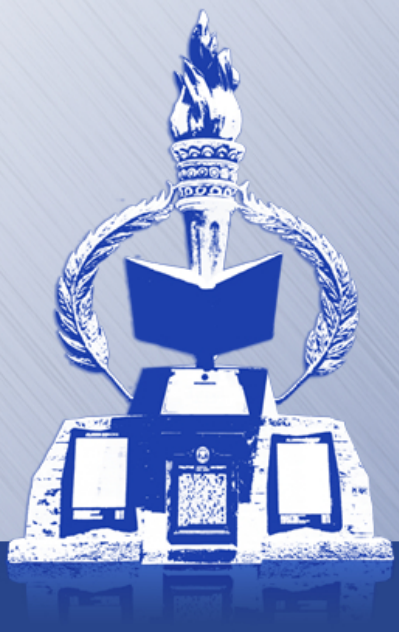
2018

Indigenized Material in Understanding the Content and Processes

Jasmin Fe P. Gardiola
Philippine Normal University - North Luzon



PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

INDIGENIZED MATERIAL IN UNDERSTANDING THE CONTENT AND PROCESSES ON MATTER 7

A THESIS
Presented to
The Faculty of Graduate Studies and Teacher Education Research
in Indigenous Peoples Education
Philippine Normal University
North Luzon
Aurora, Alicia, Isabela

In Partial Fulfillment
of the Requirements for the Degree
MASTER OF ARTS IN EDUCATION
With specialization in Science Education

JASMIN FE P. GARDIOLA

2018

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

CERTIFICATION OF APPROVAL

The thesis attached hereto, titled **INDIGENZED MATERIAL IN UNDERSTANDING THE CONTENT AND PROCESSES ON MATTER 7** prepared and submitted by JASMIN FE P. GARDIOLA in partial fulfillment of the requirements for the degree **MASTER OF ARTS IN EDUCATION** with specialization in **Science Education**, is hereby recommended for oral examination.

MARIE GRACE S. CABANSAG
Adviser

Approved in partial fulfillment of the requirements of **Master of Arts in Education** by the Oral Examination Committee.

ROLDAN S. CARDONA
Member

MARISSA R. GUIAB
Member

JESUS D. GONZALES
Chairman

Accepted in partial fulfillment of the requirements for the degree of **Master of Arts in Education** by the oral Examination Committee.

JANE N. CARIAGA
Associate Dean, Faculty of Graduate Studies and Teacher Education Research in Indigenous Peoples Education

MARIE GRACE S. CABANSAG
Dean, Academics and Indigenous Peoples Education

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Dedication

To the

Almighty God

for the wisdom, love, courage, and blessings

Late Tatay Junior and Nanay Shion

for the unconditional love and support

Kuya Juvis and Kuya James

for the assistance, love, and support

Albert

for the support, love and inspiration

This humble work is FOR you…

Jasmin Fe

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Acknowledgement

The author expresses her heartfelt gratitude to the following people who had given an extraordinary contribution to the success and completion of this humble work:

To GOD for His unending love and blessings;

To her research adviser, Dr. Marie Grace S. Cabansag, for her unending support, guidance, encouragement to improve and check this research;

To her statistician, Prof. Roldan S. Cardona, for his enthusiasm in giving the information and patience in guiding the researcher;

To her evaluators, Ma'am Genevieve Babaran, for giving their priceless time in evaluating her developed indigenized material used in this study;

To the Oral Defense Committee, Dr. Marissa Guiab, Prof. Jesus D. Gonzales, and Prof. Roldan S. Cardona, for their valuable suggestions and comments for the improvement of this study;

To Prof. Josie Jordan G. Rosete, for patiently editing the text of this study;

To Sir John Mina, for letting the researcher use the developed module in his respective school;

To Ma'am Lirio and Sir Julius, for utilizing the developed indigenized material in their Science classes;

To Hans Albert Carinugan, for enhancing the icons used in the developed module;

To her friends, Ma'am Genevieve, Sir Rene, Mam Novie, Ma'am Ivy, Ma'am Melody, Ma'am Ruth, Ma'am Marjory, and Sir Eugene, for their friendship, support and assistance;

To her Tito Pedring and Tita Naty for their unending support;

To her Ate Macel, Ninag Ingga, and Uncle Kabog for their undying support;

To her late parents, Tatay Junior and Nanay Shion for their teachings in making the dreams of the researcher come true;

To Kuya Juvis, Ate Alyssa, Kuya James, Nephew Juju and Niece Jhett for their unconditional love and support;

To her future husband, Albert, as a source of inspiration and strength, for his undying love and support all these years.

To those people whose names were not mentioned but whose support and love was unconditional, the researcher's heartfelt thanks and endless appreciation.

The Researcher

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

TABLE OF CONTENTS

Appendices

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

LIST OF TABLES

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

LIST OF FIGURES

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Abstract

The primary aim of this study was the development and validation of the Indigenized Material on Matter for grade seven (7) students to improve their low performance in the field of Chemistry. This study the followed process of instrumentation with these three main phases: preparation, development, and validation in developing the Indigenized Material on Matter 7. Indigenous materials were integrated in the lesson following the PNU ACES and Inquiry Based approaches in the formulation of the material. The developed and validated Indigenized Material on Matter 7 were evaluated by the experts in Science teaching using an adopted assessment tool. The result showed high agreement among the evaluators. The developed Indigenized Materials were also tried out and were found highly significant in improving their performance. Based on the gathered data, the developed and validated Indigenized Materials on Matter 7 can serve as alternative instructional materials for grade 7 lessons on Matter. It is recommended that further studies may be conducted to produce additional sets of indigenized materials for grade 7 Science corresponding to the lessons in the three other quarters of the school year.

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Abstrak

Ang pangunahing layunin ng pag-aaral na ito ay ang pagbuo at pagbalidayt ng kagamitang pampagturo gamit ang mga natural na bagay na karaniwang matatagpuan sa pook na kinaroroonan. Ang kagamitang pampagtuturong ito ay para sa mga nasa ikapitong baitang na mag-aaral upang maitaas ang kaalaman sa asignaturang Chemistry. Ang pagbuo ng kagamitang pampagtuturo na ito ay sang-ayon sa metodo ng instrumentalisasyon na may tatlong pangunahing bahagi, ang mga ito ay ang paghahanda, pagbuo at balidasyon. Ang mga natural na mga gamit sa paligid ay naisanib sa mga gawaing mag-aaral alinsunod sa pagdulog ng PNU ACES at ng Inquiry Based upang makabuo ng mga materyal na pampagtuturo. Ang mga nabuong kagamitang pampagtuturong ito ay sumailalim sa pagtataya ng mg eksperto sa larangan ng pagtuturo ng agham. Ang kinalabasan ng pagtatatyang ito ay nagpapakita ng mataas na pagsang-ayon ng mga eksperto. Gayun din nagkaroon ng pagsubok sa paggamit ng mga nabuong kagamitang pampagtuturo. Batay sa pagsubok na ito ay napatunayang nakakapagdulot ito ng mabuting pagkatuto ng mga mag-aaral na ginamitan ng *indigenous* na materyal pampagtuturo. Batay sa nakalap na datos, ang binuo at nabalidayt na *indigenous* na materyal pampagtuturo sa Matter 7 ay maaaring gamitin bilang alternatibong mga gamit sa pagtuturo para sa mga aralin sa ika-pitong baitang sa *Matter*. Inirerekomenda na ang karagdagang mga pag-aaral ay maaaring isagawa upang makabuo ng karagdagang mga hanay ng mga *indigenous* na materyal pampagtuturo na natukoy para sa mga nasa ika-

pitong baitang sa Science na tumutugma sa mga aralin sa tatlong iba pang mga bahagi ng taon ng paaralan.

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

CHAPTER 1

THE PROBLEM AND LITERATURE REVIEW

Background of the Study

Learners in the 21st century are actively involved in the nature of teaching-learning process, which lead them to achieve higher goals. Most importantly, theories are being applied that help the learners earn more experiences for effective and quality education. Basically, learners expect that there is only one way to find the correct answer in a specific question, thus, it may lead the learners to confusion or misconception in Chemistry, one of the branches of science that involves active and exciting connections that guide the learners to understand better their environment.

