mga ito? Isulat ang sagot sa papel.

a. _____ b. _____

c. _____ d. _____

Tanong

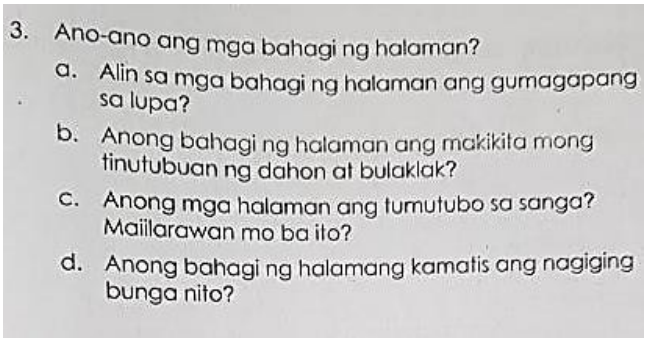
1. Nakikita mo ba ang mga hayop na ito sa kapaligiran?
2. Ano-ano ang hayop na ito?
3. Saan mo makikita ang mga ito?
4. Mailalarawan mo ba ang kapaligiran ng mga hayop na ito?

Figure 9. ES2 Lesson, Mga Hayop sa Kapaligiran

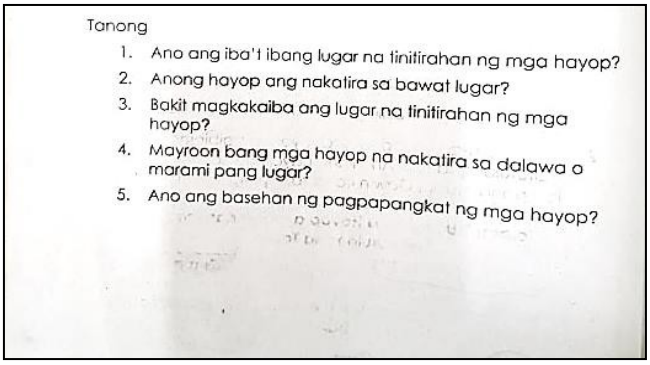
Transferring, which transfers familiar information to new contexts, got a mean score of 1.33 for all three schools, with each school observed getting the same mean, interpreted as *not observed*. This means there was not enough opportunity provided to learners to transfer their learning into new contexts.

In the analyzed instructional material, all three lessons concluded with questions relative to the discussion and examples provided in it. There was no opportunity provided for learners to transfer what they learned in another setting, subject, or real-world activity. Figure 10 shows how the three lessons end.

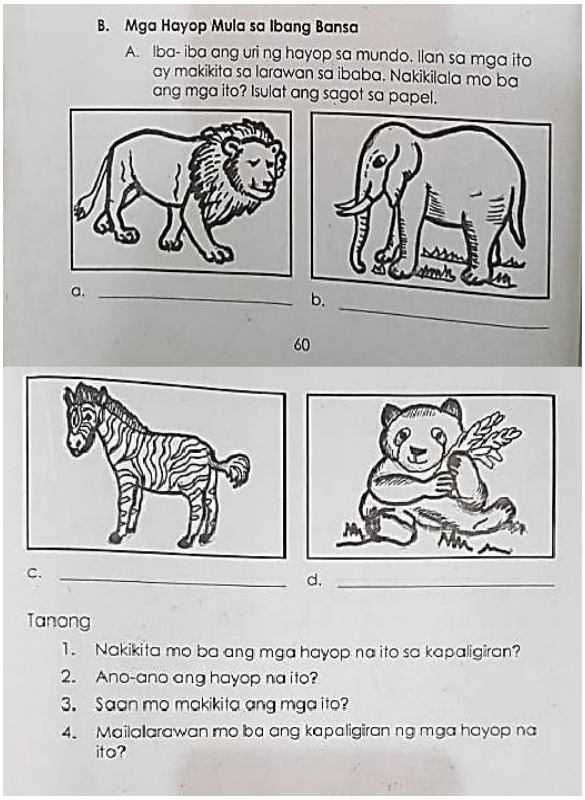
Mga Bahagi ng Halaman


3. Ano-ano ang mga bahagi ng halaman?
   a. Alin sa mga bahagi ng halaman ang gumagapang sa lupa?
   b. Anong bahagi ng halaman ang makikita mong tinutubuan ng dahon at bulaklak?
   c. Anong mga halaman ang tumutubo sa sanga? Maiilarawan mo ba ito?
   d. Anong bahagi ng halamang kamatis ang nagiging bunga nito?

Mga Hayop Ayon sa Kanilang Pook Tirahan


Tanong
1. Ano ang iba't ibang lugar na tinitirahan ng mga hayop?
2. Anong hayop ang nakatira sa bawat lugar?
3. Bakit magkakaiba ang lugar na tinitirahan ng mga hayop?
4. Mayroon bang mga hayop na nakatira sa dalawa o marami pang lugar?
5. Ano ang basehan ng pagpapangkat ng mga hayop?

Mga Hayop sa Kapaligiran


B. Mga Hayop Mula sa Ibang Bansa

A. Iba- iba ang uri ng hayop sa mundo. Ilan sa mga ito ay makikita sa larawan sa ibaba. Nakikilala mo ba ang mga ito? Isulat ang sagot sa papel.

a. _____ b. _____

60

c. _____ d. _____

Tanong
1. Nakikita mo ba ang mga hayop na ito sa kapaligiran?
2. Ano-ano ang hayop na ito?
3. Saan mo makikita ang mga ito?
4. Maiilalarawan mo ba ang kapaligiran ng mga hayop na ito?

Figure 10. Lesson Conclusions of the Three Analyzed Lessons

Based on these results, development of instructional materials should focus on *relating*, *applying*, and *transferring* to provide for contextualization of learning. This means that in developing the instructional materials, these three aspects must be emphasized and that the other two, experiencing and collaborating must also be further improved. While the latter two yielded the highest mean, they nevertheless are still in the *not observed* range.

Overall, the level of contextualization is 1.49, interpreted as *not observed*. According to Reyes, Insorio, Ingreso, Hilario, and Gutierrez (2019), contextualization is relating the lesson to a learner's life, which means using learners' real-life situations, considering the learners' experiences in planning the lesson, and making sense of the lesson. Lessons should be based within the context of the learner through different situations or using materials familiar to the learners wherein learners construct

contextualized given the very level of contextualization based on the observations conducted.

For research question number 2, “What is the extent of Grade 3 teachers’ implementation of mother tongue as a medium of instruction in a science subject?” Table 4 presents the analysis of the interview results.

Table 4

Generated Themes from the Responses on Teachers’ Interview on Extent of MT Implementation

Main Themes	**Verbatim Responses**	**Codes**
Medium of Instruction Used in Science Classrooms	Hindi ko naexperience na magturo ng Science na English (haven’t experienced teaching science in English)	Have always used mother tongue
	Naituturo ko ang mga aralin ng mas nauunawaan ako ng aking mga estudyante. (Learners understand lessons in MT more)	Better understanding of the lesson Familiarity with language used
	Mas active sila na sumagot at ipahayag ang kanilang mga damdamin nang walang takot o pangamba dahil gamay nila ang salitang kanilang gagamitin. (They are more confident to answer because they are familiar with the language they are using).	Encourages participation Familiarity with language used
	Epektibo and MT sa mga primary grades dahil hindi pa sila ganoon kaalam gumamit ng salitang English (MT is effective in the primary grades because they are not familiar yet with the English language)	Familiarity with language used
	Mas gamay ko ang Mother Tongue mas nakapagpapaliwanagan at nagkakaunawaan kami ng aking mga estudyante (I am more at home with using MT as I am able to explain the lesson	At home with mother tongue Better understanding of the lesson Familiarity with language used

	more in a way that they can understand better)	
	May Special Science Classes na gumagamit ng English as medium of instruction (Special science classes use English as MOI)	English for special science classes
	Meron naman kami science classes na English ang gamit na medium of instruction. Ito ay sa section A kung saan ang mga bata ay mas nakakaunawa sa English	English for higher sections
	Naicocontextualize ko ang lesson dahil nga sa mas nagkakaintindihan kami ng aking mga estudyante gamit ang Mother Tongue (I am able to contextualize the lesson because we understand each other better)	Lessons are contextualized by teachers Better understanding of the lesson
	Mas madali sa kanila ang maiexpress ang sariling idea gamit ang mother-tongue. Kadalasan, dahil sa paggamit ng mother tongue ng mga mag-aaral, malaya nilang naipapaliwanag ang kanilang saloobin, tama ang kanilang pagkaunawa sa lesson.	Familiarity with language Ecourages participation Better understanding of the lesson
	Kapag mother tongue ang gamit sa pagtuturo, parang mas interesado sila makinig, mas nakukuha ang kanilang atensyon sa pakikinig. Mas mabilis din silang maka pick up sa lesson.	Better understanding of the lesson More interested
	Mas gamay ko magturo gamit ang mother tongue	At home with language Familiarity with language
	Gamit ang MT, mas madali na nilang naiintindihan ang mga aralin at naipapaliwanag nila ang kanilang mga sagot nang walang pag-aalinlangan	Better understanding of the lesson Familiary with language used Encourages participation
Trainings on Teaching Science in the Mother Tongue	Wala akong natatandaan maliban sa K-12 na seminar namin. (I don't remember any training except for the K-12 seminars.)	No trainings
	Honestly po, wala pa po ako seminar o training na daluhan	No Trainings

	sa paggamit ng Mother-tongue sa pagtuturo ng Science (Honestly, I haven't attended seminars or trainings on teaching science in the MT)	
	Bihasang bihasa na ang mga guro sa pagtuturo ng mother tongue sa science (Teachers are adept at using MT in teaching)	No need for trainings
	Wala pa akong nattendan na training on science (I haven't attended any training in science)	No training
Instructional Materials used in the Science Classroom	Mayroon kaming mga video lessons na ipinapanood sa mga bata (We have video lessons that children watch)	Video lessons
	Gamit namin ang book na binigay ni DepEd. Gumagamit din kami ng ibang reference sa pagtuturo tulad ng libro mula sa ibang private school.	DepEd-issued instructional material Video clips Books used by private schools
	Gumagamit din kami ng internet tulad ng videoclips at powerpoint presentation sa pagtuturo (We use DepEd issued instructional materials, book references from private schools, internet, video clips, PPT)	Internet sources PPT
	Mga kagamitang limbag at ginagawa ng guro, namamasid at napapanood (printed materials, teacher-made materials, videos)	Printed materials, Teacher-made materials, videos
Challenges in Teaching Science in the Mother Tongue	May mga terms sa Science na walang katumbas na salita sa Mother Tongue so nagiging problema minsan sa bata dahil sa spelling, sinusulat nila ang mga terms ng kung ano ang baybay nito. (There are science terms that have no equivalent translation which becomes a problem in spelling. Learners tend to spell the terms following the Tagalog rules in spelling)	Lack of equivalent Tagalog terms
	Dapat iemphasize ng mga guro ang mga terminologies na	Spelling integration in science classes

	gagamitin sa bawat lesson. Mag-integrate ng spelling para sa mga terms na ito (Put emphasis on terms used in each lesson. Then integrate spelling to familiarize students).	
	Minsan may mga salita na malalim at kahit ang mga guro hindi nila ito kayang unawain at hindi sila familiar sa salitang iyon (There are words in MT whose meanings could not be easily understood by pupils or teachers)	Deep variety of words
	Pagsasalin ng mga ingles na salita sa mother tongue (Translating English words to MT)	Translating English words to MT

Medium of Instruction Used in Science Classrooms

Table 4 shows the extent of implementation of the three schools in using mother tongue as the medium of instruction. As shown, out of the three science classes observed, two schools, ES1 and ES2 teach science using English and Filipino as the medium of instruction. The two schools use English as a medium of instruction for the science sections and Tagalog for the regular sections. According to the ES1 teacher when asked about the medium of instruction used in the science classroom, “Mayroon kaming special science classes na gumagamit ng English as medium of instruction kahit sa mga primary grades.” (We have special science classes that use English as a medium of instruction even in primary grades.)

In ES1 and ES2, both located in Baliwag, each level from Grades 1 to 3 consists of two to three sections. One section per grade level is called the special science section. This section is where the best and the brightest learners are assigned, and in which all subjects are taught in English. When asked why they use English as a medium of instruction despite the MTB-MLE policy for K to 3, the Grade 3 teacher in

ES1 said, "*Mam, matatalino kasi ang mga bata dito sa science section. Kaya po nila at naiintindihan nila kahit English ang medium of instruction. Piling pili po ang mga batang iyan. Gusto rin po kasi naming makasabay sila sa mga private school na mahusay mag-English*." (Mam, learners in this science section are intelligent. They can cope with it and can understand English as a medium of instruction. They children are among the best. We also want their competence to be at par with learners in the private schools in terms of English proficiency.)

This response reveals that while MTB-MLE policy is in place, not all schools adhere to the policy due to misconceptions about language learning. In this interview, it was revealed that the teacher, including the principal, do not fully buy into the MTB-MLE, thinking that intelligent or advanced learners in the science section should be taught in English to complement their advanced skills in other subjects. So as not to be left behind in their language class, they use English as a medium of instruction.

This finding is supported by Adriano (2021) who said that teachers who showed a negative attitude towards using MTB-MLE are not convinced about the advantage of using the mother tongue as a medium of instruction because they see English as the more pragmatic language to learn. There are also beliefs that MTB-MLE is a disadvantage for future employability where English is highly valued (Wa-Mbaleka, 2014).

This practice shows the lack of understanding among teachers and school principals on the advantage of using MTB-MLE in their classrooms. They think that the lack of exposure of these children to English (with mother tongue as MOI) will undermine the development of their English proficiency. Thus, they want to introduce the English language as early as possible. This misconception defeats the purpose of using MTB-MLE as a medium of instruction because children as young as six years old or Grade 1 are taught in a language that is not familiar to them. Moreover, at this

stage, they have not yet developed their cognitive academic language proficiency (CALP), which could slow their proficiency in both their mother tongues and the second language.

Training on Teaching Science in the Mother Tongue

This seeming lack of awareness on why the mother tongue should be the medium of instruction used in the classroom may be attributed to teachers' lack of training and seminars pertaining to how they should teach science using the mother tongue. When asked about the number of seminars or training attended in the past years on how to teach mother tongue in science, all three science teachers said they do not remember attending a seminar or training on the topic. The teacher from ES1, who has been a teacher for 29 years and has been teaching science for six years said, *"Wala akong natatandaan maliban sa K-12 na seminar namin."* (I do not remember anything except for the K-12 seminar we had).

The science teacher in ES2, who has been teaching for 27 years and has been teaching science for only five years said "Wala pa." (None so far). The science teacher from ES3, who has been in the teaching profession for 15 years and has been teaching science for 14 years, gave the same response when she stated: "Honestly po, wala pa po ako seminar o training na nadaluhan sa paggamit ng Mother-tongue sa pagtuturo ng Science." (Honestly, I haven't attended a seminar or training on how to teach science using mother tongue as the medium of instruction).

These three teachers revealed that they have not been trained in the use of mother tongue as a medium of instruction in teaching science. Thus, they teach according to how they know best. It is worthy to note that MTB-MLE has been implemented in SY 2012-2013. This means that eight years into the program, these science teachers have not had even one seminar on how and why to teach science in the mother tongue. This shows that teachers adopt the policy even if they do not have

sufficient knowledge and skills on how to implement it in the classroom.

The lack of training experienced by teachers was also revealed in the study of Adriano (2021), who investigated teachers' perceptions of the mother tongue. In her study, she found out that teachers have a negative attitude towards the MT due to lack of materials and training. Wa-Mbaleka (2014) likewise cited the one of the reasons for the negative perception of teachers is due to lack of teachers' training in the local languages used for instruction where they teach.

Instructional Materials Used in the Science Classroom

When asked about the instructional materials used in teaching science, ES1 teacher said, "Mayroon kaming mga video lessons na ipinapanood sa mga bata na malaking tulong ang nagagawa para maging interesado sila sa bawat aralin." (We have video lessons that we ask the learners to watch, which is a big to make learners interested in each lesson.). When probed where these video lessons came from, the teacher said they get sources from the internet and from the DepEd TV video lessons uploaded in the LRMDS website and in YouTube.

The Grade 3 science teacher from ES2 responded to the same question, "Mga kagamitang limbag at ginagawa ng guro, namamasid at napapanood." (Printed materials made by teachers, including the ones that can be viewed and watched by learners). Again, this refers to the numerous resources found in LRMDS that include printed and video materials.

While teachers have many available and varied resources for their lessons, not all materials they use are contextualized or culturally relevant which is necessary in teaching content using the mother tongue. Generally, resources found in the internet and other self-made instructional materials were not screened nor evaluated for appropriateness for use in the classroom.

In fact, in the study of Mangila (2018) who examined the extent of cultural relevance of the instructional materials used by elementary teachers in mother tongue, it was revealed that the instructional materials are not culturally relevant as inconsistencies exist on the cultural messages contained in them. This was supported by Moran (2001) who claimed that some of these textbooks are not even culturally relevant to students. It is therefore crucial that teachers use instructional materials that are contextualized and therefore, culturally relevant.

Challenges in Teaching Science in the Mother Tongue

The weak implementation of teaching science in the mother tongue as presented in the foregoing discussions may be attributed to the challenges teacher faced in teaching the subject. The ES1 teacher said, “Katulad kasi ng Mathematics, may mga terms sa science na walang katumbas na salita sa mother tongue so nagiging problema minsan sa bata dahil sa spelling, sinusulat nila ang mga terms ng kung ano ang baybay nito.” (Just like in mathematics, there are science terms that do not have equivalent translation in the mother tongue; thus, this sometimes becomes a problem for learners who spell the English terms according to how they are pronounced.)

This is actually language interference. Filipinos are used to spelling Tagalog words according to how they are pronounced. Thus, the challenge, according to ES1 teacher, is that learners transfer their knowledge of Tagalog spelling into the English terms. She therefore suggests for science teachers to define the terms to be used and integrate its spelling in the lesson. She said, “Kailangan iemphasize ng mga guro ang mga terminologies na gagamitin sa bawat lesson. Mag-integrate ng spelling para sa mga terms na ito.” (Teachers should emphasize the terminologies that will be used in each lesson and integrate spelling while it is being taught).

This finding is supported by the finding of Azardon et al. (2016) who said that some technical terms have no equivalent in the local language, especially in the mathematics subject. For materials produced at the central office, the tendency was to use the “deeper” version of the language. These difficult terms used in the learners materials require additional time to search for the meaning of the words. These words have not been used by many for decades but writers employed by the Central Office would want to revive them. This concern is not felt in Buguias and the schools in Bukidnon because the materials were developed locally, hence the existing language type was used.

Meanwhile, the concern of teacher from ES2 is the translation of English terms in the mother tongue. When asked about the challenge she replied, “Ang pagsasalin ng mga Ingles na salita sa mother tongue.” (Translation of English terms into the mother tongue). During the class observations, the Teacher’s Guide reference used by the teacher in this school was written in English. Only the instructional material used by the learners were written in the mother tongue. Thus, teachers tend to translate their reference material into Tagalog as they prepare for the lesson since the available material they use is printed in English.

Thus, she suggested, “Bilang guro, kinakailangan pa ng pagsasanay sa pagsasalin ng Ingles sa mother tongue.” (As a teacher, there is yet a need to be trained in translating English to mother tongue). This observation is consistent with Azardon’s (2016) finding that one of the major concerns of teachers is the lack of materials produced for teaching, which are properly translated to the different mother tongue languages.

Paulson (2010a, 2010b) revealed a number of barriers to effective implementation: a) deep-seated attitudes about indigenous languages and their suitability for the classroom, b) perceived extra work in teaching the mother tongue

as a third language in the classroom, c) their own unfamiliarity with the grammatical and orthographic system of their mother tongue, and lack of confidence in teaching reading and writing in that language, d) attitudes and beliefs about the best way to learn to read based on their personal schooling experiences, and e) fear of losing authoritative control in their classroom.

Of the challenges mentioned, the challenges of orthography, translation, and lack of equivalent terms are consistent with the observations of Paulson in terms of the perceived extra work in teaching the mother tongue as a third language in the classroom. The extra work is the burden of translating instructional materials written in English into Tagalog. This entails a lot of time and results in an added burden for teachers. Another is unfamiliarity with the grammatical and orthographic system of their mother tongue as teachers mentioned about the problems in spelling and the lack of equivalent scientific terms in the mother tongue.

In summary, in terms of the extent of implementation of teaching science using mother tongue as a medium of instruction, it is evident that teachers do not implement it fully as evidenced by the bilingual media of instruction, English and mother tongue, used in the two schools. The poor implementation may be attributed to teachers' lack of theoretical understanding about the mother tongue, its benefits, and the rationale behind the shift to this language policy.

In addition, all three teachers have not been trained specifically in using mother tongue as a medium of instruction in teaching science. The lack of instructional materials printed in the mother tongue also could have affected its implementation. Thus, teachers should be trained in the concept of mother tongue, strategies in teaching science in the mother tongue, developing instructional materials in the mother tongue, and overcoming challenges in implementing mother tongue as MOI in different content areas.

For research question number 3, “What framework may be used to design contextualized instructional materials in Bulacan-Tagalog?

Table 5

5Is: Framework Used in Designing Contextualized Instructional Materials in Science

Original REACT Strategy	**5Is Model - Revised Strategy from REACT**	**Description**
Relate-Example of real-world connection or discussion of preconceptions	**Iugnay** - Ang bagong impormasyon ay naiuugnay sa pang-araw araw na buhay.	This part serves as the motivation part to prepare learners for the lesson. It connects the lesson’s concepts to what the children already know.
Experience-Activity or procedure for experiencing the skill or standard.	**Isagawa** - Nararanasan ng mga bata ang gumawa, magsuri, tumuklas, at lumikha ng mga bagay na natutunan.	This part points out learning in the context of exploration, discovery, and invention. The aim is to allow learners to experience activities that are directly related to real life work.
Apply-Activity or procedure for using the skill or standard.	**Ilapat -** Ang mga pagsasanay ay nailalapat ng mga mag-aaral sa kapakipaki-nabang na konteksto o sa kanilang mga gawain sa bahay.	This stage, learners apply concepts and information in a useful context through projects, activities, labs, text, and video.
Cooperate-How learners will interact.	**Ibahagi** - Nakakabahagi ang bawat mag-aaral sa pagsasanay sa pamamagitan ng mga gawaing nakagrupo.	This stage points out learning in the context of sharing, responding, and communicating with other learners. This can be actualized via group activities such as projects, labs, problem-solving, realistic scenarios
Transfer of learning strategy (wrap-up and new or unique situation application)	**Itawid** - Nagagamit ang konseptong natutunan sa ibang aralin.	In this stage, learners transfer skills and knowledge from one setting to another. This part contains an experiment to hone the scientific skills of learners.

Table 5 shows the 5Is model, a framework created by the researcher to design contextualized instructional materials in science. This model was patterned after the REACT strategy. The Center for Occupational Research and Development (1999) explained that curricula and instruction based on contextual learning strategies should be structured to encourage five essential engagement strategies known as REACT: relating, experiencing, applying, cooperating, and transferring. The REACT strategies are designed to help learners build new skills and knowledge regardless of their starting point.

Because the context of the REACT strategy is mainly for English language learners, the researcher developed a counterpart of the REACT strategy for Filipino learners. The 5Is model stands for *Iugnay, Isagawa, Ilapat, Ibahagi,* and *Itawid*. Embedded in each part are concepts proposed by the Science Framework for Philippine Basic Education such as inquiry skills, under *Iugnay* and *Ilapat*; scientific attitudes under *Itawid* which is the conduct of experiment part; and content and connections which exemplified *Isagawa*, *Ibahagi* and *Itawid*.

This framework consists of three interlocking elements, (1) inquiry skills, (2) scientific attitudes, and (3) content and connections, which are exemplified in the developed instructional material in science and that overlap in each of the five 5Is dimension. Each component is essential in supporting the holistic development of a scientifically literate individual.

What makes this design unique is the conduct of experiments to cap off each lesson, which targets the inquiry skills and scientific attitudes of learners. For example, in Lesson 1 under Ilapat, the learners are asked to cook their own breakfast, fried egg. While they ask the help of their parents or older siblings to do this, they observe the initial state of the raw egg and the change that took place after it was cooked. Moreover, the activity is always connected with technology as learners are asked to

take a photo of their breakfast and caption it, then post it in their social media accounts. This exemplifies content and connections in so many ways, the activity's connection in their everyday lives, their learning with the help of family members, the connection of the content with technology, and the way all parts of the 5Is achieve to meet the lesson's objectives.

The result of the contextualization survey in Table 5, particularly the relate, experience, and apply were all emphasized under Iugnay, Isagawa, at Ilapat. The model is designed to be learner-centered, with the teacher guiding the learners to achieve the learning goals. Ibahagi engages learners in collaborative activities with their classmates even in an online learning setup. The Itawid part also provides an avenue for learners to use their learning in a different context. The Itawid Journal, the last section under Itawid, aims to hone the writing skills of the learners by asking them to write their reflection about the learning they gained in the lesson.

According to O'Connell and Dyment (2006), journal writing enables students to improve their writing skills and promotes critical their thinking. Moreover, research also suggests that journal writing improves students' writing and enhances their learning and writing as reflected in test scores (Connor-Greene, 2000; Bartscher et al., 2001). Similarly, Bartscher et al. (2001) suggests that journal writing improves significantly students' writing, and students "grew into the emotional commitment of expressing their feelings" (p. 46).

Another characteristic of this instructional material is that it did not use the deep Tagalog variety that exemplifies instructional materials written in the mother tongue. Azardon et al. defines the deep variety as difficult terms used in the learners' materials that require additional time to search for the meaning of the words. These words have not been used by many for decades but instructional materials writers from DepEd would want to revive them; hence, the use. This concern is addressed in the

developed instructional materials. The approach was conversational and the words used were consistent with everyday language. It follows the more informal and conversational style in explaining the concepts.

The font size of the material was also 14 to accommodate the various visual needs of Grade 3 learners. Based on this framework, the module consists of one unit, with three lessons each. The key features of the design are illustrated in Appendix A and are explained in the succeeding sections.

The 5Is Model

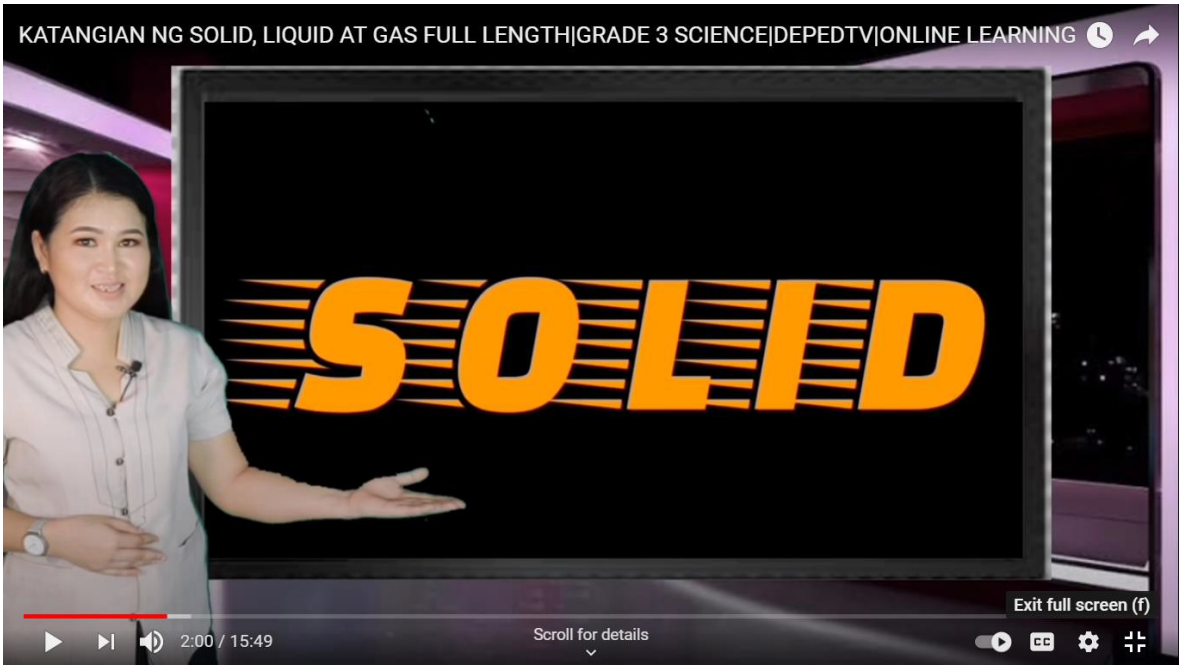
Iugnay. Ang bagong impormasyon ay naiuugnay sa pang-araw araw na buhay. This part serves as the motivation part to prepare learners for the lesson. It connects the lesson's concepts to what the children already know. In the developed instructional material for the lesson "Solid," this part is illustrated this way.