Generally, Chemistry focuses on structure of matters and because of this, it proves that it is a very difficult subject since it involves abstraction. Chemistry lessons are fused in abstract concepts, which become the core in learning chemistry and other branches of science (Taber, 2002). Chemistry is labeled as a hard subject, leading learners to decline in continuing explorations in Chemistry.

Apparently, Science education in the Philippines is on the least rank covered with other countries, specifically in the Enhanced Basic Education category. Though some Filipino students are recognized internationally because of their high-level performance, these students however are usually a product of high school with specialized science

curricula. In addition, standardized tests including National Achievement Test (NAT) manifests the poor performance of Filipino High School students. There are also reports coming from the Department of Education (DepEd), in school year 2012-2013 that the National Achievement Test mean percentage score (MPS) in high school was 51.41 percent, specifically, 41.35 percent was the MPS in Science which is below 50 percent (www.pressreader.com).

Furthermore, it was in 2003 where Philippines last participated in the assessment in the Trends in International Mathematics and Science Study where the country ranked 43rd out of 46 countries in secondary high school Science. In addition, 2015-2016 Global Competitiveness Report of the World Economic Forum showed the ranking of countries in quality education of Mathematics and Science. Here, Philippines was in the 67th place out of 140 countries; whereas in 2016-2017 data, Philippines was on the 79th spot all over 138 countries (www.pressreader.com), several steps down ranks in the previous year. Unfortunately, Filipino students gathered correct answers in chemistry with an average of 30 percent in Trends in International Mathematics and Science Study (TIMSS), which is lower than 45 percent correct answers in an international average (Espinosa, Monterola, & Punzalan, 2013).

Studies also show that the retention of Filipino students in concepts is low, the analytical skills and reasoning is finite, and communication skills is poor (NISMED, 2004). Moreover, in selected schools a huge percentage of fourth year and grade 6 students cannot solve real-life problems through the use of concepts neither in solving problem in

the process of creative investigation (UP NISMED, 2005). There are many factors that cause low performance of Filipino students in science according to the findings of graduate student scholars and educators. These are the factors: teachers' quality, school program, teaching-learning process, instructional materials and administrative support (DOST-SEI, 2006). Furthermore, the deficiency is within the instructional materials. The connectivity of indigenous material and culture is not fully integrated, eventually affecting the scientific knowledge and understanding of the learners.

Philippines is now engaged with the K to 12 curriculum also known as the Enhanced Basic Education Curriculum characterized with spiral progression of concepts and processes that supports Indigenous Peoples Education Program (IPEd) as provided in DepEd Order no. 32, s. 2015 (DepEd.gov.ph). Thus, Indigenous Peoples Education Program provides culture-based education supporting the learners' rooted culture linking to their learning. Moreover, there is a strengthened advocacy for Education for All (EFA) especially to the indigenous people in making a lifelong learning connecting to the culture for enrichment and preservation. Consequently, there is likewise an evident integration of mother tongue, stories, artifacts, songs, musical instruments, dances and reviews in instructional materials (DepEd.gov.ph).

Based on IPEd curriculum framework, contextualization is an educational process that deals with the relation of a specific setting, area or situation of application that makes the educational competencies meaningful, useful, and appropriate to the learners. Hence, contextualization may be described into two degree: localization and indigenization

(DepEd.gov.ph). Localization is a learning process which encompasses learning content in the curriculum based on local materials and information in the community of the involved learners. Furthermore, indigenization is an educational process that covers the learner's historical, bio-geographical, and socio-cultural that improves the education resources, teaching-learning process and competencies (DepEd.gov.ph).

Peoples who encompassed histories of relations with the nature itself were able to develop and maintain "Indigenous or Local Knowledge" which is the accumulation and multifaceted forms of knowledge, practices, illustrations, identifying, and application (UNESCO, 2003). Indigenous or local knowledge also includes refined realization, analysis, and significance (UNESCO, 2003:1). It is also described by Fien (2010) as something exceptional in a culture or civilization. Therefore, science curriculum go through indigenization which is the application of " indigenous science" a science within a culture- as core of the curriculum stating alternatives to the development of making knowledge established on " ways of indigenous living thru nature and ways of neo-indigenous in knowing" (Aikenhead & Ogawa 2007, 540). The uniqueness of the culture makes people intact, which is useful to the society, making an alliance in solving distinct problems and different challenges as well as in the learning system. The role of Science is to let the learners bring out their skills and talents, curiosity, values, attitudes, and propositions in different issues that strengthen conceptual understanding and appreciation of processes that bring about lifelong learning.

According to Ramirez (2006), several educators confirmed that materials and

strategy are very important instruments in the process of teaching and learning. The use of appropriate and relevant Instructional Material (IM), such as strings, blackboards, containers, textbooks, and kites affects participation (Armstein, 2004). Instructional materials impart significant help to the learners and teachers in the teaching-learning process. It improves the critical thinking ability of the learners. As primary basis of scientific practices, views; content and development of scientific knowledge, educational materials can hypothetically create a promising teaching and learning atmosphere (Obanya 2001). In the point of view of Abdullahi (2003), materials can be local or imported that can create a remarkable development in a specific lesson if it were used correctly.

Similarly, instructional materials are considered as devices or objects, which are used by the teacher to make a certain lesson much understood by the learners (Isola, 2010). Hence, instructional materials are basic aid to teachers specifically on how to teach science in a more real-life situated manner. To ensure the quality education of the learners, there are also approaches, strategies, and theories applied in teaching-learning process. One of these approaches is the inquiry-based. It is a step-by-step process in understanding science characterized by the use of scientific activities. It also follows the process of acquiring knowledge through investigation where learners try to find answers to specific questions.

According to Hiang (2005) inquiry includes the following: making a research in a certain problem; making use of critical thinking ability, observations, inquiring questions, experimentation and stating generalization; creative thinking and exercising intuition in discovering knowledge or truth.

Additionally, teachers who exercise the use of inquiry-based instruction were the teacher acting as-a facilitator of hands-on activities (Poon, Tan & Tan 2009). Through the application of inquiry-based approach, the learners will be able to grasp the needed substance in each concepts and the teacher will be able to teach and guide the learners evenly and effectively. Pre-services teachers who used inquiry-based approach in teaching believed that in a science classroom there is a possibility in developing hands-on activities (Hohloch, Groove & Bretz, 2007). The study of Ergul, Calis, Simsekli, Gocmencelebi, Sanli and Ozdilek (2011) shows that inquiry-based method in teaching significantly improves students' scientific attitudes and science process and skills.

Moreover, PNU ACES approach is a blend of independent study and moderate guidance of the teacher in the learning process. ACES refers to Affective-Cognitive Experiences for Self-direction that matches Filipino learning pattern in making a relevant and effective instructional material. The proponents of the PNU ACES were experts in the field of Psychology and Values Education at Philippine Normal University (PNU) Manila. The approach had been tried out for use in various disciplines through values integration but eventually flourished as an approach utilized in the delivery of lessons in different subject areas, which supports experiential learning strategies. It has a step-by-step process: Activity, Analysis, Abstraction, and Application.

The first part of the lesson, which become the springboard is the activity followed by analysis where questions are presented to be answered by the learner connected with the activity. Abstraction is the part the teacher guides the learner to summarize the acquired

learning. The last part is application that extends the lessons learned by the learners accompanied by assignments. These two approaches, Inquiry-based and PNU ACES are bases in the evolution of instructional material designed to improve the learning process of the Filipino students.

In this study, indigenous materials refer to the widely available indigenous materials or indigenous products. The materialization of the indigenized material were based on the use of indigenous product in making a twist in the teaching-learning on Chemistry 7. For instance, the integration of native beverages and native fruits in understanding the concept of acidity and basicity, which can be within the experiences of the learners exhibits indigenization of the material. It corresponds to the nature of indigenous peoples' way of life interrelating to the concepts of science with scientific explanation.

In the case study of Torri and Laplante (2009), they assert that "traditional knowledge" also known as "indigenous knowledge" offers the foundation of fundamentals in making decisions in a specific community through village group wherein problems are noticed and solutions are figured out in the locality. Thus, indigenous knowledge is an effective instrument to make teaching-learning process become effective.

As the studies show above, indigenous materials can help the students to become more active in class. Henceforth, the learners will be aware of the materials, which can help them understand the concepts in science or chemistry. The researcher tries to create an indigenized material for enhancement of instructional material for meaningful learning.

The indigenization of material in Matter 7 aims to interrelate the three important factors: Indigenous Peoples (IP) Core Curriculum, Matter 7 Concepts, and Indigenous Science Concepts. The Indigenous Peoples (IP) Core Curriculum is concerned with six (6) areas: Health, Family Life, Sanitation and Nutrition, Civic Consciousness, Environment, and Economic and Income (Abayao, 2014).

For health as the first topic, indigenous people used different ways in maintaining good health and in curing illnesses. The observed practices are the following: decoction, infusion, juicing, ponding, powdering, and oslob or steaming. These practices are applied to get the essential extract from the different herbal plants as a natural medicine such as in juicing or ponding the *kutsay* leaves to extract the substance needed in curing wounds. Another is decoction and infusion, the boiling of different parts of the plants, like bark of *bugnay* for lowering blood sugar, leaves of *dangla* and *pansit-pansitan* for fever. Also oslob or steaming process is the use of warm water with herbal plant, like *subusob* for fever. Tincture process is the soaking of a specific part of a plant in a vodka, like bark of *dugtong-ahas* or also known as *lupluppit* in a long period of time for arthritis. Lastly is the powdering of herbs, like oregano in making healthy tea.

All of these processes and herbal plants are used by indigenous people in early times and still practiced by Filipino people today. Hence, these practices can correlate into science specifically in matter concepts, the extract from those plants contains specific substance for a specific ailment. The concept of substance will be much understood by the learners if it is incorporated with these practices, herbal plants since they can observe those

plants in their surroundings, and they already experienced the different practices stated above.

Second is family life, Filipino family have a strong bond in each family member and rich in traditions. Activities like rituals, weddings, offerings, and even in their daily activity food and drinks are always present. Some of the indigenous food and drinks, which are present in the menu, are the following: rice coffee drink, *bugnay* wine, *tapuy* or rice wine, *dendelot* sauce, cassava cake, *puto-bumbong*, *bibingka*, *kalamay*, *kilawin*, and *buro*. The raw material of these delicious food and drinks are indigenous ingredients, which are traditionally processed by the indigenous people and passed from generation to generation. In relation, these indigenous food and drinks is relevant to the concept of solutions and mixture in Matter 7, which are usually present in family gatherings, events, rituals, and daily consumption of Filipino family. Hence, the learners will realize that those food and drinks are an example of solution and mixture that may lead to high retention of concepts.

Third is sanitation and nutrition, Filipinos are indigenous in making different products. The delicacies of indigenous people are being introduced to the market. It means that it follows the protocol in sanitation and nutrition facts present in the food label of the product. The indigenous products that are distributed in the market are the following: *patis, bagoong*, squash chips, banana chips, *munggo* noodles, camote chips, and *malunggay*-calamansi bottled drink bought by consumers. The consumer should be aware that elements are present in the nutrient section of the food label and ingredients are in the form of compounds to ensure quality and safety. In this matter, learners will be able to identify

which product they should buy and recognize that indigenous food products are nutritious and safe.

Fourth is economy and income. Philippines is well known for high quality goods and services which are being bought and sold locally and internationally. The indigenous craftsmanship and designs in both technique and materials are part of the industry in making indigenous products in the market. The techniques of the indigenous people in making unique materials are passed by generation to generation, which become today's foundation in creating significant products. The weaving, braiding and sewing of different indigenous fibers like *sinamay* from agam ferns, abaca, buri, raffia, and maguey to create elegant clothes and other useful materials (www.globalsources.com). These materials can be classified as substance in matter since, each material contains different substances that make them unique. In addition, the pieces of jewelry of indigenous people like Ling-ling O necklace (brass), Ling-ling O pendant and earing pairs (silver), garuda earings (gold), and payneta (gold-plated silver) are some of indigenous pieces exposed today, which symbolizes belief, traditions and practices, beauty, and economic status in a certain group.

These indigenous jewelries can be interconnected to the lesson of metals and nonmetals in Matter 7 as a set of example in explaining the concepts same through connecting with other subject specifically, Philippine History for enrichment. In relating indigenous materials in understanding the economic and income of the Philippines the learners will be able to realize that indigenous materials and practices can be interrelated in Matter 7 which contributes to the economy and income of the Philippines.

Fifth is environment. It naturally provides the basic needs such as shelter, clothing, and food. The indigenous peoples have their own designs in building their houses depending on their location. Some of the well-known indigenous houses in the Philippinesare the following: Nipa hut, Agta-lean to, Badjao houseboat, Higaonon tree house, Ivatan house, Mandaya house, Ifugao house and Maranao Torogan, which are made up of indigenous materials like bamboo, lash sapling, cogon grass, and rattan in building unique shelters (www.wanderingbaya.com). Moreover, clothes of indigenous peoples are made up of plant fibers such as pinya, abacca, and banana, which are dyed naturally and weaved finely in creating unique patterns that emphasizes their culture. In addition, indigenous food is highly appreciated today because of its unique ingredients and taste. It follows traditional procedures in creating processed indigenous food and wild fruits are highly appreciated. Some of the indigenous products are the following: rice wine, cassava cake, *buro*, *basi*, camote chips and wild fruits that are distributed in the market today. Hence, environment provides evidences that support the concepts on Matter 7 and serves as a concrete example that will help the learners to understand the lessons on Matter 7 in a real-life situated manner.

Sixth is civic consciousness. People are using the natural resources to create a new material which will be used for living but the refinement of the natural material creates a waste that definitely harmed the environment itself. There are different waste such as indigenous waste, mining waste, nano waste, and other form of waste produced by humans.

Hence, through the integration of indigenous materials on Matter 7 it will widen

the understanding of the learners that may result to the environment awareness. The students may propose investigatory projects that can help to decrease the amount of waste in the environment and create a machine, which is eco-friendly. The students may also join different programs such as *bayanihan*, tree planting and groups that are against mining and dynamite fishing in restoring and saving the mother earth.

Philippine education was engaged in the K to 12 curriculum where new created modules were disseminated in the country but there were still schools in the country that do not have learners' module and teachers' module on-hand specifically in the rural areas. In addition, the materials needed in some activities in the module is not yet available and the lack of connectivity of the material to the students' environment and intellectual capacity specifically students in the Basic Education Curriculum (BEC). Furthermore, the lesson is presented in a high-level approach that does not suit the majority of the Filipino students resulting to low academic performance on Matter 7.

The present instructional material given by DepEd is composed of activities to which some of these were not achievable by the students because of the unavailability of the equipment and facility in most schools in the country. Furthermore, the presentation of the topic creates a gap between the instructional materials and learners because of its high level approach and unavailability of the materials to the students in comparison to the formulated indigenized material on Matter 7 where the integration of various indigenous materials became one of the foundation of the material. Through the use of indigenous materials the students will be able to learn Matter in a more remarkable and meaningful

way; since, these materials are easy to find and it is being observed by the students. In addition, the use of PNU ACES as strategy with the influenced of Inquiry-Based approach were the keystone to create a more comprehensible material that supports the learner-centered advocacy for long-life learning.

This study, hence, aims to fill-in the gap between the instructional material and learning process of the learners. The indigenous materials were used because of its availability and familiarity of the material to the learners. Through the use of indigenous materials as a part of the teaching-learning process the gap between instructional material and learning process of the learners will be addressed because the connectivity of indigenous material in understanding the content and process on Matter 7.

There were many educational studies stating different problems in understanding the content and processes of Chemistry such as lack of materials, low retention of the learners, lack of motivation, and connectivity of instructional materials in the cultures, practices, and environment of the learners. Thus, the researcher was able to formulate an indigenized material in understanding the content and processes on Matter 7 based on the given data that supports the need of instructional material innovation. Moreover, the researcher considered the ethnicity and differences of the learners in writing the indigenized material that serves as a bridge in better understanding resulting competitive and productive Filipino learners. The formulation of the indigenized material on Matter 7 is based on PNU ACES approach as a strategy influenced by Inquiry based approach particularly in activity, analysis, and application of the indigenized material. The material

is also consists of prerequisite knowledge activity, main activity, and enhancement activity. The indigenous materials were incorporated in the instructional material as a core in teaching-learning process on Matter 7. It showcased the Filipino culture-laden through interconnection of different concepts in Matter that will set the mood and readiness of the learners that will serve as a ladder in better understanding and in molding productive learners. Thus, the formulated indigenized material in Matter 7 is suitable to the culture, environment, and mentality of the learners in bringing up equitable and quality education as illustrated in Figure 1.1.