Kabanata 1: Solid

May tatlong kalagayan o state ang matter. Ito ay ang solid, liquid, at gas. Unahin nating pag-aralan ang solid. May mga katangian ang solid na naiiba sa liquid at gas. Ang solid ay maari nating ilarawan ayon sa kulay, laki, hugis, tekstura, bigat, at kapal. Ito ay may tiyak na hugis, laki, tiyak na dami at may kakaibang katangiang taglay. Halika na at pag-aralan nating ang solid!

Aralin 1 – Katangian ng Solid

a. Panoorin mo ang videong ito sa inyong mga tahanan. Magpatulong ka sa mga kasama mo sa bahay na iclick ang video link na ito: https://youtu.be/1t18EG6ssfE
b. Kung walang internet, tingnan ang mga larawan ng solid sa iyong modyul.
c. Magpatulong sa nakatatandang kasama sa bahay na mangalap ng limang solid na makikita sa iyong kapaligiran.



LAYUNIN

a. Natutukoy ang pangalan ng mga solid.
b. Nailalarawan ang mga solid ayon sa kulay, laki, hugis, at tekstura.
c. Naipapangkat ang mga solid ayon sa ayon sa kulay, laki, hugis, at tekstura.

Mga Larawan ng Solid

holen

pinggan

palayok

salakot

Iugnay

Base sa napanood mo o nakita sa larawan ng modyul o mga bagay na nakalap mo, paano mo ilalarawan ang solid? May mga solid ka ba na ginamit para maghanda sa pag-aaral ngayong araw na ito? Magbigay ka ng halimbawa ng mga solid na ginagamit mo ngayon sa pag-aaral. Magbigay ng limang halimbawa:

1. _____
2. _____
3. _____
4. _____
5. _____

In order to connect to prior knowledge, the material asked about what the learner already knows about solid. The video lesson serves to trigger learners' prior knowledge and link it to new knowledge. The options provided at the beginning of the lesson under Aralin 1 aims to meet learners' needs. This exemplifies differentiated instruction. The DepEd video lessons are for those who have access to the internet, the drawings in the module are for those who do not have internet access, while the third option to gather solid found in the environment are for those who have neither internet connectivity nor modules (For example, the module was late in coming or was not picked up by the parent in the school).

Moreover, the examples provided in the photos were also reflective of Filipino culture. There are people who still use salakot in Town 1 and 2 since these places are agricultural areas. Option C that asked the learners to find solid objects in the environment also serves to connect the lesson to what is familiar to the learners, giving the learners the idea that what they are learning is relevant to their everyday lives.

Under Iugnay activity, learners are encouraged to write down five examples of solid that they use in their studies. Again, this reinforces the concept that science is relevant to everyday life, that science is linked to culture, and that science is connected

to language. Language is used by students to reveal their knowledge of science concepts through the examples they provide.

Isagawa. Nararanasan ng mga bata ang gumawa, magsuri, tumuklas, at lumikha ng mga bagay na natutunan. This part points out learning in the context of exploration, discovery, and invention. The aim is to allow learners to experience activities that are directly related to real life work.

Isagawa

1. Gamit ang mga halimbawa ng solid na ginagamit mosa pag-aaral, ilipat ang mga halimbawa sa tsart sa ibaba.

2. Isulat mo ang pangalan ng solid, pagkatapos ay ilarawan mo ang solid ayon sa kani-kanyang kulay, laki, hugis, at tekstura.

Tandaan:

a. Ang tekstura ay naglalarawan ng kinis, gaspang, lambot o tigas ng isang bagay ayon sa hipo sa solid.
b. Ang laki ay maaring maliit, katamtaman, at malaki.
c. Ang hugis ay maaring bilog, parihaba, parisukat, tatsulok, o bilohaba.
d. Ang bigat ay maaring magaan, katamtaman, o mabigat.

Tsart ng Solid

Solid	Kulay	Laki	Hugis	Tekstura	Bigat
1.					
2.					
3.					
4.					
5.					

3. Matapos mong ipangkat ang mga solid ayon sa mga katangian nito, paano mong ilalarawan ang solid? Punan ang puwang para buuin ang paglalarawan.

Ang solid ay isang kalagayan o state ng matter na

_____
_____
_____
_____.

The *Isagawa* provides an opportunity for learners to explore, observe, and discover the concepts on their own. The activity invites learners to observe solid and write its color, size, shape, texture, and weight. This aims to develop curiosity and inquiry skills among students, the scientific skills on which the activities are anchored. What the learners know about ordinary objects that they see every day are given depth by letting the students examine closely and discover other properties of an otherwise common objects. In this regard, Isagawa sheds new light to learners' everyday encounters with their environment.

In question 3, this part provides connection to science and language, in which language is used to explain science concepts. The fluency of a learner in explaining science concept reveals the depth of learning.

Ilapat. Ang mga pagsasanay ay nailalapat ng mga mag-aaral sa kapaki-pakinabang na konteksto o sa kanilang mga gawain sa bahay. At this stage, learners apply concepts and information in a useful context through projects, activities, labs, text, and videos.

Ilapat

Gawin ang mga sumusunod:

1. Magpatulong sa iyong nanay o nakatatandang kapatid na maghanda ng iyong agahan. Pumili ka sa hanay ng mga sumusunod base sa agahang nakasanayan mong kainin at mayroon sa inyong tahanan. Pagkatapos ay ihanda mo ito sa hapag kainan:

Agahan 1	Agahan 2	Agahan 3
itlog longganisang bawang gatas kanin	kape Pandesal Binating itlog	Kanin Itlog na maalat kamatis Dilis, tuyo o pritong isda tubig

***Maaring palitan ang mga halimbawang binigay ng anumang nakasanayang agahan na hinahanda sa inyong tahanan.*

2. Magpatulong ka sa iyong nanay o sa kahit sinong nakatatanda sa bahay na iprito ang itlog. Habang ginagawa mo ito, obserbahan mo ang itlog matapos itong basagin at isalin sa lalagyan. Batihin mo ang itlog at lagyan ng kaunting asin, pagkatapos ay iprito mo ito. Iprito mo rin ang longganisang bawang.

3. Ilaga mo ang isa pang itlog. Balatan mo ito at ihain.

4. Anu-ano ang mga solid na kinain mo? May napansin ka bang liquid pero nang mainitan ay naging solid? Ano ito?

5. Kunan ng litrato ang iyong agahan na kasama ka, ipost sa FB, at lagyan ng pamagat.

   **Kung walang internet, iguhit ang iyong almusal at kulayan ito.

This part exemplifies the connection of the lesson to learners' real world. Learners are encouraged to involve themselves in everyday tasks at home and be observant of the daily things they do. If previously they are served breakfast by an adult in the home, this time, they will learn the process that the food goes through before they are served at the table. The everyday activity then becomes more meaningful as they get to participate in the task.

In the first step of the activity, learners are asked to prepare their own breakfast

and to observe which ones are solid or liquid. This illustrates that science is both a content and a process. The activity provides context in learning science, the context of which is students' daily activities. This activity stimulates learners' observations skills and arouses their curiosity.

In step 5, the learners are asked to take a photo of their breakfast and post in FB. In the science framework for Philippine basic education, technology is integrated in learning. The scientific attitude that this activity aims to highlight is for learners to be scientifically (through curisosity and observation) technologically literate individuals (through the use of social media and taking photos through their cellphones).

In case learners do not have gadgets or internet, an alternative is provided to have them draw their breakfast and color it.

Ibahagi. Nakakabahagi ang bawat mag-aaral sa pagsasanay sa pamamagitan ng mga gawaing nakagrupo. This stage points out learning in the context of sharing, responding, and communicating with other learners. This can be actualized via group activities such as projects, labs, problem-solving, realistic scenarios

Ibahagi

Kasama ang iyong mga kaibigan o kagrupo sa klase, gumawa ng album ng solid na naglalaman ng mga paborito ninyo. Bawat isa sa inyo ay magdikit ng paborito ninyong laruan, aklat, damit, sapatos, baso, ulam, at iba pa para mas makilala ninyo pa ang isa't isa. Pagsama-samahin ang mga nagawa ninyo at icompile sa Google Docs. Magisip ng pangalan ng inyong grupo at isubmit sa Group Chat ng inyong klase.

Kung wala kang gadyet o internet, gumawa ka ng album kasama ang iyong kagrupo gamit ang folder at bond paper. Gumupit ng mga ididkit mula sa magazine, pahayagan at iba pa.

Maari ding iguhit ang mga napiling bagay kung walang magasin o pahayagan.

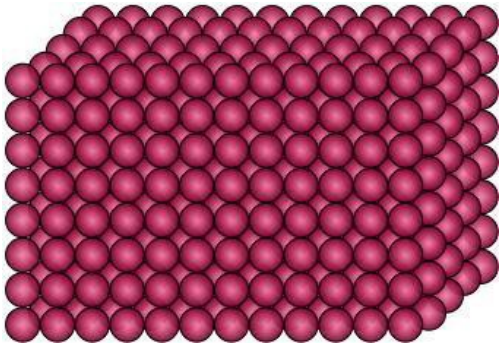
Under Ibahagi, learners are encouraged to work in groups and share what they know with their classmates. This parts aims to hone the communications skills of learners as they share science concepts to their peers. Thus, language is used as a vehicle for strengthening science learning, highlighting the connection between language and science. The last instruction under paragraph 1 is for learners to think of their group name and submit the Google Docs file in the class's group chat.

The use of Google docs in compiling the group projects and in posting in the class's GC targets the technogical skills of learners, which is a scientific skill highlighted in the Philippine science framework. However, in case learners do not have access to the internet, an option is provided for them to compile solid objects using cutouts or draw the objects in case they do not have available materials from which to cut the photos.

Itawid. Nagagamit ang konseptong natutunan sa ibang aralin. At this stage, learners transfer skills and knowledge from one setting to another. This part contains an experiment to hone the inquiry or scientific skills of learners.

Itawid

Ang particles ng solid ay siksik, o magkakadikit at hindi umaalis ng lugar. Ito ang dahilan kung bakit hindi nagbabago ang hugis ng solid. Ang hugis ng solid ay maaring tatsulok, parihaba, bilog, parisukat, biluhaba at iba pa. Ang lahat ng matter ay binubuo ng maliit na particles. Tingnan mo ang larawan sa ibaba.



Sa proyektong ito, ihanda ang mga kagamitang ito:

1. Butter
2. Mantika
3. Yelo

Panuto:

1. Humingi ka ng tulong sa nakatatandang kasama mo sa bahay. Initin ang kawali at magpatulong kang ilagay ang kapirasong butter sa kawali. Pagkatapos ay obserbahan mo ito.

2. Ano ang nangyari sa butter?

3. Sumunod ay isalin mo ang mantika sa isang maliit na lalagyan. Ilagay mo ito sa inyong ref at kuhanin kinabukasan. Ano ang nangyari sa mantika?

4. Kumuha ng kapirasong yelo sa freezer. Ilagay ito sa isang lalagyan at hayaan lang sa labas. Matapos ang ilang oras, ano na ang nagyari sa yelo?

5. Kunan ng picture ang pagbabagong naganap sa mga ito at idikit sa iyong journal.

Itawid Journal

Isulat sa iyong Itawid Journal and iyong obserbasyon at ang iyong mga natutunan sa proyektong ito. Lagyan ng petsa ang bawat repleksyon.

Of all the five dimensions of the 5Is model, this part ensures that learners completes the lesson with a sense of awe as they conduct the science experiments. This aspect develops their inquiry skills, their critical thinking skills, and integrates language (explaining science concepts), culture (way of doing things), and science (scientific process of the experiment) in attempting to test and explain the hypothesis.

In the simple experiment, learners are made aware that solids or liquids undergo change. When the butter melts, it changes into liquid; when the cooking oil is refrigerated, it changes into solid, and when the ice is exposed to heat, it changes into liquid. Through this experiment, learners will realize that the properties of solid are affected by their interaction or conditions in the environment. Asking learners to observe and then record what they see is a scientific discipline that they can imbibe through the experiment. Again, scientific attitudes are integrated with language skill in explaining science concepts and culture, the way people do things. The instruction to take a photo is integrating technology in learning.

The Itawid Journal, on the other hand, aims to develop the writing skills of learners by explaining what they learn using scientific terms. It helps them record what they learn in science by presenting science concepts in their mother tongue. According to Hidayanti and Wibowo (2019), journal writing helps build the writing skill of learners when it is conducted on a regular basis. In addition, “journal writing provides learners with good opportunities to improve their writing skills individually and good chances to record their thoughts and feelings.” (Ngoh, 2002, p. 27)

The 5Is model provides a framework for instructional materials designers on how to develop instructional materials in Bulacan-Tagalog. In comparing the lessons exemplar developed using the 5Is framework and the Grade 3 instructional material that was analyzed, the latter evidently lacks a framework on which to base its activities, resulting in limited learning opportunities for learners. Moreover, the concepts

developed in the analyzed material do not encourage higher order-thinking skills and do not exemplify scientific attitudes. Lessons were just merely presented and introduced without connections to learners' prior knowledge or real life scenarios.

Using the 5Is model, anchored on the science framework for Philippine basic education, would ensure that learners would be provided with lessons that are contextualized, culturally relevant, and anchored on scientific attitudes. Each dimension of the model offers an opportunity for learners to relate, experience, apply, collaborate, and transfer learning in other settings. This model is therefore proposed to develop learners who are scientifically, technologically, and environmentally literate but also ones who have deep appreciation for their language and their culture, learners who are deeply rooted in their cultural heritage and who use their language and culture to enrich their understanding of the world they live in through science.

Chapter V

CONCLUSIONS AND RECOMMENDATIONS

This chapter presents the conclusion and recommendations of this study. The conclusions are arranged according to how the research questions are presented in the study, followed by the recommendations.