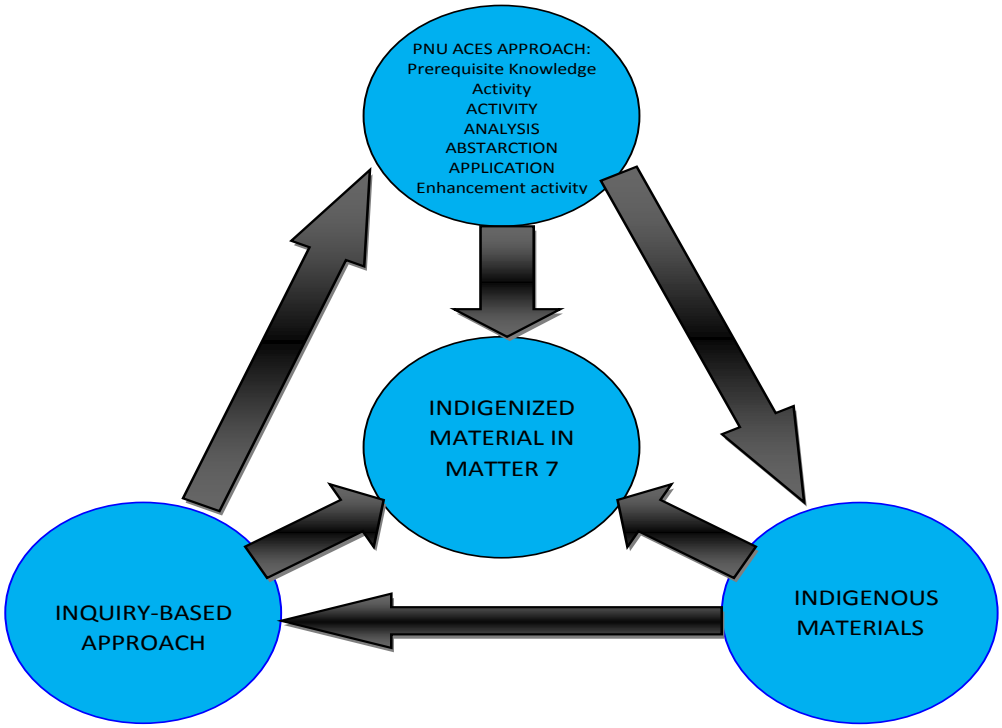


Figure 1.1
Theoretical Framework

The Indigenized Material in Matter 7 uses the format of the PNU ACES Approach proposed by Filipino experts lending it more appropriate to students in the local context.

The ACES approach is influenced by Inquiry-based Approach and is constructively aligned with Indigenous Materials related to Chemistry.

This study follows the pattern of Input-Process-Output Model in developing and validating the instructional material. The guide of the process component was the theoretical framework. The input components for the learning material were taken from K to 12 curriculum guide, K to 12 learning modules, Science books, Indigenous materials, and PNU ACES and Inquiry Based approaches.

The process component was divided into three major stages: preparation of the material, development of material, and validation of the material.

The preparation of the material involved selecting the content, formulating of objectives, selecting appropriate teaching-learning competencies, and identifying strategies.

The development of the material is the writing process which was guided and shaped by the theoretical framework and the production of the learning material. This included proofreading, editing, printing, evaluation by the experts, and initial revision of the learning.

The validation stage was done by the experts and the revision of the module was based on their comments and suggestions. It also included the testing of the revised learning material to the chosen respondents, followed by another revision by the experts and then the second pilot testing of the material and lastly the final revision of the learning material. To check the authenticity and originality of the material it was subjected to plagiarism

checking. The obtained value in the evaluation of the experts were subject to internal consistency of the experts' rating, and Cronbach Alpha was computed and for reliability test.

The output of the study was the developed and validated Indigenized Material on Matter 7.

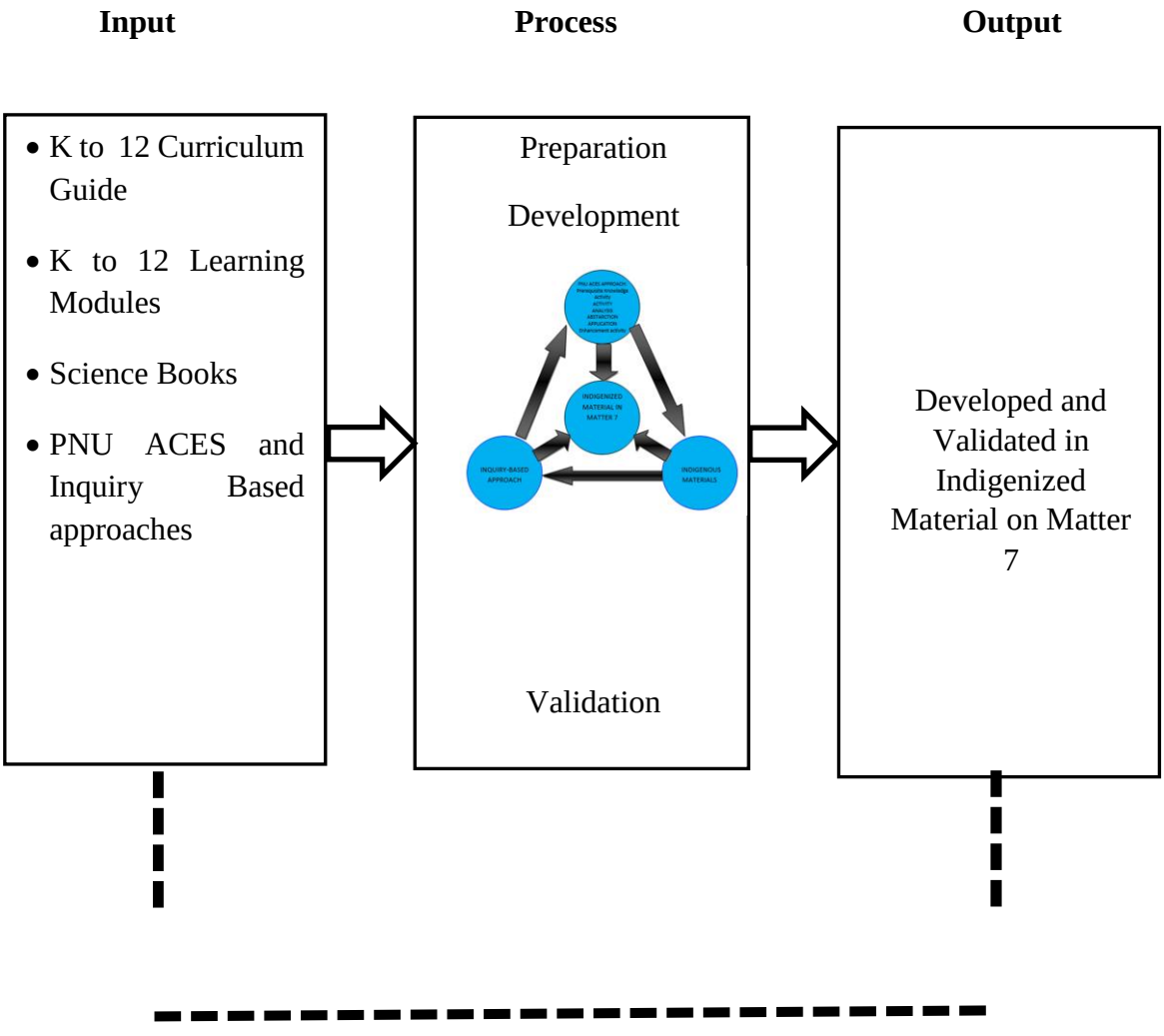


Figure 1.2
Research Paradigm

Statement of Purpose

The primary aim of this study was the development of an indigenized material in understanding the content and processes on Matter for grade 7 students as prescribed in the Enhanced Basic Education Curriculum (K to 12).

The study also validated the indigenized material based on its content, face, organization, readability, and effectiveness. Furthermore, revision of the module depends on the assessment of the evaluators.

1. 5 Significance of the Study

The developed indigenized material may be practically valuable to the following:

Students. The indigenized material in Matter 7 could help the learners understand the concept and processes in Matter 7. These were incorporated with different indigenous materials, which are related to their culture and experiences. As a probable result, the learners will be motivated to learn and grasp the concepts easily. This will also encourage the learners to link their culture into scientific matters for quality learning.

Teachers. It may inspire them to create and develop their own design of indigenized material in teaching that suits the needs and culture of the learners to create more interesting teaching-learning atmosphere.

Administrators. The outcome of the study may encourage the school administrators to utilize suitable learning materials that may serve as an aid to the learning process of the learners as well as teaching process of the teachers. It will be a scaffold in gaining

support in enhancing and constructing different indigenized materials that would benefit their own

community.

Curriculum Planners. The outcome of the study can be a basis to help curriculum planners identify the need of having a constant reviews and modification in the curriculum parallel to the educational objectives in the country. It will be also a guide in producing globally competitive and holistic learners that can meet the demands of the society.

Parents. The result of the study may be an evidence in realizing their role in the educational quest for their children. It may give ideas on how to reinforce their children and to motivate them in guiding their children to become holistic learners.

Future Researchers. The result of the study will be a basis in creating and validating other indigenized materials in a different field.

Scope and Delimitations

The study endeavored to develop and validate an indigenized material in understanding the content and processes in Matter 7, based on the to the objectives of Enhanced Basic Education Curriculum (K to 12) during the phase of the study. The indigenized material highlights the use of available indigenous materials in their environment, enriching the activities in each topic in Matter 7 as well as preserving the embedded cultural practice. The indigenous material, concept, and practices of ethnics groups not available in the study area were not included such as those of the indigenous groups outside Cauayan City.

Definition of Terms

For comprehensive understanding of the Indigenized Material on Matter 7, the following terms are defined:

Apog. This is a white powder used as an ingredient in "momma".

Bugnay Wine. It is a fermented *bugnay* fruit used as a beverage in special occasions.

Contextualization. It deals with the specific area or situation that makes the learning process meaningful.

Indigenization. It is an educational process that use different indigenous materials in teaching.

Indigenous Materials. These are the widely available indigenous materials that can be seen in the kitchen, market, and in the surrounding.

Inquiry Based Approach. It is an approach focused on enhancing the critical thinking ability of the learner through questions based on the activity.

Lana. This is a traditional oil produced from coconuts used for body massage.

Localization. It is a learning process that deals with the use local materials that can be found in a specific community.

Munggo coffee. This is an indigenous legume, which is processed to create coffee.

PNU ACES Approach. It is an active approach that motivates the students to become more active and independent learner. It is consists of Activity, Application, Analysis, and Application.

Powdered Atsuete. This is used as a natural food coloring.

~~**Sinakob**. A solidified sugar used in cooking delicacies.~~

Sukang Basi. It is a fermented vinegar from the juice of a sugarcane.

Tagapulot. It is a solidified sugar used for cooking native delicacies.

CHAPTER 2

RESEARCH METHODS

This chapter contains the discussion of the research methodology, participants of the study, research local, research instruments, statistical tools applied in the analysis and interpretation of data, ethical limitation and consideration of the study and the processes in the development and validation of Indigenized Material in Matter 7.

Research Design

This study endeavored on the development and validation of instructional material in Matter 7 based on the PNU ACES and Inquiry based approaches. This study applied the descriptive method of research through the process of instrumentation in designing the indigenized instructional material.

Descriptive research design deals with the on-going condition. The final goal is to identify new truth (Calmorin, & Calmorin, 2012). The nature of the study was descriptive since it distinguished the learning competencies in Matter 7, which emphasized the current needs of the students based on the PNU ACES and Inquiry based in learning Matter 7. These two, are instruments in achieving the ultimate objective of the study -- the indigenized material in understanding the concept and processes in Matter 7. Moreover, it presented the learning experiences of the students, very

significant in the evaluation of the study. The indigenized material was prepared to undergo initial evaluation of the effectiveness of the material that followed the

PNU ACES and Inquiry Based approaches as part of the learning indicators. The developed and validated Indigenized Material based on PNU ACES and Inquiry Based approaches had three main stages: Preparation, Development, and Validation.

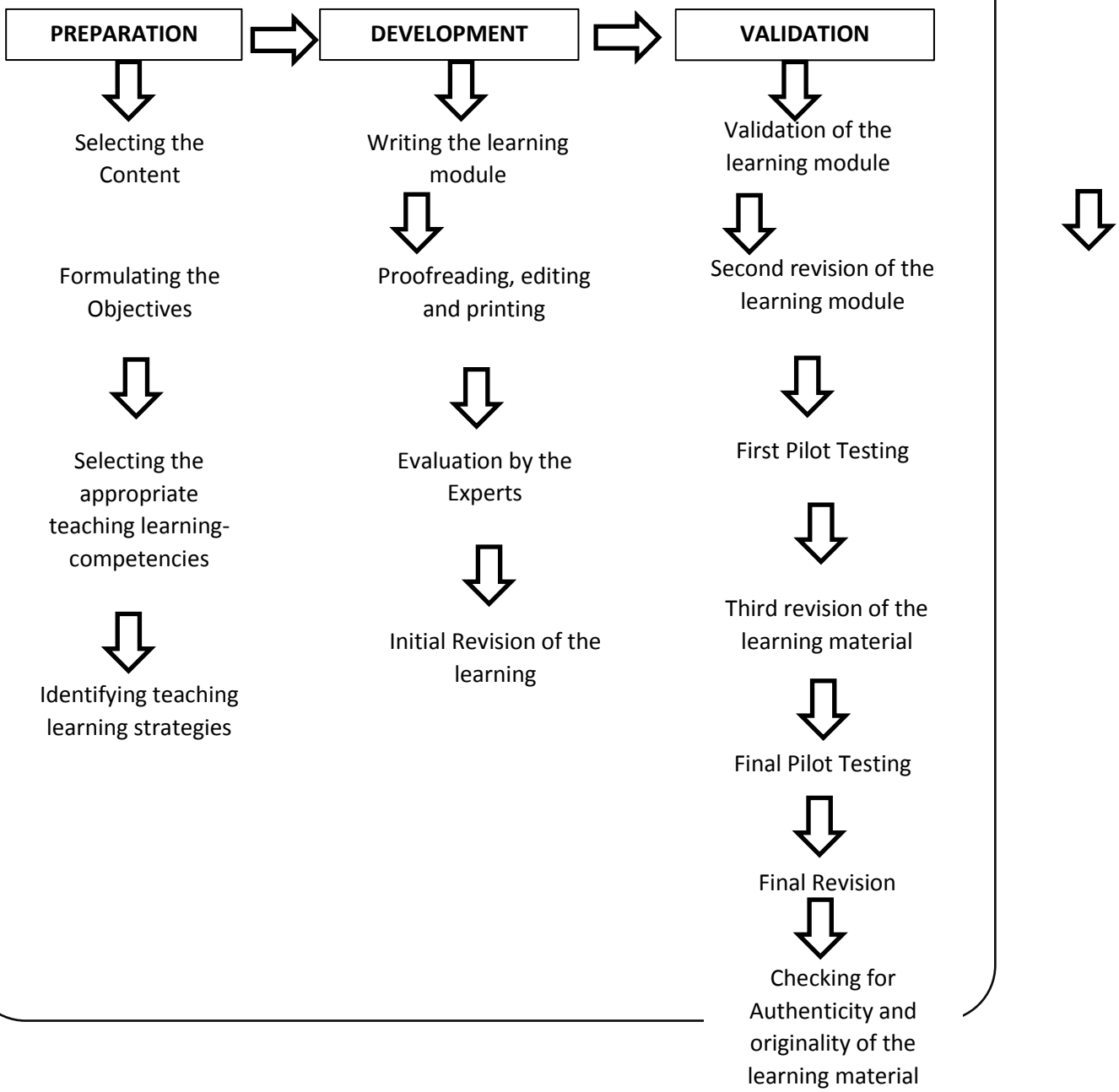


Figure 2.1
Flow Chart of the Development and Validation of Material

Research Locale

The researcher conducted the study at Cauayan National High School situated in Barangay Turayong, Cauayan City, Isabela. In 1997, it was established as Cauayan Polytechnic College-High School Extension. It has Junior High School with four curriculum: Basic Education Curriculum (BEC), Science and Technology Engineering Curriculum (STEC), and Special Program for Sports (SPS) and Special Program in the Arts and Design (SPAD). The mission of the school is to promote and protect Filipino's right to have equitable, quality, culture-based and finish basic education.