The need to contextualize instructional materials is paramount in teaching subjects in the mother tongue. The use of mother tongue in teaching science strengthens not only the learning of one's language but also encourages appreciation of one's culture. In addition, language and culture are connected to science, which is defined as a systematized and organized body of knowledge derived from careful observation and experimentation. Science knowledge is embedded in one's culture and are expressed and explained through language. Moreover, culture provides the context for learning science in the same way that culture makes the application of science relevant to learners. Contextualized science instructional materials, therefore, highlight the connections between and among language, culture, and scientific concepts and attitudes.

The study's finding that contextualization is not observed in the instructional materials could be attributed to the lack of framework used by developers. It is evident, however, that at the classroom level, teachers attempt to contextualize the delivery of lessons by giving collaborative activities to compensate for the lack of contextualization in the material. While this effort is laudable, group activities are just one aspect of contextualization. Other contextualization domains must be targeted too in order to provide a holistic experience for learners.

With the many teaching and administrative tasks of teachers, further contextualizing the instructional material is an added burden to them because it entails

a lot of time and preparation. To cut down lesson preparation time and simplify teachers' job, the researcher developed a lesson exemplar based on the proposed 5Is model that presents contextualized science content anchored on the Philippine science framework. The exemplar, with its five contextualization dimensions, *Iugnay*, *Isagawa*, *Ilapat*, *Ibahagi*, *Itawid*, can serve as a guide in designing science instructional materials in Bulacan-Tagalog to ensure that content and activities are contextualized.

Using the 5Is model can also improve the level of contextualization of existing science materials. Moreover, the model can also be used in other content areas and can be easily customized to other subcultures of Philippine languages. Aside from it promoting successful teaching and learning, the lesson exemplar is also culturally relevant and accommodates the various needs of learners. It provides learners options in terms of activities and the medium by which to accomplish tasks.

As of date, DepEd has not proposed a model in developing science instructional materials in the mother tongue. What the department proposed is a process that an instructional materials writer should observe in developing instructional material. The 5Is model that the researcher proposes is a detailed guide on the different parts of a lesson as exemplified by the 5Is: *Iugnay, Isagawa, Ibahagi, Ilapat,* and *Itawid.* The guide can be easily followed by public elementary school teachers who plan to develop their own contextualized instructional materials.

Given the mentioned benefits of using the 5Is model in designing instructional materials, it is recommended the model be used by Grade 3 science teachers in developing their own instructional materials in science or in improving the already existing science materials that they use. The exemplar may also serve as a pattern by Grade 3 teachers who teach science. It is recommended that they use the exemplar to extend this study in order to find out if the material is effective in improving the level

of contextualization in the teaching-learning process, both in the material level and in the classroom.

This study also concludes that not all teachers believe in the benefits of mother tongue education. According to Paulson (2010a, 2010b), teachers' belief about mother tongue serves as a major barrier in MTB-MLE implementation. Thus, it is important for teachers to understand the what, why, and how of mother tongue so that they could better appreciate the policy. If teachers are not convinced about mother tongue education, they will not practice it. As observed, there are teachers who use English as a medium of instruction, particularly the special science sections implemented in various public schools. These varied practices could undermine the efforts and the benefits that could be derived from the MTB-MLE.

It is evident that principals and teachers who do not fully understand the policy or who are not convinced about the benefits of mother tongue do not implement it in their schools. Despite the length of time MTB-MLE has been practiced (SY 2012-2013), not all school administrators and teachers buy into it.

Therefore, it is recommended that teachers and school principals be provided with short courses on mother tongue training, especially those teaching the K-3. This is to ensure that they are aware of the benefits of this policy, on how it should be implemented, and on how to contextualize instructional materials. This recommendation is based on the responses of interviewed science teachers who said they have not had any training on MTB-MLE except for the mass training on K-12 prior to the transition to the K-12 program. Aside from courses on MTB-MLE, they should also be trained in developing instructional materials that are contextualized. It is evident that the extent of implementation of the mother tongue by teachers clearly reflects their lack of training. Equipping should always accompany reforms on language of instruction in schools.

It is also recommended that as teachers adopt the 5Is model, that a training on how to use the model be conducted and a pilot testing of the developed instructional material be scheduled for the validation and extension of the project. Future researchers are also welcome to use the 5Is model in their studies and find out if it is indeed effective in terms of learners' outcomes. The claim of the 5Is model is that the developed instructional material is effective at improving a learner's skill in terms of language skill, appreciation of local culture, and science concepts. It would be appreciated if future researchers test this claim and conduct a study that would establish whether it is indeed effective.

REFERENCES

Abraham-Mella, J. (2013). Reading comprehension skills of Grade VI learners: Basis for a differentiated school reading intervention [Poster]. Presented at 1st International Research Conference on K to 12 Education, 20-23 Aug. 2013, hosted by Department of Education– Region 5. Oriental Hotel, Legazpi City, Philippines.

Adley-Sta. Maria (1997). Issues in Language Shift, Textbook Development, and Native Speaker-University Collaboration. *Teaching Indigenous Languages* Retrieved from http://jan.ucc.nau.edu/~jar/TIL_12.html

Adriano, M.N.I., Franco, N. T. & Estrealla, E. A. (2021). Language-in-education policies and stakeholders' perception of the current MTB-MLE policy in an ASEAN country. *Australian Journal of Language & Literacy,* 44,1, p84-99. 16p.

Ahmed, S. (2016). An Evaluation of Effective Communication Skills Course book. Advances on Language and Literary Studies, 5(3), 57-70.

Ahmed, S. (2017). Authentic ELT materials in the language classroom: An overview. *Journal of Applied Linguistics and Language Research 4*(2):181-202. Retrieved from https://www.researchgate.net/publication/315765820_Authentic_ELT_Materials_in_the_Language_Classroom_An_Overview/citations

Alba, R., Logan, J., Lutz, A., & Stults, B. (2002). Only English by the third generation? Loss and preservation of the mother tongue among the grandchildren of contemporary immigrants. *Demography*, *39*(3), 467-484.

Albano, E. (2019). Seriousness of DepEd textbook review doubted. Retrieved from https://www.manilatimes.net/seriousness-of-deped-textbook-review-doubted/518298/

Alberto, R., Gabinete, S., & Rañola, V. (2016). Issues and challenges in teaching mother tongue-based multilingual education in grades II and III: The Philippine experience. http://dx.doi.org/10.2139/ssrn.2768558

Ambrose, Valerie & Davis, C. Amelia & Ziegler, Mary. (2014). From Research to Practice: A Framework for Contextualizing Teaching and Learning. Journal of College Reading and Learning. 44. 35-50. 10.1080/10790195.2013.10850371.

Anderson, V. B. & Anderson, J. N. (2005). Pangasinan—An Endangered Language? Retrospect and Prospect. Retrieved from https://www2.hawaii.edu/~vanderso/Pangasinan.pdf

Arzadon, M., Igcalinos, A, Zubiri, L., Cortez, A, Awid, M and Gumba, L. (2016). Regional research on the use of language(s) in classrooms in ethnolinguistic

communities: Philippines. Unpublished Report submitted to UNESCO, Bangkok

Ball, J. (2010). Enhancing learning of children from diverse language backgrounds: Mother tongue-based bilingual or multilingual education in the early years. Paper commissioned for UNESCO. Retrieved on November 25, 2016 from https://goo.gl/m3goxq

Bartscher, M., Lawler, K.., Rameriz, A., Schinault, K. (2001).Improving student's writing ability through journals and creative writing exercises. (Report No. CS 217 644) Chicago, IL: Saint Xavier University & IRI/Skylight. (ERIC Document Reproduction Service No. ED 455525).

Bernardo, J. (2020). Philippines ranks last among 58 countries in Grade 4 math, science: Study. https://news.abs-cbn.com/news/12/09/20/ph-ranks-last-among-58-countries-in-grade-4-math-science-study

Brame, C. (2016). Active learning. Vanderbilt University Center for Teaching. Retrieved [todaysdate] from https://cft.vanderbilt.edu/active-learning/.

Bowden, C., & Galindo-Gonzalez, S. (2015). Interviewing when you're not face-to-face: The use of email interviews in a phenomenological study. International Journal of Doctoral Studies, 10, 79-92. Retrieved http://ijds.org/Volume10/IJDSv10p079-092Bowden0684.pdf

Brousseau, A. M. (2011). Identités linguistiques, langues identitaires: synthèse". *Arborescences: revue d'études françaises* 1. http://id.erudit.org).

Callahan, R. M., Sampson, V., & Rivale, S. (2019). Activating Bilingual English Language Learners' Strengths in Science: The Pedagogy of Argument Driven Inquiry (ADI). In L. C. de Oliveira et al. (eds.), Teaching the Content Areas to English Language Learners in Secondary Schools, English Language Education 17, https://doi.org/10.1007/978-3-030-02245-7_12

Canagarajah, A.S. (1999). *Resisting linguistic imperialism in English teaching.* Oxford, UK: Oxford University Press.

Connor-Greene, P. (2000). Making connections: Evaluating the effectiveness of journal writing in enhancing student learning. Teaching of Psychology, 27(1), 44-46.

CORD (1999). Teaching science contextually, CORD Communications, Inc., Waco, Texas, USA

Crawford, L. M. (2001). Teaching contextual: Research, rationale and techniques for improving pupil motivation and achievement in mathematics and sciences. CCI Publishing: Texas

Creswell, J. W. (2003). Research design: Qualitative, quantitative, and mixed methods approaches (2nd ed.). Thousand Oaks, CA: Sage.

Cruz, N. T. (2015). The implementation of the mother tongue-based multilingual education in grade i in the public elementary schools in Pangasinan I. *Proceedings of the DLSU Research Congress*, *3*.

Department of Education (2019). Statement on buffer stock learning materials, errors in textbooks, https://www.deped.gov.ph/2019/08/13/statement-on-buffer-stock-learning-materials-errors-in-textbooks/

Department of Education. (2016). Department Order No. 35: The learning action cell as a k to 12 basic education program school-based continuing professional development strategy for the improvement of teaching and learning. Metro Manila, Philippines: Department of Education, Republic of the Philippines.

Department of Education. (2012). Department Order No. 16: Guidelines on the implementation of the mother tongue-based multilingual education (MTB-MLE). Metro Manila, Philippines: Department of Education, Republic of the Philippines.

Department of Education. (2009). Department Order No. 74: Institutionalizing mother tongue-based multilingual education (MLE). Metro Manila, Philippines: Department of Education, Republic of the Philippines.

Dekker, D. E., & Dumatog, R. (2004). First language education in Lubuagan, Kalinga, northern Philippines. Paper presented at the conference on language development, language revitalization and multilingual education in minority communities in Asia, Bangkok, Thailand. Retrieved October 10, 2011 from http://www.sil.org/asia/ldc/parallel_papers/dumatog_and_dekker.pdf.

Dicks, B. (Ed.) (2011). Digital qualitative research methods. Sage Publishing

Din-Garcia, T. (2013). The correlation of parental involvement and the status of the school in relation to language development of Grade-I learners in the K to 12 curriculum [Poster]. Presented at 1st International Research Conference on K to 12 Education, 20-23 Aug. 2013, hosted by Department of Education–Region 5. Oriental Hotel, Legazpi City, Philippines.

Dwyer, A. M. (2011). Tools and techniques for endangered-language assessment and revitalization. In Vitality and Viability of Minority Languages. October 23-24, 2009. New York: Trace Foundation Lecture Series Proceedings. Preprint. Online: http://www.trace.org/events/events_lecture_proceedings.html

Elo, S., & Kyngäs, H. (2008). The qualitative content analysis process. *Journal of Advanced Nursing*, *62*(1), 107-115.

Elley, W.B. (1996). Using book floods to raise literacy levels in developing countries. In Greaney, V. (Ed.), Promoting reading in developing countries. Newark, US: International Reading Association.

Faisal, 2005, Pembelajaran Volume Kubus dan Balok dengan Strategi REACT pada Peserta didik Kelas I SMPNegeri 6 Malang, Tesis, Program Pasca Sarjana Universitas Negeri Malang, Tidak dipublikasikan

Fishman, J. A. (1991). *Reversing language shift: Theoretical and empirical foundations of assistance to threatened languages*. Clevedon, Avon, England: Multilingual Matters.

Gerlach, J. M. (1994). “Is this collaboration?” in Bosworth, K. and Hamilton, S. J. (Eds.), Collaborative learning: Underlying processes and effective techniques, New Directions for Teaching and Learning No. 59.

Getuiza, R. (2013). Appropriateness of Mother-Tongue Based Multi- Lingual Education (MTB-MLE) in Urban Areas : A Synthesis Study. *International Journal of Scientific Engineering and Research (IJSER)*, *1*(1), 611–620. Retrieved from www.ijser.in

Gordon, R. G. (2005). Ethnologue: Languages of the world. Retrieved from https://www.researchgate.net/publication/246103692_Ethnologue_Languages_of_the_World

Graneheim, U. H. & Lundman, B. (2004). Qualitative content analysis in nursing research: concepts, procedures and measures to achieve trustworthiness. Nurse Education Today 24, 105–112.

Headland, T. (2003). Thirty endangered languages in the Philippines. Retrieved from https://www.researchgate.net/publication/248078736_Thirty_endangered_languages_in_the_Philippines. DOI: 10.31356/silwp.vol47.01

Henson, K. (2003). Foundations for learner-centered education: A knowledge base. Learner-centered education programs at the Citadel. Education, 124(1), 4-104.

Hiber, D. (2012). Why do languages die? Retrieved from https://mises.org/library/why-do-languages-die

Hsieh, H. F. & Shannon, S. (2005). Three approaches to qualitative content analysis. *Qualitative Health Research 15*, 1277– 1288.

Ianiro, S. (2007). Authentic materials. California Adult Literacy Professional Development Project (CALPRO). https://www.calpro-online.org/documents/AuthenticMaterialsFinal.pdf

Koohang, A. (2009). E-learning and constructivism: From theory to application, *Interdisciplinary Journal of E-Learning and Learning Objects, Volume 5*

Korne, H. D. E., Duron, B. D., & Dowd, A. J. (2011). Guidelines for context-embedded assessment of Mother Tongue-based Multilingual Education programs. Retrieved from https://mlephil.files.wordpress.com/2013/08/mtbmle-assessment-guide_sept2011_with-edits-and-branding.pdf

Ladefoged, P. (2004). The world’s languages are vanishing. *UCLA Today 24*(14). Retrieved from http://www.today.ucla.edu/2004/040511voices_mymind.html, accessed 20 Mar. 2007.