Sampling and Participants of the Study

The enrolled grade seven students at Cauayan National High School under the Enhanced Basic Education Curriculum (K to 12) of school year 2017-2018 were the chosen participants of the study. The selection of the respondents was done through cluster sampling. There were twenty-four cluster corresponding to their section. Name of cluster or sections were written in sheets of paper rolled as lot and were drawn randomly to select the two cluster of classes that were involved in the study. The selected heterogeneous sections or clusters; they were the Grade 7- Talisay and Grade 7- Hermalite. The Grade 7 Talisay consists of 43 students they were the participants in the first pilot testing while Grade 7 Hermalite consisting of 40 students were the participants in the second pilot testing of the Indigenized instructional materials on Matter 7.

Material Development and Validation Stages

Stage 1.

Preparation.

This phase encompassed planning, organization of the content and objectives, teaching-learning experiences and strategies, and varied activities, with the guidance of the teachers teaching Science 7 at Cauayan City National High School.

Selecting the content.

The content of the indigenized material was guided by the prescribed course description under the Enhanced Basic Education Curriculum of Science by the Department of Education. The topics involved in the indigenized material in Matter 7 for the first quarter were the following:

Module 1: Solutions

Module 2: Substances and Mixtures

Module 3: Elements and Compounds

Module 4: Acids and Bases

Module 5: Metals and Nonmetals

Formulating the objectives of the learning modules.

Every course, instruction, and activity starts with a goal. The goal can be specified in the learning objectives which are summarized statements heading the learners to

accomplish the instruction. The objectives in the main activity was formulated based on the learning competencies or objectives of the K to 12 Curriculum guide. The formulated learning objectives of prerequisite knowledge activity and enrichment activity was based

on the objectives of the activities of the K to 12 learners' module.

In leading the learners to the goal there must be well-defined learning objectives to attain the following:

- direct the learners to the learning purpose of the material.
- facilitate the conduct of instructional activities.
- directs the assessment strategies.

Table 2.1
Learning Objectives, Activities, and Objectives of the Activity

Learning Competencies: SOLUTIONS **a. investigate properties of unsaturated or saturated solutions;** **b. express concentrations of solutions quantitatively by preparing different concentrations of mixtures according to uses and availability of materials.**	
Activity	**Objectives**
Prerequisite Knowledge Activity	
• Indigenous Solutions Available in Your Locality	• describe the characteristics of the given indigenous solution by using your senses; and • list the different characteristics of the given indigenous solution through a table form.
• Solution Properties	• describe the properties of indigenous solutions based on observation; and • identify the indigenous sample as

solution or not.

Solution Activity	
• Evidence of Saturated Indigenous Solution	• describe the characteristics of saturated and unsaturated indigenous solution
• Diluted or Concentrated: Indigenous Solution	• determine the maximum amount of solid solute that will dissolve evenly in a specific amount of water
Enrichment Activity	
• It's about the Size	• identify which solution is concentrated or diluted • describe the concentrations qualitatively based on the appearance and quantitatively based on the amount or number of solute added to a fixed amount of solvent.
• Rate of Dissolving Munggo Coffee, Hot and Cold Water!	
• Rock Salt Vs. Munggo Cereal! Hot and Cold!	• construct a hypothesis and compare it to collected data; and • identify the independent and dependent variables. • identify the rate of dissolving munggo coffee in hot and cold water; and • differentiate the rate of dissolving munggo coffee between hot and cold water. • identify which indigenous material dissolves faster in hot and cold water; and compare the effect of hot water and cold water to solubility of solid solute.

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Learning Competencies: Substances and Mixtures
a. distinguish mixtures from substances based on a set of properties;

Activity	Objectives
Prerequisite Knowledge Activity	
• In Heat: Salt Solution	• assemble correctly a simple laboratory set-up; • separate water from salt; and • collect the salt in the salt solution after the activity.
Substances and Mixtures Activity	
• Filtrate It!	• identify the substances in the mixture; • describe the appearance of substance and mixtures; and • distinguish the substance and mixtures based on the activity.
Enrichment Activity	
• Indigenously Unknown Sample: Substance or Mixture?	• design simple procedures in identifying the unknown indigenous sample as substance or mixture

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Learning Competencies: Elements and Compounds
a. recognize that substances are classified into elements and compounds

Activity	Objectives
Prerequisite Knowledge Activity	
• Flash it: Elements or Compounds?	• assemble correctly a simple laboratory set-up; • separate water from salt; and • collect the salt in the salt solution after the activity.
Elements and Compounds Activity	
• Guess What? Elements or Compounds	• identify the different elements and compounds contained in the indigenous products; • identify the symbol of each elements involved; and • classify the identified elements according to its family, and group number by using periodic table of elements.
Enrichment Activity	
• Matter: Indigenous Product	• identify the elements present in the nutrition facts of indigenous products; and • recognize that most of the ingredients of indigenous products are made up of compounds.

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Learning Competencies: Acids and Bases
a. investigates properties of acidic and basic mixtures using natural indicators

Activity	Objectives
Prerequisite Knowledge Activity	
• Acids and Bases Everywhere	• identify the materials as acids or bases**;** and • determine the use of acids and bases in your daily living.
Acids and Bases Activity	
• Name it: Acidic or Basic?	• describe the change in color of the given indigenous solution by using your senses**;** and • identify the nature of the sample by the use of the plant indicator.
• Water Samples: Acidic or Basic	• describe the change in color of the different water samples by using your senses**;** and • identify the nature of the water from different sources by the use of plant indicator
Enrichment Activity	
• Color Change and Indicator-Acidic or Basic	• identify the pH of the samples from the first activity by the use of pH scale.

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Learning Competencies: Metals and Nonmetals
a. describe some properties of metals and nonmetals such as luster malleability, ductility, and conductivity

Activity	Objectives
Prerequisite Knowledge Activity	
• Metals and Nonmetals on Earth	• identify the available metals and nonmetals in the surrounding**;** and

	• determine the use of the identified metals and nonmetals
Metals and Nonmetals Activity	
• Conducts Electricity: Metals or Nonmetals	• describe the appearance of the materials**;** • identify the indigenous materials as metals or nonmetals based on the appearance of the material**;** and • distinguish metals from nonmetals
Enrichment Activity	
• Indigenous Metallic and Nonmetallic	• identify the indigenous material that are considered as metal or nonmetal**;** and • recognize the importance of metal and nonmetal in your daily activity.

Selecting the teaching-learning experiences.

The objectives of the indigenized material were patterned on the Enhanced Basic Education Curriculum under the supervision of the Department of Education. The varied learning activities in the indigenized material were identified as well as the role of the teacher and learner.

To assure the positive effect of each module, the form of learning should be appropriate to the anticipated results. The instructions were based on the selected methods in supporting the learners' needs and to attain the objectives.

The learning experiences were based on the practices of the native residents of the community. For instance, the topic "Solutions" considered the locally preserved wine and vinegar while "Mixture and Substances" considered the local delicacies such as *buro*, *kilawin*, and *padas* as concrete examples of the lesson.

The K to 12 Curriculum emphasizes the orientation of learner centeredness. Thus, the teacher acts as a facilitator or guide in the learning process while the learner acts as a responsible explorers in finding out the truth and concepts that will contribute to their learning and in creating productive outputs.

Identifying teaching-learning strategies.

Each topic in the indigenized material followed the flow of PNU ACES, consisting of four components: Activity, Analysis, Abstraction, and Application. It encompasses the step-by-step process where students act as doer and teacher acts as facilitator of learning.