Lartec, J. K., Belisario, A. M., Bendanillo, J. P., Binas-o, H. K., Bucang, N. O. (2014). Strategies and Problems encountered by teachers in implementing mother tongue-based instruction in a multilingual classroom. *The IAFOR Journal of Language Learning*, *1*(1), 1–16. https://doi.org/10.1016/j.sbspro.2010.03.088

Littlebear, D. (1990). Keynote address: Effective language education practices and native language survival. In J. Reyhner (Ed.), *Effective language education practices and native language survival* (pp. 1-8). Choctaw, OK: Native American Language Issues.

Llaneta, C. (2018). Teaching in mother tongues. Retrieved from https://www.up.edu.ph/index.php/teaching-in-mother-tongues/https://www.up.edu.ph/index.php/teaching-in-mother-tongues/

Mahadi, T. S. & Jafari, S. P. (2012). Language and culture. *International Journal of Humanities and Social Science, 2*(17). Retrieved from https://www.ijhssnet.com/journals/Vol_2_No_17_September_2012/24.pdf

Malone, S. (2007). Mother tongue-based multilingual education: Implications for education policy. Paper presented at the Education policy and the right to education: Towards more equitable outcomes for South Asia's children seminar, Kathmandu, Nepal. Retrieved on November 24, 2016 from https://goo.gl/xBGA1z [3] Sanchez, A.S.Q. (2013).

Massa, N. M. (2008). Problem-based learning: A real-world antidote to the standards and testing regime. *The New England Journal of Higher Education*, 19-20.

McEachern, F. (2013). Local languages and literacy in the Philippines: Implications for early grade reading instruction and assessment. Retrieved from https://www.globalreadingnetwork.net/sites/default/files/eddata/PhilEdData_Firth_Toolkit_formatted_10.pdf

Mede, E. & Yalcin, S. (2019). Utilizing textbook adaptation strategies: experiences and challenges of novice and experienced EFL instructors. https://files.eric.ed.gov/fulltext/EJ1244104.pdf

Meecham, M. & Rees-Miller, J. (2001). Language in social contexts. In W. O'Grady, J. Archibald, M. Aronoff and J. Rees-Miller (eds) *Contemporary Linguistics*. pp. 537-590. Boston: Bedford/St. Martin's.

Merrill, M. D., & Gilbert, C. G. (2008). Effective peer interaction in a problem-centered instructional strategy. *Distance Education*, *29*(2), 199-207.

Molina-Felix, C. (2012). Third graders' literacy behaviour and their family literacy practices (Master of Arts in Education dissertation). College of Education, University of the Philippines – Diliman, Quezon City, Philippines.

Moran, P. (2001). Teaching culture: Perspectives in practice. Australia: Heinle & Heinle.

Morauda-Gutierrez, M.R. (2013). An evaluation of the readability levels of English and Filipino texts: Implications on the preparation of the K-12 learning resource

materials [Paper and electronic slide presentation]. Presented at the 1st International Research Conference on K to 12 Education, 20-23 Aug. 2013, hosted by Department of Education–Region 5. Oriental Hotel, Legazpi City, Philippines.

National Research Council (US) and Institute of Medicine (US) Committee on Assessing Integrity in Research Environments. Integrity in Scientific Research: Creating an Environment That Promotes Responsible Conduct. Washington (DC): National Academies Press (US); 2002. 2, Integrity in Research. Available from: https://www.ncbi.nlm.nih.gov/books/NBK208714/

Nettle, D., & S. Romaine (2000). *Vanishing voices: The extinction of the world's languages.* New York: Oxford University Press.

O'Connel, T. & Dyment, J. (2006). Reflections on using journals in higher education: a focus group discussion with faculty. Assessment and Evaluation in Higher Education, 31(6), 671-691.

O'Grady, William, John Archibald, Mark Aronoff, and Jane Rees-Miller. eds. (2001) *Contemporary Linguistics*. Boston: Bedford/St. Martin's.

Ottenheimer, H. J. (2006) *The Anthropology of Language*. Belmont, CA: Wadsworth Cengage.

Peacock, M. (1997). The effect of authentic materials on the motivation of EFL learners in English. *Language Teaching Journal 51*, pp 2

Piper, B., Zuilkowski, S. S., Kwayumba, D., & Oyanga, A. (2018). Examining the secondary effects of mother-tongue literacy instruction in Kenya: Impacts on student learning in English, Kiswahili, and mathematics, *International Journal of Educational Development,59.* https://www.sciencedirect.com/science/article/pii/S0738059317302225#fig0025

Reid, J. W., Smith-Walters, C., Mangione, K. A., Dorris, A., & Tharp, T. (2019). Supporting English Language Learners Through Inquiry-Based Science: Three Strategies for Your Classroom . In L. C. de Oliveira et al. (eds.), Teaching the Content Areas to English Language Learners in Secondary Schools, English Language Education 17, https://doi.org/10.1007/978-3-030-02245-7_12

Reinhardt, M. (2017). Curriculum development, lesson planning, and delivery: A guide to native language immersion. *Cogent Education*, *4*(1). https://doi.org/10.1080/2331186X.2017.1340861

Republic Act 10533 (2013). An act enhancing the Philippine basic education system by strengthening its curriculum and increasing the number of years for basic education, appropriating funds therefor and for other purposes

Rohati (2011). Pengembangan Bahan Ajar materi Bangun Ruang Dengan Menggunakan Strategi Relating, Experiencing, Applying, Cooperating,

Transferring (REACT) di Sekolah Menengah Pertama, Jurnal Edumatika Volume 01 Nomor.

Rull V. (2014). The most important application of science: As scientists have to justify research funding with potential social benefits, they may well add education to the list. *EMBO reports*, *15*(9), 919–922. https://doi.org/10.15252/embr.201438848

Saurman, M. & Stallsmith, G. (n.d.). Traditional music and arts in the classroom: A whole-brain learning approach to language and culture. Retrieved from https://drive.google.com/file/d/0B_yZGfkL8ELvN2U2ZDk5ZWUtODkxMS00NGU0LWFkNjMtNDMxOGNjMjg5OTFl/view?hl=en

Schilling-Estes, Natalies. (2006) "Dialect variation." In R.W. Fasold and J. Connor-Linton (eds) *An Introduction to Language and Linguistics*. pp. 311-341. Cambridge: Cambridge University Press.

Seitz, S. (1998). Coping strategies in an ethnic minority group: the Aeta of Mount Pinatubo. *Disasters*, *22*(1), 76–90. https://doi.org/doi:10.1111/1467-7717.00076

Sibayan, B.P. (1991). Literate in what? The RAP Journal, 14(Oct): 4-9.

Sibayan, B.P. (2002). Literate in what? A redefinition of literacy. The RAP Journal, 25(Nov): 4-11.

SIL International (2019). Ethnologue: Languages of the world. Retrieved from https://www.ethnologue.com/

Skutnabb-Kangas, T. (1997). Human rights and language policy in education. *Encyclopedia of Language and Education*, *1*, 55–66.

Skutnabb-Kangas, T. (n.d.). In Orelus, Pierre Wilbert (ed.). *Affirming Language Diversity in Schools and Society. Beyond Linguistic Apartheid*. New York / London: Routledge, 215-249

Sumarmi, 2012, Model-Model Pembelajaran Geografi, Aditya Media Publishing, Malang

Sunday, A., & Joshua, A., (2010). Assessment of resources and instructional materials status in the teaching of mathematics in South Western Nigeria. Nigeria: *Euro Journals Publishing, Inc.*

Sundita, C. (2006). Tagalog language. Retrieved from https://en.wikipedia.org/wiki/Tagalog_language

Sutton, B., & Novkov, J. (2008). 1. Rethinking Security, Confronting Inequality: An Introduction. In *Security Disarmed* (pp. 3-29). Rutgers University Press.

Svinicki, M. D. (2004). *Learning and motivation in the postsecondary classroom*. San Francisco: Jossey-Bass.

Tan, M. L. (2015). Why languages die. *Philippine Daily Inquirer.* https://opinion.inquirer.net/88219/why-languages-die

Tejero, C. C. (2015). Why Bulacan is the culture capital of the Philippines. Philippine Daily Inquirer. Retrieved from https://lifestyle.inquirer.net/216845/why-bulacan-is-the-culture-capital-of-the-philippines/#ixzz6AyVL8rz0

Tety, J. L. (2016). Role of instructional materials in academic performance in community

Trask, R. L. (2007). Stockwell, Peter (ed.). *Language and Linguistics: The Key Concepts* (2nd ed.). Routledge.

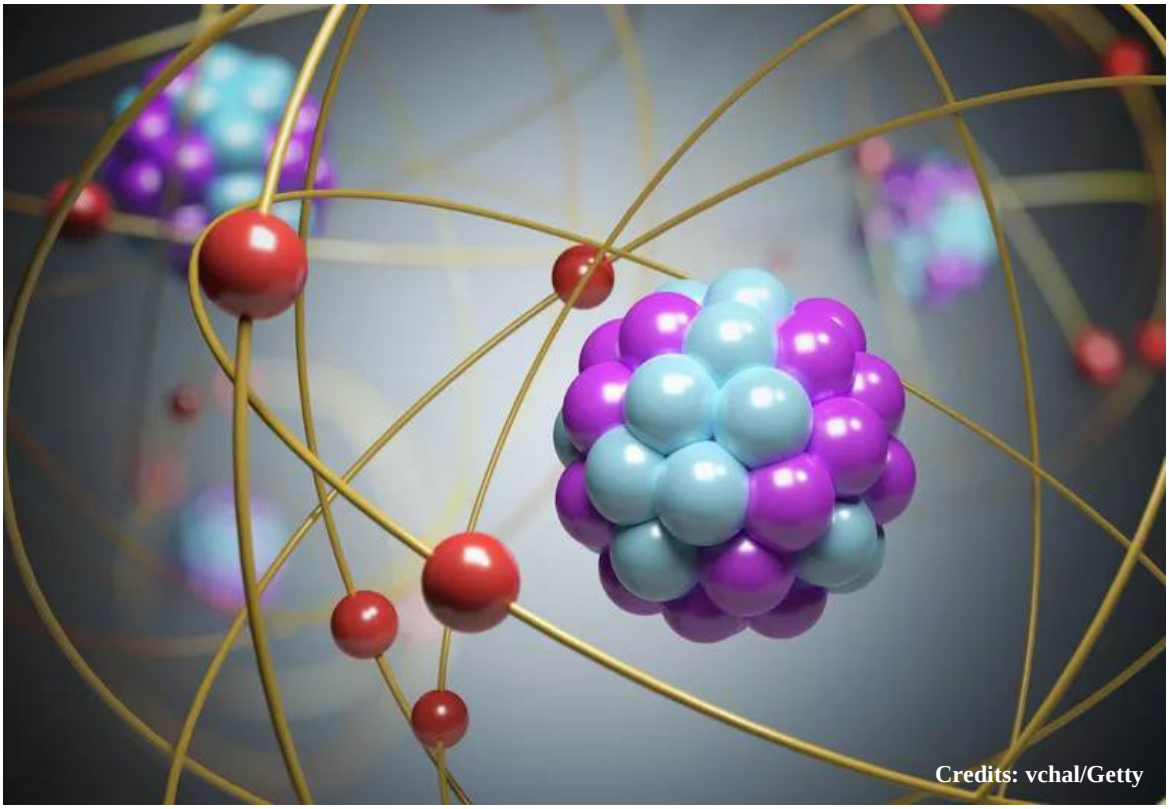
United Nations Educational, Scientific and Cultural Organization. (2003). Education in a multilingual world. Paris, France: UNESCO.

Wallace, C. (1992). *Reading.* Oxford, O.U.P.

Walter, S.L., & Dekker, D. E. (2011). Mother tongue instruction in Lubuagan: A case study from the Philippines. *Springer Science & Business Media B.V*, 667-683. doi: 10.1007/s11159-011-9246-4

Yoder, B. (2017). Participatory orthography development in Abawiri. *SIL International*. Retrieved from https://www.researchgate.net/publication/326069077

YUNIT 1: Matter



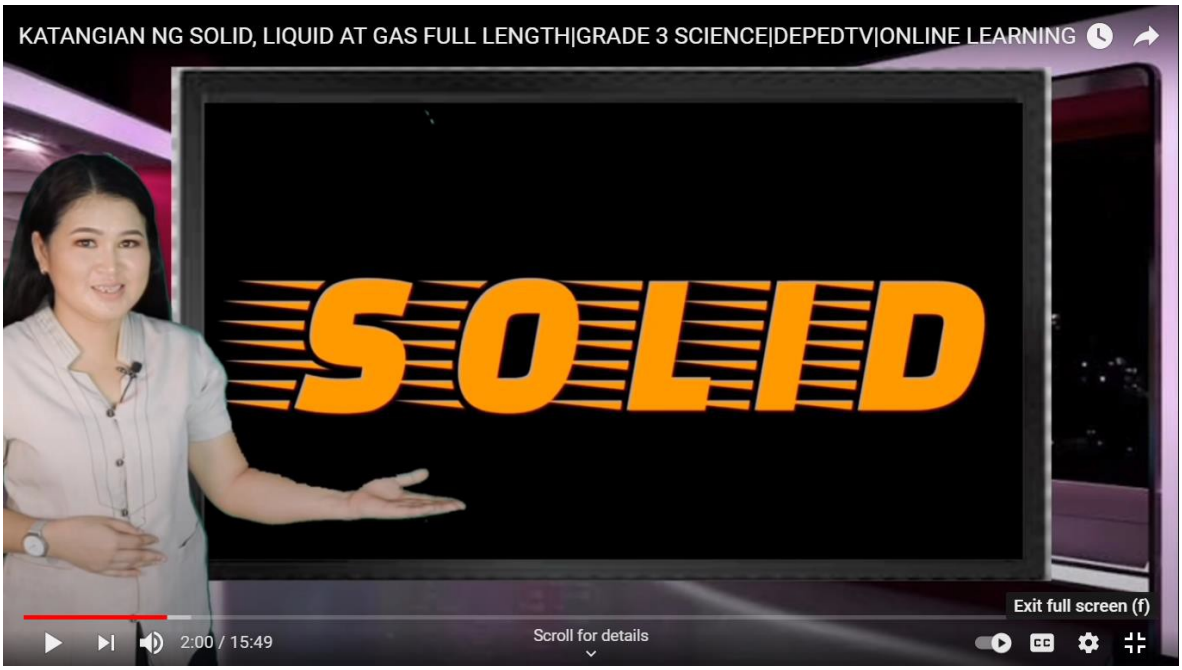
Ang matter ay anumang bagay na sumasakop ng espasyo at may bigat o timbang. Lahat ng bagay na nakikita natin ay binubuo ng matter. Ang buong kalikasan ay matter. Ngunit ano ang bumubuo sa matter? Ang atom ay ang pangunahing bumubuo sa matter. Madali nating matutukoy ang matter sa pamamagitan ng kalagayan nito dahil may mga katangian ito na nasusuri o naoobserbahan sa pamamagitan ng ating mga pandama. Simulan nating pag-usapan ang solid.