All of the PNU ACES components were chosen because it manifest progressional effect to the learning process of the learners. The activity is hands-on that serves as a springboard of the lesson and at the same time enhances the manipulative skill of the learners. The analysis is composed of varied questions, which is interconnected to the activity that enhances the critical and creative thinking of the learners.

The abstraction contains the elaboration of the lesson and it also corrects the misconception of the learners. The application is a supplement of the lesson in the form of activity, which integrates the lesson in a real-situated manner.

Thus, PNU ACES approach is appropriate in guiding the learners to understand the lesson in a more realistic and comprehensive manner.

Stage 2: Development.

This stage was the core of the study. The preparation of the indigenized material on Matter 7 is the highlight in this stage.

Writing the learning module.

This was the major portion of the development and validation of the indigenized material on Matter 7. Its content was based on the K to 12 Curriculum.

The indigenized material was considered unique for other modules because it is integrated with Indigenous materials and PNU ACES was the major pattern of the said learning module.

Using the PNU ACES and Inquiry Based approaches as pattern in the formulation of the learning material, each learning activity in the module consists of five parts: Overview, Activity, Analysis, Abstraction, and Application.

First is Overview. It contains the background of the lesson which serves as a hint to the expected activities.

Second is Activity. It is an actual manipulation of the indigenous material. The activity is hands-on activity enabling the learners to become more proactive and responsible in acquiring their own knowledge.

Third is Analysis. A set of questions serves as a scaffold in the lesson. The questions are formulated based on the content of the activity that helps the learners to realize and

understand the concept of the activity relating it to the main topic.

Fourth is Abstraction. This is a lecture part that emphasizes the concepts being drawn in the activity and analysis. It also contains additional information that can broaden the knowledge and understanding of the learners.

Fifth is Application. It contains activity that follow-up the lesson learned by the learners and emphasizes the application of the lesson in the real-life situation.

In addition, the learning module was also divided into three major parts: Prerequisite Knowledge Activity, Main Activity, and Enrichment Activity.

Prerequisite knowledge activity contains activities that deal with their current knowledge and served as a springboard to the new lesson.

The main activity includes different activities that encompasses the learning competency in the curriculum guide. It was utilized to acquire new knowledge which will be used in creating output and for further learning.

The enrichment activity contains additional activities that strengthens the newly acquired knowledge of the learners.

Thus, PNU ACES approach together with the influence of Inquiry Based approach

finely guided the formulation of the indigenized material in creating unique and effective instructional materials.

Proofreading, editing, and printing the learning module.

The indigenized material underwent grammar and spelling check by an English teacher. The auto-editing of the graphics, text, layout, and format of the material was facilitated by the computer for the appealing appearance that can catch the learner's

attention. The elements, features, and components were checked by the adviser and experts to ensure the clarity and correctness, and consistency of the learning material.

Evaluation by the adviser.

The developed indigenized material were previewed by the thesis adviser for suggestions and comments before presented to the experts who were science teacher practitioners for evaluation.

Initial revision of the learning material.

The indigenized material was modified before the module is reprinted based on the suggestions and comments of the adviser.

Stage 3: Validation.

This stage focused on the content and face validity, readability and organization of the developed instructional material.

***Validation by experts*.**

The instructional material undergone content validity through the assessment of expert validators to ensure the appropriateness of the learning material to the learners, as well as the consistency and clarity of the objectives in the subject matter. Through the use of Expert's Assessment Checklist the indigenized material were validated accordingly. The checklist was developed as keystone on several theses namely: Libranda (2004), Salvador (2005), Rivera (2011), and Agorilla (2015). It was found out that it was appropriate for instructional validation, thus, the theses writers adopted it.

The Experts Assessment Checklist contains the following criteria: objectives, content, organization, materials and resources, and effectivity which covers all the

variable sources to broaden the root of knowledge and to build up learning and student's prior skills and knowledge in the material. The learning material was focused to its effectivity in promoting active learning and real-life application in cultivating the learners and boosting the morale on learning.

The rating and verbal description used in validation by the experts were as follows:

Mean Rating	Verbal Description
4.5-5.0	Outstanding (O)
3.51-4.5	Highly Satisfactory (HS)
2.51-3.5	Satisfactory (S)
1.51-2.5	Not Satisfactory (NS)
0.5-1.5	Needs Improvement (NI)

The rating was treated statistically using Cronbach Alpha to identify the expert's internal consistency and reliability. The overall scores were the variances used to determine the Alpha Coefficient. The ideal value for Cronbach Alpha Coefficient is 0.7.

Second revision of the indigenized material on matter.

The Indigenized Material on Matter 7 was revised based on the recommendation and suggestion of the experts. Thus, the expert's suggestion were considered in the revision of the material.

First pilot testing.

The learning material were administered to Grade 7 students of Talisay under the Enhanced Basic Education Curriculum of Cauayan City National High School with forty three (43) students during the First Quarter of School Year 2017-2018. The first pilot

testing aimed to determine different difficulties during the administration of the material, which served as a basis for revisions. There is also assumption that a material is effective if it improves the achievement of the students and it implies that the Indigenized Material on Matter 7 is valid.

Third revision of the indigenized material on matter 7.

The learning material was revised based on results in the first pilot testing. It was revised based on suggestions, comments and difficulties encountered by the teachers and learners. The revised learning material was implemented for the second time to collect the outputs of the learners. The scores were statistically analyze to identify the Intraclass Correlation Coefficient.

Final pilot testing.

The same method was utilized in the second pilot testing. The revised Indigenized Material on Matter 7 were administered to forty (40) students Grade 7 of section Hermalite under the Enhanced Basic Education Curriculum of Cauayan City National High School. All the learning materials were administered in the first pilot testing followed by revisions. The revised material was utilized in the second pilot testing.

After the two sets of testing, all the outputs of the students were gathered and were analyzed using Statistical Package for Social Sciences (SPSS) and Microsoft Excel. The students' scores from pretest and posttest from first pilot testing to second pilot testing were subjected to paired sample t-test to determine the effectivity of the learning material.

The ideal p-value must be ≤ 0.05 accepted as significant and p- value must be ≤ 0.01 accepted as highly significant (Valdez, 2014).

Final revision of the indigenized material on matter 7.

This stage is the final revision of the developed learning material. All the problems encountered during the second pilot testing was used for revisions on the learning materials. A sample of validated learning material is located on Appendices.

Establishing authenticity and originality of the indigenized material.

The developed and validated Indigenized Material on Matter 7 was subjected to Originality and Authenticity.

Statistical Tool

The instruments that were used to analyze the gathered data in this study were the following:

1. Weighted Mean was used to assess the level of acceptance of the research instruments.

2. The standard deviation was utilized to measure the difference of the pretest and posttest scores of the respondents.

3. Two-tailed dependent samples t-test was used to determine if the pretest and posttest scores have a significant difference.

4. Intraclass Correlation Coefficient was used to determine the internal consistency of the collected data.

Table 2.2

Cronbach's Alpha Interpretation of Results

Cronbach's Alpha	Internal Consistency
0.80 or better	Exemplary
0.70 to 0.79	Extensive
0.60 to 0.69	Moderate
< 0.60	Minimal
Not reported	None

(Robinson, Shaver, &Wrightman, 1991 12-13)

2.5 Instruments

A checklist was used to measure the required information.

2.6 Ethical Considerations

The development and validation of the indigenized material on Matter 7 based on PNU ACES and Inquiry Based approaches was the primary purpose of this study. The researcher formulated a new Chemistry instructional material in response to the need of integration of indigenous material in subject matter for better learning in the Philippine context of education.

The indigenized material also aimed to evaluate the students' learning-achievement experiences. The researcher guaranteed that the chosen secondary school was appropriate

in representing the research locale of the public schools consist of heterogeneous student population, as an integral part of the study. Moreover, the researcher ensured the protection

and safety of the participants of the study since the study was not risky.

In addition, the researcher assured that the each participant participated the study voluntarily and they can withdraw anytime with or without reasons through submitting a consent form. The parents were also informed regarding the participation of their children to the study. The developed indigenized material was applied in the first quarter of school year 2017-2018. The participants used the indigenized material for fifty (50) minutes every day as prescribed by the Department of Education in the first quarter. Furthermore, pretest and posttest were administered to define the effectiveness of the module based on student's achievement.