Kabanata 1: Solid

May tatlong kalagayan o state ang matter. Ito ay ang solid, liquid, at gas. Unahin nating pag-aralan ang solid. May mga katangian ang solid na naiiba sa liquid at gas. Ang solid ay maari nating ilarawan ayon sa kulay, laki, hugis, tekstura, bigat, at kapal. Ito ay may tiyak na hugis, laki, tiyak na dami at may kakaibang katangiang taglay. Halika na at pag-aralan nating ang solid!

Aralin 1 – Katangian ng Solid

a. Panoorin mo ang videong ito sa inyong mga tahanan. Magpatulong ka sa mga kasama mo sa bahay na iclick ang video link na ito: https://youtu.be/1t18EG6ssfE
b. Kung wala kang internet, tingnan mo ang mga larawan ng solid sa iyong module.
c. Magpatulong ka sa nakatatandang kasama mo sa bahay na mangalap ng limang solid na makikita sa iyong kapaligiran.



LAYUNIN

a. Natutukoy ang pangalan ng mga solid.
b. Nailalarawan ang mga solid ayon sa kulay, laki, hugis, at tekstura.
c. Naipapangkat ang mga solid ayon sa ayon sa kulay, laki, hugis, at tekstura.

Mga Larawan ng Solid

holen

pinggan

palayok

salakot

Iugnay

Base sa napanood mo o nakita sa larawan ng modyul o mga bagay na nakalap mo, paano mo ilalarawan ang solid? May mga solid ka ba na ginamit para maghanda sa pag-aaral ngayong araw na ito? Magbigay ka ng halimbawa ng mga solid na ginagamit mo ngayon sa pag-aaral. Magbigay ng limang halimbawa:

1. _____
2. _____
3. _____
4. _____
5. _____

Isagawa (Experience)

1. Gamit ang mga halimbawa ng mga solid na ginagamit sa pag-aaral, ilipat mo ang mga halimbawa sa tsart sa ibaba.

2. Pagkatapos ilagay ang pangalan ng solid, ilarawan mo ang solid ayon sa kulay, laki, hugis, at tekstura.

Tandaan:

a. Ang tekstura ay naglalarawan ng kinis, gaspang, lambot o tigas ng isang bagay ayon sa hipo sa solid.
b. Ang laki ay maaring maliit, katamtaman, at malaki.
c. Ang hugis ay maaring bilog, parihaba, parisukat, tatsulok, o bilohaba.
d. Ang bigat ay maaring magaan, katamtaman, o mabigat.

Tsart ng Solid

Solid	Kulay	Laki	Hugis	Tekstura	Bigat
1.					
2.					
3.					
4.					
5.					

4. Pagkatapos mong ipangkat ang mga solid ayon sa mga katangian nito, paano mong ilalarawan ang solid? Punan ang puwang para buuin ang paglalarawan.

Ang solid ay isang kalagayan o state ng matter na

_____
_____
_____
_____
_____.

Ilapat (Applying)

Gawin ang mga sumusunod:

1. Magpatulong sa iyong nanay o nakatatandang kapatid na maghanda ng iyong agahan. Pumili ka sa hanay ng mga sumusunod base sa agahang nakasanayan mong kainin at mayroon sa inyong tahanan. Pagkatapos ay ihanda mo ito sa hapag kainan:

Agahan 1	Agahan 2	Agahan 3
itlog longganisang bawang gatas kanin	kape Pandesal Binating itlog	Kanin Itlog na maalat kamatis Dilis, tuyo o pritong isda tubig

***Maaring palitan ang mga halimbawang binigay ng anumang nakasanayang agahan na hinahanda sa inyong tahanan.*

2. Magpatulong ka sa iyong nanay o sa kahit sinong nakatatanda sa bahay na iprito ang itlog. Habang ginagawa mo ito, obserbahan mo ang ang itlog matapos itong basagin at isalin sa lalagyan. Batihin mo ang itlog at lagyan ng kaunting asin, pagkatapos ay iprito mo ito. Iprito mo rin ang longganisang bawang.

3. Ilaga mo ang isa pang itlog. Balatan mo ito at ihain.

4. Anu-ano ang mga solid na kinain mo? May napansin ka bang liquid pero nang mainitan ay naging solid? Ano ito?

5. Kunan ng litrato ang iyong agahan na kasama ka, ipost sa FB, at lagyan ng pamagat.

   **Kung walang internet, iguhit ang iyong almusal at kulayan ito.

Ibahagi (Cooperating)

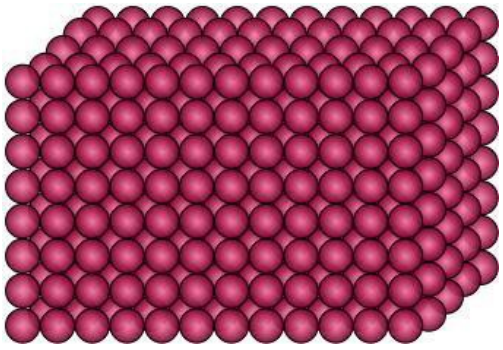
Kasama ang iyong mga kaibigan o kagrupo sa klase, gumawa ka ng album ng solid na naglalaman ng mga paborito ninyo. Bawat isa sa inyo ay magdikit ng paborito ninyong laruan, aklat, damit, sapatos, baso, ulam, at iba pa para mas makilala ninyo pa ang isa't isa. Pagsama-samahin ang mga nagawa ninyo at icompile sa Google Docs. Magisip ng pangalan ng inyong grupo at isubmit sa Group Chat ng inyong klase.

Kung wala kang gadyet o internet, gumawa ka ng album kasama ang iyong kagrupo gamit ang folder at bond paper. Gumupit ng mga ididikit mula sa magasin, pahayagan at iba pa.

Maari mo ding iguhit ang mga napiling bagay kung walang magasin o pahayagan.

Itawid (Transferring)

Ang particles ng solid ay siksik, o magkakadikit at hindi umaalis ng lugar. Ito ang dahilan kung bakit hindi nagbabago ang hugis ng solid. Ang hugis ng solid ay maaring tatsulok, parihaba, bilog, parisukat, biluhaba at iba pa. Ang lahat ng matter ay binubuo ng maliit na particles. Tingnan mo ang larawan sa ibaba.



Sa proyektong ito, ihanda ang mga kagamitang ito:

- Butter
- Mantika
- Yelo

Panuto:

- Humingi ka ng tulong sa nakatatandang kasama mo sa bahay. Initin ang kawali at magpatulong kang ilagay ang kapirasong butter sa kawali. Pagkatapos ay obserbahan mo ito.

- Ano ang nangyari sa butter?

- Sumunod ay isalin mo ang mantika sa isang maliit na lalagyan. Ilagay mo ito sa inyong ref at kuhanin kinabukasan. Ano ang nangyari sa mantika?

- Kumuha ng kapirasong yelo sa freezer. Ilagay ito sa isang lalagyan at hayaan lang sa labas. Matapos ang ilang oras, ano na ang nagyari sa yelo?

- Kunan ng picture ang pagbabagong naganap sa mga ito at idikit sa iyong journal.

Itawid Journal

Isulat sa iyong Itawid Journal and iyong obserbasyon at ang iyong mga natutunan sa proyektong ito. Lagyan ng petsa ang bawat repleksyon.

Kabanata 2: Liquid

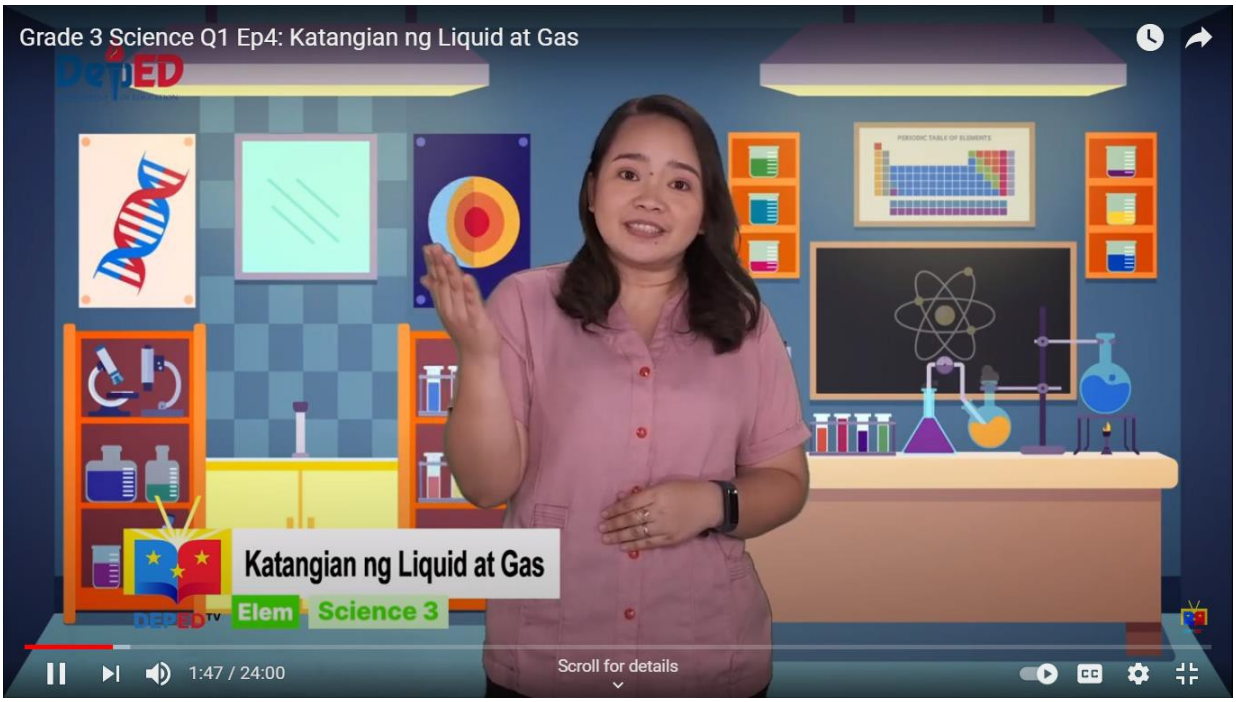
Ang ikalawang kalagayan o state ng matter na pag-aaralan natin ay ang liquid. Ito ay isang uri ng matter na walang tiyak na hugis. Ang hugis nito ay ayon sa hugis ng pinaglalagyan nito.

Ang liquid ay may kakayahang dumaloy at mailipat sa ibang lalagyan. Ito ay maaring dumaloy ng mabagal o mabilis.

Aralin 1 – Katangian ng Liquid

Pumili ng isa sa mga sumusunod.

1. Panoorin mo ang videong ito sa inyong tahanan. Magpatulong ka sa mga kasama mo sa bahay na iclick ang video link na ito: https://www.youtube.com/watch?v=2HVaoQFC5f0. Panoorin ang video hanggang sa time stamp na 13:35.



2. Kung walang internet access, tingnan mo ang mga larawan sa iyong modyul.

Sukang Paombong

Gatas ng kalabaw

Toyo

Mantika

3. Kung walang kopya ng modyul, kumuha ng limang halimbawa ng liquid sa inyong bahay at ihanay ang mga ito sa hapag kainan.

LAYUNIN

a. Natutukoy ang pangalan ng mga liquid.
b. Nailalarawan ang lasa, kulay, at amoy ng iba't-ibang liquid.
c. Nailalarawan kung papaano dumadaloy ang tubig mula sa isang sisidlan patungo sa isa pang sisidlan.

Iugnay (Relating)

Sino sa inyo ang kumakain ng adobo…adobo-fried pugo? Alam nyo ba na ang isa sa pinakamalaking quail farm ay matatagpuan sa Pandi, Bulacan? Samantalang isang kalye naman sa Baliwag, Bulacan ang nakilala dahil sa pagtitinda nila ng mga pinritong pugo tulad ng adobo fried pugo.

Marunong ka bang magluto ng adobo fried pugo? Mayroon akong listahan ng mga sangkap ng adobo fried pugo dito. Basahin mo at suriin and mga ito. Magtanong kay nanay o sa nakatatanda sa inyong bahay kung ganito din ba ang mga sangkap na ginagamit niya sa pagluluto ng ordinaryong adobo. Ano ang naiibang sangkap sa luto ng inyong adobo?

Sangkap ng Adobo-Fried

Pugo

- Mantika
- dinikdik na bawang
- hiwang sibuyas
- 1/2 kilo pugo
- suka
- toyo
- tubig
- dahon ng laurel
- pamintang buo
- asukal na pula

Sa lista ng mga sangkap na ito, karamihan dito ay solid at ang iba naman ay liquid. Ipangkat ang mga sangkap ayon sa sa unang dalawang kalagayan ng matter gamit ang tsart sa ibaba.

Sangkap na Solid	Sangkap na Liquid
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

Isagawa (Experience)

Magpasama ka sa nakatatandang kasama sa bahay sa inyong kusina. Tingnan mo ang mga bote ng mga liquid na nakahanay sa taasan ni nanay o ng nagluluto sa inyo. Pumili ng limang liquid sa kusina o sa ref ninyo.

Isalin sa maliit na lalagyan ang bawat isang liquid at tikman, obserbahan ang kulay, amuyin at ilista sa ibaba. Magpatulong sa nakatatandang kasama sa bahay at isulat ang pagsusuri sa talaan sa ibaba.

Tandaan: Mag-ingat ka sa pag-abot at pagtikim ng liquid na makukuha mo. Mahalaga na may kasama kang nakatatandang kapatid o kasama sa bahay na gagabay sa iyo.

Liquid	Kulay	Lasa	Amoy
1.			
2.			
3.			

4.			
5.			

Matapos mong ipangkat ang mga liquid ayon sa mga katangian nito, paano mong ilalarawan ang liquid? Punan mo ang puwang para buuin ang paglalarawan.

Ang liquid ay isang kalagayan o state ng matter na

_____
_____
_____
_____
_____.

Ilapat (Applying)

Gawin mo ang mga sumusunod:

1. Tulungang magluto si nanay ng paborito mong ulam. Itanong kay nanay ang mga sangkap na gagamitin sa pagluluto at ilista sa isang malinis na papel. Pangkatin ang mga sangkap na solid at liquid. Ilagay sa talaan na ito.

Sangkap na solid	Sukat o dami	Sangkap na Liquid	Sukat o dami
1.		1.	
2.		2.	
3.		3.	
4.		4.	
5.		5.	

2. Ikaw ang magsukat ng mga sangkap ayon sa sukat o dami na sinabi ni nanay o ng nagluluto. Tumulong ka din sa pagluluto.

3. Kunan ng litrato ang paborito mong ulam na kasama ka at ipost sa FB. Lagyan ng pamagat at i-tag mo ako.

4. Kung walang internet, iguhit ang paboritong ulam sa iyong journal at kulayan ito.

Ibahagi (Cooperating)

Kasama ang iyong mga kaibigan o kagrupo sa klase, tipunin ninyo ang iba't ibang klaseng inumin. Mamili ng isa sa mga pamamaraang ito:

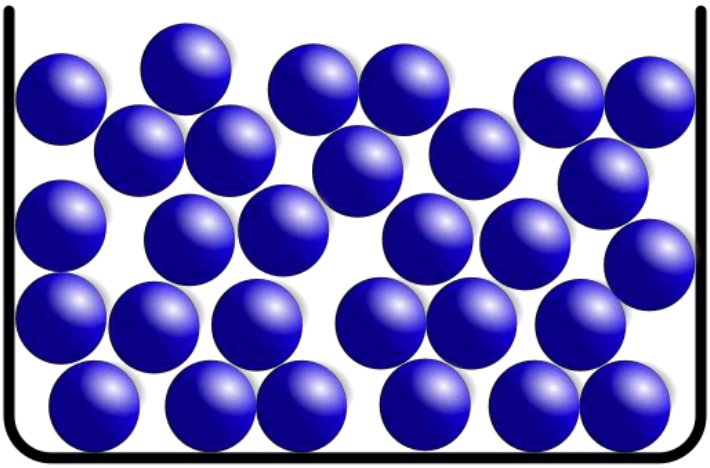
a. Iguhit ang mga larawan ng iba't ibang klaseng liquid.
b. Kunan ng larawan ang mga liquid na makikita sa bahay
c. Kumuha ng mga larawan sa internet.

Pangkatin ang mga inumin base sa "Mabuti sa Kalusugan" at "Di Mabuti sa Kalusugan." Bawat isa sa inyo ay magdikit ng dalawang larawan, isang nakababuti sa katawan at isang hindi nakakabuti. Pagsama-samahin ang mga nagawa ninyo at icompile sa PPT. Magisip ng pangalan ng inyong grupo at isubmit sa Group Chat ng inyong klase and PPT.

Kung walang internet, gumawa ng album. Hatiin ang album sa dalawa: "Mabuti sa Kalusugan" at "Di Mabuti sa Kalusugan." Ipangkat ang mga nakalap na larawang ginupit.

Itawid (Transferring)

Nakakita ka na ba ng tubig na naglalakad? Hindi pa? Iyan ang gagawin natin ngayon sa proyektong ito. Ang mga particles na bumubuo sa tubig ay hindi katulad ng solid na dikit dikit kundi mas hiwa-hiwalay ito at may espasyo katulad ng larawan sa ibaba.



Dahil dito, ang liquid ay dumadaloy at maaring isalin sa isang lalagyan. Tingnan natin kung paano dumaloy ang liquid sa pamamagitan ng gawaing ito. Ihanda ang mga kagamitang kailangan sa proyektong ito at huwag mong kalimutang magpatulong sa nakatatandang kasama sa bahay.

1. Table napkin na ginagamit sa pagluluto
2. Tatlong malinaw at pantay pantay na laki ng baso
3. Blue food coloring at yellow food coloring.
4. Kutsara panghalo

Paraan

1. Pumilas ng dalawang parihabang table napkin. Tiklupin ito ng parihabna ng dalawang beses. Magiging isa at kalahating pulgada ang lapad nito.
2. Ihanay ng pahalang ang tatlong baso. Lagyan ng kalahating tubig ang una t ikatlong baso. Huwag lagyan ng tubig ang gitnang baso.
3. Lagyan ng blue food cloring ang unang baso at yellow food coloring ang ikatlong baso. Haluin ng kutsara ang mga basong nilagyan ng kulay.
4. Ilagay ang dulo ng table napkin sa unang baso at ang isang dulo sa gitnang baso. Ganon din ang gawin sa dulong baso at gitnang baso.

5. Iwanan sa loob ng isang oras. Balikan at obserbahan kung ano ang nangyari.
6. Kunan ng larawan. Ipost sa FB ang ginawa, lagyan ng pamagat at ibigay ang iyong konlusyon base sa iyong obserbasyon at itag ako.
7. Kung walang internet, iguhit ang ginawang eksperiment. Kulayan para Makita ang pagdaloy ng liquid.

Itawid Journal

Isulat mo ang lahat ng natutunan at naobserbahan mo sa proyekto sa iyong journal. Isulat din kung may mga katanungang naiwan sa iyong isip.

Kabanata 3: Gas

Ang ikatlong kalagayan o state ng matter na pag-aaralan natin ay ang gas. Ang *gas* ay nasa paligid natin ngunit hindi ito nakikita, at hindi rin nahahawakan. Ito ay walang lasa at walang kulay. Ito ay walang tiyak na hugis at mabilis kumilos.

Aralin 1 – Katangian ng Gas

Mamili ng isa sa tatlong Gawain.

a. Panoorin mo ang videong ito sa inyong tahanan. Magpatulong ka samga kasama mo sa bahay na iclick ang video link na ito: https://www.youtube.com/watch?v=Un9g_IV-GQ4.
b. Tingnan ang mga larawan ng gas na makikita sa iyong modyul.
c. Maghanap ng mga gas na mkikita sa inyong bahay at ilista ito. Magbigay ng tatlong halimbawa.

LAYUNIN

a. Nakapagbibigay ng halimbawa ng mga gas.
b. Nailalarawan ang iba't-ibang katangian ng gas.
c. Naihahambing ang kaibahan ng gas sa iba pang kalagayan ng matter.

lugnay (Relating)

Nakadalo ka na ba sa birthday party? Ano ang kadalasang dinadala mo pag uwi mo mula sa party? Tama ka! Lobo!

Ang mga lobo ay bilog, pero kapag ito ay pumutok, nawawala ang hugis nito. Ano ba ng laman ng lobo? Magaling! Hangin. Ang hangin ay halimbawa ng gas. Ito ay sumasakop din ng espasyo.

Katulad ng mga lobo, ang mga bula din ay may lamang gas. Nakapaghugas ka na ba ng pinggan? Alam mo bang maari kang lumikha ng mga maliliit na bula na puno ng gas gamit ang dishwashing liquid?

Sa isang maliit na lalagyan, paghaluin mo ang tubig at kaunting dishwashing liquid. Basain ang kamay at isawsaw sa dishwashing liquid na may tubig. Sige, palobohin mo! Ang mga bula na iyan na nililipad ng hangin ay may lamang gas.

Ano pa ba ang mga gamit sa loob at sa labas ng bahay ninyo na gas? Iguhit mo dito.

Mga Larawan ng Gas

Isagawa (Experience)

Kapag ikaw ay may sakit o inuubo, mahalaga na ikaw ay lumanghap ng steam o singaw ng mainit na tubig na may halong menthol o Vicks vapor rub. Ito ay tinatawag ding “suob.” Ngayong panahon ng Covid-19, maraming nagsasabi na ito daw ay dapat ginagawa ng mga may Covid para guminhawa ang kanilang paghinga. Ang steam o singaw na nilalanghap ay gas.

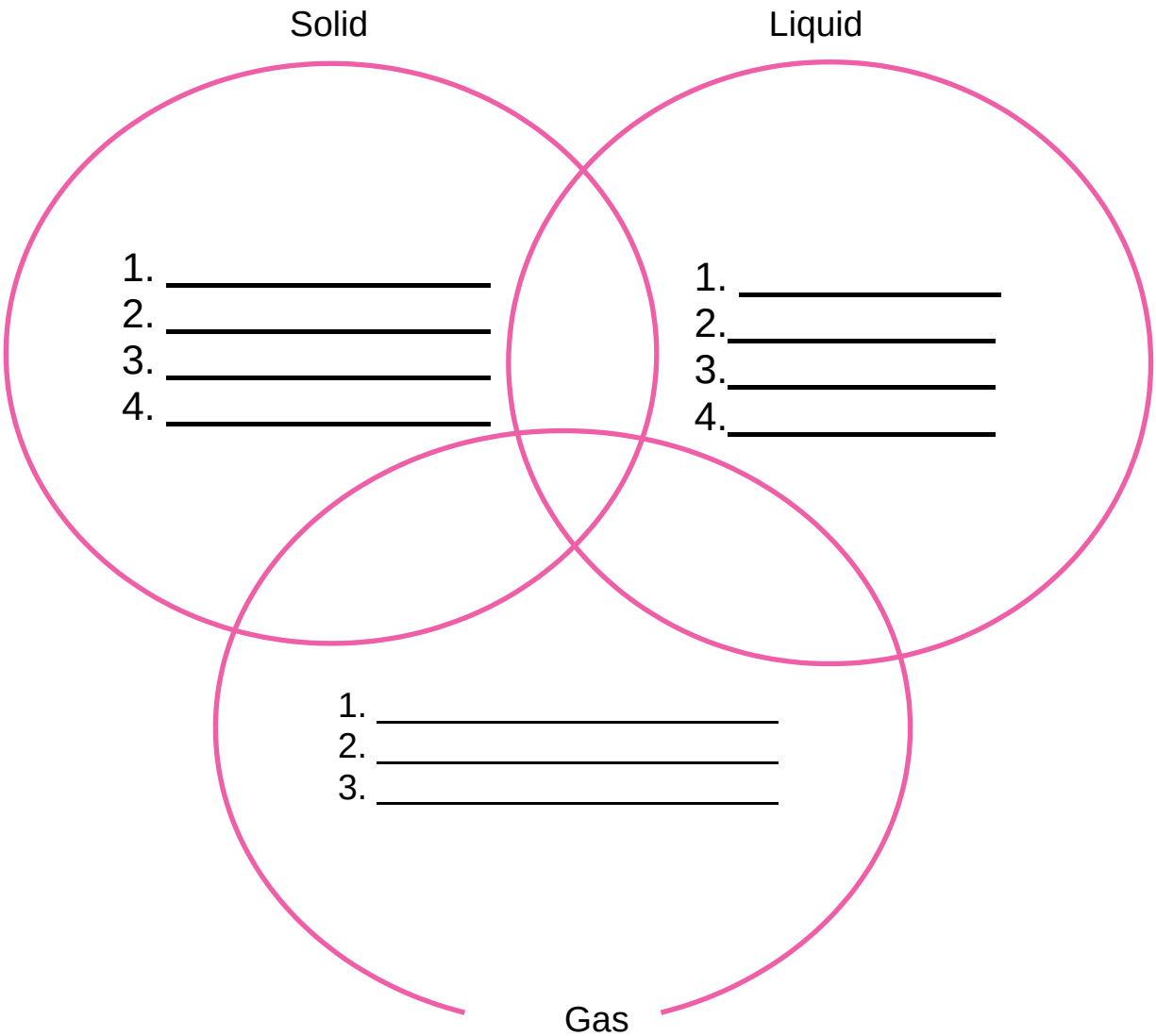
Halika at subukan mong lumanghap ng steam. Magpatulong sa nakatatandang kasama sa bahay na magpakulo ng tubig at lagyan ito ng Vicks vapor rub o kahit na anong menthol. Magtalukbong ng tuwalya kasama ang palanggana kung saan isinalin ang mainit na tubig na may menthol. Langhapin ang steam o singaw na galing sa mainit na tubig.

Isulat sa talaan kung ano ang mga pakiramdam mo matapos gawin ito.

Obserbasyon
1.
2.
3.
4.

Ilagay ang mga katangian ng mga kalagayan o states ng matter at ang pakakaiba ng mga ito. Ilagay sa malaking bahagi ng bilog ang mga katangian ng bawat isa at sa magkapatong na bilog ang magkakatulad na katangian.

Venn Diagram



Ilapat (Applying)

Pumili ng isa sa mga sumusunod:

1. Panoorin ang balitang ito noong April 7, 2021 sa GTV: Iclick ang link na ito: https://www.youtube.com/watch?v=igLMI2-rP20

2. Basahin ang artikulong ito sa inyong modyul na hinango sa pahayagang Tribune, April 8, 2021

Oxygen, nagkakaubusan na

Nagkakaubusan na diumano ang mga oxygen tank na ibinebenta sa Bambang, Maynila kaalinsabay nang patuloy na pagtaas ng kaso ng coronavirus disease sa bansa.

Ilang mga tindahan sa Bambang ang nagsabi na unti-unti nang nauubos ang kanilang suplay na oxygen tank dahil sa dami ng mga bumibili nito lalo na ngayon na puno ang mga ospital at karamihan ay sa bahay na lamang naga-isolate.

Ang Bambang ay sikat na bilihan ng mga medical supplies at equipment. Matatandaan na noong isang taon sa kasagsagan ng pagsipa ng pangangailangan ng alcohol at mask, ang Bambang din ang naging takbuhan ng publiko.

Sa report ng DZBB, isang supplier ng medical supplies ang nagasbi na nagkakaubusuan na sila ng oxygen tank noon pang Semana Santa.

Bukod dito, tumaas na rin umano ang presyo ng oxygen tank dahil sa mataas ang demand.

Nagbabala naman si Health Undersecretary Maria Rosario Vergeire sa publiko kaugnay ng paggamit ng mga oxygen tank sa kani-kanilang bahay.

Posibleng iniisip diumano ng publiko na simple lang ang paggamit ng tangke. Anya, maaring mas makasama kaysa makabuti ang paggamit ng oxygen tank kung hindi alam ang tamang paggamit nito.

Katanungan:

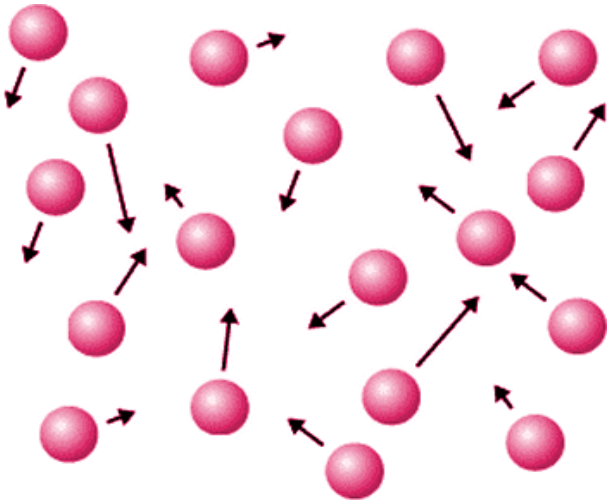
1. Ano ang gas na sinasabing kailangan ng mga taong nagkakasakit ng Covid-19?
2. Ano ang problemang sinasabi sa balita?
3. Ano ang resulta ng kakulangan ng gas na ito?
4. Ano sa tingin mo ang maaring epekto nito sa mga taong may sakit?
5. Gaano kahalaga ang oxygen sa mga taong may sakit ng Covid-19?
6. Mahalaga din ba ito sa mga taong walang sakit? Bakit?

Ibahagi (Cooperating)

Suamma sa iyong kagrupo. Magtulong kayong gumawa ng saranggolang papel. Lagyan ito ng design. Paliparin ang saranggola sa labas ng paaralan. Pumaitaas ba ang saranggola ninyo? Bakit? Ano ang nagpapailanlang sa saranggola?

Itawid (Transferring)

Ang particles na bumubuo sa gas ay magkakalayo katulad ng larawang makikita mo sa ibaba. Malaki ang espasyo sa pagitan ng bawat isa kaya malayang nakakakilos ang mga ito. Ito rin ang dahilan kung bakit hindi ito nahahawakan ngunit nadarama lang.



Kinuha sa: Analytics Vidhya

Sa bahaging ito, obserbahan natin ang isang uri ng gas na tinatawag na carbon dioxide. Ihanda ang mga sumusunod na kagamitan:

1. Malinaw na baso
2. Sprite o 7-Up

3. Menthos candy (isang piraso)
4. Straw.

Paraan

1. Ivideo ang project mula simula. Magpatulong sa nakatatandang kasama sa bahay.
2. Isalin ang Sprite o 7-Up sa baso hanggang sa kalahati.
3. Obserbahan ang mga bula. Ang mga bula ay carbon dioxide.
4. Ilagay sa baso ang straw. Obserbahan ang mangyayari sa baso.
5. Ilagay ang isang pirasong mentos.
6. Obserbahan ang mangyayari at lista sa Itawid Journal.

8. Iupload ang video sa Facebook mo at itag ako. Lagyan ng pamagat.

Itawid Journal

Isulat ang lahat ng natutunan at naobserbahan mo sa proyekto sa iyong journal. Isulat din kung may mga katanungang naiwan sa iyong isipan.

Appendix B – Level of Contextualization Rubric

LEVEL OF CONTEXTUALIZATION OBSERVATION RUBRIC

School: Overall Rating:
Grade Level: Description:
Lesson Topic:

REACT STRATEGY. Please rate your observation/instructional material based on the rubric provided below. Put a check on the number that corresponds to your rating and descriptors.

Rating	Level	Descriptors
1.00-1.80	Not Observed	The standard is not observed
1.81-2.60	Emerging	One or more elements of the standard are enacted.
2.61-3.40	Developing	The teacher designs and enacts activities that demonstrate a partial enactment of the standard.
3.41-4.20	Enacting	The teacher designs, enacts, and assists in activities that demonstrate a complete enactment of the standard.
4.21-5.00	Exemplary	The teacher designs, enacts, and assists in activities that demonstrate skillful integration of multiple standards simultaneously.

Relating	**1**	**2**	**3**	**4**	**5**
1. New concepts are presented in real-life situations and experiences that are familiar to the pupil.					
2. Concepts in examples and pupil exercises are based on learners' own culture.					
3. New concepts are presented in the context of what the pupil already knows.					
4. Authentic locally made materials or materials available in the community are maximized/used.					
Experiencing					
5. learners gather and analyze their own data as they are guided i n disco-very of the important concepts.					
6. learners learn by doing, hands-on, simulation, etc.					
7. Opportunities are presented for learners to gather and analyze their own data for enrichment and extension (community visits, immersion, field trips, experiential learning)					
Applying					
8. Examples and pupil exercises include many real, believable problem-solving situations that learners can recognize as important to their current and future lives.					
9. Examples and pupil exercises cultivate an attitude that says, "I need to learn this."					

10. Lessons and activities encourage the pupil to apply concepts and information in useful contexts, projecting the learners into imagined futures (eg. possible careers) and unfamiliar locations (e.g. workplaces)					
11. Assessment tools and performance tasks integrate contextualization to make it more relevant for learners.					
Collaborating					
12. learners are expected regularly in interactive groups where sharing, communicating, and responding to the important concepts and decision-making occur.					
13. Activities are carefully selected to encourage shy and non-participative learners to be included in discussions and activities through small groups.					
14. Activities are designed in such a way that learners are encouraged to interact with one another, with each member assigned a task to work on.					
Transferring					
15. Lessons, exercises, and labs improve not only the knowledge of learners in the actual subject matter but also their written oral and communication skills in addition to mathematical reasoning and achievement.					
16. Learners use knowledge in a new context or in novel situations.					
17. The knowledge gained by learners are practical and can be used in contexts outside of the classroom or in the real world.					

Sources: Heaslip's (2013) Standard for Effective Pedagogy based on the Center for Research on Education, Diversity, and Excellence [CREDE], (n.d.), and DepEd Contextualization Monitoring Tool

Appendix C – Classroom Observation Rubric (CREDE, 2011)

CREDE ECE-7 An Instrument to Measure Use of the CREDE Standards in Early Childhood Classrooms

Standard	**Not Observed (0)**	**Emerging (1)**	**Developing (2)**	**Advancing (3)**	**Enacting (4)**	**Exemplary (5)**
Joint Productive Activity	Not observed	A pair or small group of children contributes individual work (e.g.: turn-taking), not requiring collaboration to a joint product*. Children work independently without teacher involvement.	The teacher and children collaborate on a joint product in a whole-class setting	The teacher collaborates with individuals on a joint product.	The teacher and a small group of children collaborate* on a joint product. The majority of the children participate in the product's* creation. The teacher assists collaboration using multiple forms of assistance*. Collaboration may mainly be between teacher and children, rather than among child peers.	The teacher and a small group of children collaborate on a joint product. The teacher encourages collaboration between peers working towards a joint product.

Language & Literacy Development	Not observed	The teacher designs and enacts an activity where children engage in brief, repetitive, or drill-like reading, writing, or speaking activities (e.g.: flashcards).	The teacher provides opportunities for children to express themselves through verbal or non-verbal communication*.	The teacher engages children in an activity where one of the goals* is to generate language expression and/or literacy development.	The teacher designs and enacts an activity where one of the goals* is to generate language expression and/or literacy development. The teacher develops language expression and/or literacy development using multiple forms of assistance.	The teacher designs and enacts an activity with a clear goal*. These activities are designed using developmentally appropriate pre-literacy* methods that focus on developing language within the topic of the activity. The teacher develops language expression and/or literacy development using multiple forms of assistance and adjusts his/her forms of assistance based on children's feedback.
Standard	**Not Observed (0)**	**Emerging (1)**	**Developing (2)**	**Advancing (3)**	**Enacting (4)**	**Exemplary (5)**
Contextualization	Not observed	The teacher (a) connects classroom activities by theme or builds on current unit, OR (b) includes parents or community members in activities, OR (c) uses familiar items during lesson but may not explicitly connect the items to home, school, or community.	The teacher includes some aspect of children's everyday experience in instruction through incidental* connections OR responds to an incidental connection made by children.	The teacher designs and enacts instructional activities that integrates* knowledge of what children's know from their home, school or community AND invites children to think about how the activity relates	The teacher designs and enacts instructional activities that integrate* the new activity/information with what children know from home, school or community AND assists children in making a connection to their	The teacher integrates* the new activity/information with what children already know from home, school or community AND assists children in making a connection to their personal experiences. The goal is to help children reach a conceptual understanding.

				to their personal experiences.	personal experiences.	
Complex Thinking	Not observed	The teacher prompts children to use or elaborate on information provided*. These elicitations are unplanned.	The teacher designs and enacts activities that require children to use or elaborate on information provided*.	The teacher designs and enacts activities that require children to use or elaborate on information provided* AND assists with those processes.	The teacher connects activities to broader concepts and abstract ideas. The teacher assists children with a focus on advancing children's thinking to higher levels.	The teacher designs and enacts instructional activities and assists children as they use complex thinking* strategies. The teacher's focus is on concept development and uses probing questioning techniques that focus on uncovering the *why,* not just the "how" and "what" of the activity.
Standard	**Not Observed (0)**	**Emerging (1)**	**Developing (2)**	**Advancing (3)**	**Enacting (4)**	**Exemplary (5)**
Instructional Conversation	Not observed	The teacher converses* with a child or the whole class AND uses questioning, listening, or rephrasing to elicit communication.	The teacher converses* with a small group of children AND uses questioning, listening, or rephrasing to elicit communication.	The teacher designs and enacts an instructional conversation (IC) with a small group of children with a clear learning goal* AND elicits communication with questioning, listening, rephrasing, or modeling.	The teacher designs and enacts an instructional conversation (IC) with a small group of children on a clear learning goal*. The teacher listens carefully to assess and assist understanding toward the goal. The verbal and non-verbal communication ratio	The teacher designs and enacts an instructional conversation (IC) with a clear learning goal*; listens carefully to assess and assist understanding toward the goal AND questions children on their views*, judgments or rationales in reaching the goal. The verbal and non-verbal communication

					of teacher-child turn-taking is approx. 1 to 1.	ratio of teacher-child turn-taking is approx. 1 to 1.
Modeling	Not observed	The teacher, or child, models a process but does not provide an opportunity for children to practice.	The teacher or child explicitly models behaviors, thinking processes, or procedures that children then practice OR the teacher or child provides a model of a finished product that children use for inspiration.	The teacher or child explicitly models behaviors, thinking processes, or procedures that children then practice AND the teacher instructs children while they practice or create their own products.	The teacher or child explicitly models behaviors, thinking processes, or procedures that children then practice AND the teacher assists children while they practice or create their own products.	The teacher or child explicitly models behaviors, thinking processes, or procedures that children then practice AND the teacher or child provides examples that children use for inspiration that show the step by step process or final product AND the teacher assists or facilitates peer-assistance while they practice or create their own products.
Standard	**Not Observed (0)**	**Emerging (1)**	**Developing (2)**	**Advancing (3)**	**Enacting (4)**	**Exemplary (5)**

Child Directed Activity	Not observed	The teacher designs an activity and allows children to have choice within that activity.	The teacher designs activity centers and allows children to choose from among them.	The teacher designs activity centers and allows children to choose from among them AND the teacher engages in an activity with the children.	The teacher encourages children to generate their own ideas or creations within the activity AND assists with further development or expansion of the activity.	The teacher engages children in an activity generated by children's own ideas or creations AND assists with further development or expansion of the activity.

CREDE, 2011

Appendix D - Interview Questions

Grade 3 Teachers' Implementation of Mother Tongue as a Medium of Instruction in Science

No. of years of teaching: _____
No. of years teaching science: _____
School where you are teaching: _____
Age: _____
Gender: _____
Highest Educational Attainment (Please write complete course):
_____

Interview Questions.

1. Anu anong grade level ng science ang tinuturuan mo?

2. Ano ang pagkakaiba ng pagtuturo ng science noong hindi pa mother-tongue based at ngayong mother-tongue based?

3. Sa iyong palagay, gaano kabihasa ang mga guro sa pagtuturo ng mother tongue sa science?

4. Ilang seminar o training ang nadaluhan mo sa nakalipas na tao para maihanda kayo sa pagtuturo ng mother tongue sa science?

5. Ano ang instructional material na gamit ninyo sa pagtuturo ng science bago magpandemic?

6. Ano ang instructional material na gamit ninyo pagkatapos ng pandemic?

7. Base sa obserbasyon mo, paano tumutugon ang mga bata sa mother tongue sa pagtuturo ng science?

8. Sa palagay mo, epektibo ba ang pagtuturo ng science gamit ang mother tongue? Bakit o bakit hindi?

9. Alin ang mas gamay mong medium of instruction na gamit sa pagtuturo ng science?

10. May science classes ba kayo na English ang gamit na medium of instruction?

11. Ano ang mga naaobserbahan mong kaakibat na balakid sa pagtuturo ng science gamit ang mother tongue?

12. Anu-ano ang mga suhestiyon mo bilang guro para matugunan ang mga balakid na ito?

13. Gaano kalaki ang suporta ng namumuno sa paaralan sa paggamit ng mother tongue sa K-3 level na mga bata?

14. Nacocontextualize mo ba ang pagtuturo ng science sa iyong klase? Paano mo nasabi?

Comments/suggestions on teaching science using mother tongue?

Appendix E – The REACT Strategy Model

Lesson/Unit Title:

Lesson/Unit Objectives:

Anticipated Learner Outcomes:

Assessment Strategies and Objectives:

Learning Activities – Applying REACT

Relate-Example of Real World Connection or Discussion of Preconceptions:

Experience-Activity or procedure for experiencing the skill or standard:

Apply-Activity or procedure for using the skill or standard:

Cooperate-How learners will interact:

Identify Transfer of Learning Strategy (wrap-up and new or unique situation application)