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

CHAPTER 3

RESULTS AND DISCUSSIONS

This chapter contains the results, analysis, and interpretation from the collected data. Tables are presented to support the explanations. The interpretations present the synthesis of facts and insights for the formulation of conclusions and recommendations.

The purpose of the study were the following:

1. develop an Indigenized Material on Matter for Grade 7 students under the Enhanced Basic Education Curriculum;
2. verify the validity and reliability of the Indigenized Material on Matter 7; and
3. revise and finalize the Indigenized Material on Matter 7 based on the assessment.

The Indigenized Material on Matter 7 using PNU ACES and Inquiry Based Approaches

The materials were formulated for grade seven (7) students with the integration of indigenous materials in teaching Matter 7 to enhance the understanding and potentials of the students in terms of doing activities and promote active learning.

The writing of the Indigenized material on Matter seven (7) ensured the lesson as learner-centered where the students will enhance their inquiry and manipulative skills while they were learning academically.

The developed module followed the process of instrumentation with the Indigenized Material containing integration of indigenous material in each module corresponding the needs of the learners. Each module was formed with the use of PNU ACES as a strategy which was influenced by Inquiry Based approach specifically in Activity, Analysis, and Application.

The module consisted four (4) major parts: the Activity, the Analysis, the Abstraction, and the Application.

The activity is a manipulative part that serves as a springboard of the lesson and it enhanced the creativity and discipline of the students. The analysis is composed of different questions based on the activity that enhances the creative and critical thinking of the students. The abstraction contains discussion about the activity, answers to the questions in the analysis, broadens the concept and corrects the misconceptions of the students. The application is an enrichment part which includes additional activity or assignment to be answered by the students interconnected in the real-life situation. In addition the material also has three phases of activity. These are the prerequisite knowledge activity, main activity, and enhancement activity. These three phases were covered by PNU ACES as strategy with the influence of Inquiry-Based approach.

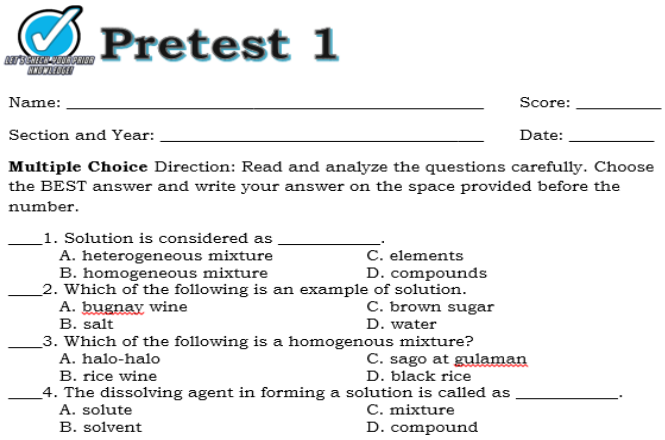
Through the guidance of the adviser, comments and suggestions of the experts, K to 12 learning competencies, PNU ACES and Inquiry-Based approaches came out as a particular design and format of the learning material. It contains the following parts:

1. Pretest

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

This is a formative test that will check the prior knowledge of the students regarding to the topic. Each student will answer 10 items of multiple choice and the questions were

based on the content of the module. (See Appendix C)



Pretest 1

Name: _____ Score: _____

Section and Year: _____ Date: _____

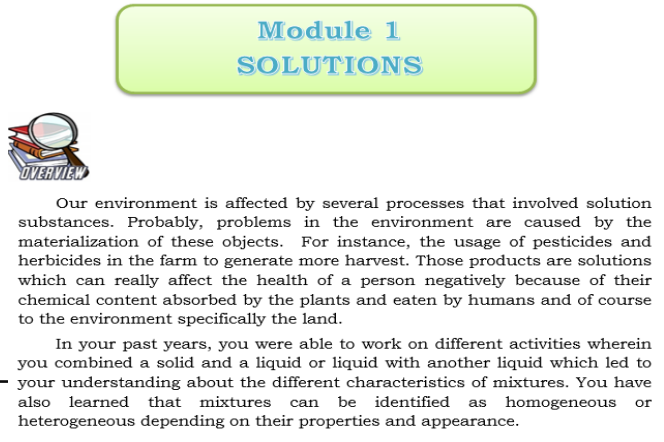
Multiple Choice Direction: Read and analyze the questions carefully. Choose the BEST answer and write your answer on the space provided before the number.

____1. Solution is considered as _____.
A. heterogeneous mixture C. elements
B. homogeneous mixture D. compounds
____2. Which of the following is an example of solution.
A. bugnay wine C. brown sugar
B. salt D. water
____3. Which of the following is a homogenous mixture?
A. halo-halo C. sago at gulaman
B. rice wine D. black rice
____4. The dissolving agent in forming a solution is called as _____.
A. solute C. mixture
B. solvent D. compound

Figure 3.1
Excerpt of Indigenized Material Pretest in Module 1

2. Overview

It is a brief information that corresponds to the lessons and the objectives were presented accordingly. (See Appendix C)



Module 1
SOLUTIONS

OVERVIEW

Our environment is affected by several processes that involved solution substances. Probably, problems in the environment are caused by the materialization of these objects. For instance, the usage of pesticides and herbicides in the farm to generate more harvest. Those products are solutions which can really affect the health of a person negatively because of their chemical content absorbed by the plants and eaten by humans and of course to the environment specifically the land.

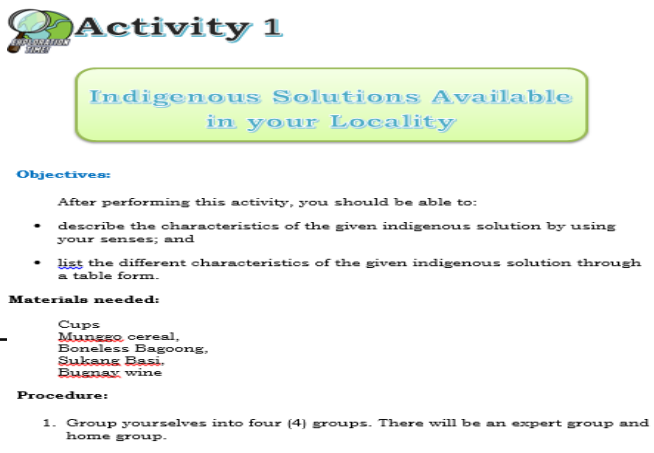
In your past years, you were able to work on different activities wherein you combined a solid and a liquid or liquid with another liquid which led to your understanding about the different characteristics of mixtures. You have also learned that mixtures can be identified as homogeneous or heterogeneous depending on their properties and appearance.

Figure 3.2
Excerpt of Indigenized Material Overview in Module 1

3. Prerequisite Knowledge Activity

This phase tries to recover the prior knowledge of the students through varied activities. It aims to recover the prior knowledge of the students in a specific topic by hands-on activities followed by questions, short discussion, and application which serves as a springboard in the main activity. . (See Appendix C)

In module one (1) solution, there were two activities: Activity one (1) Indigenous Solution Available in your Locality and Activity two (2) Solution. In activity one (1) the materials used were *bugnay* wine, *munggo* cereal, boneless *bagoong*, and *sukang basi;* while in activity two (2) the materials used were *lana*, *apog*, crushed tobacco, black rice, brown sugar, and powdered *atsuete*. The prerequisite knowledge activity was guided by K to 12 curriculum guide. The activity 1 aims to describe the characteristics of indigenous solution found in the locality and identify the characteristics of the indigenous solution. The students will receive samples from their teacher and they will use their senses to describe and identify the characteristics of the indigenous solution. For instance, *bugnay* wine they will observe if the material is an example of solution using their own senses.



Activity 1

Indigenous Solutions Available in your Locality

Objectives:

After performing this activity, you should be able to:

- describe the characteristics of the given indigenous solution by using your senses; and
- list the different characteristics of the given indigenous solution through a table form.

Materials needed:

Cups
Munggo cereal,
Boneless Bagoong,
Sukang Basi,
Bugnay wine

Procedure:

1. Group yourselves into four (4) groups. There will be an expert group and home group.

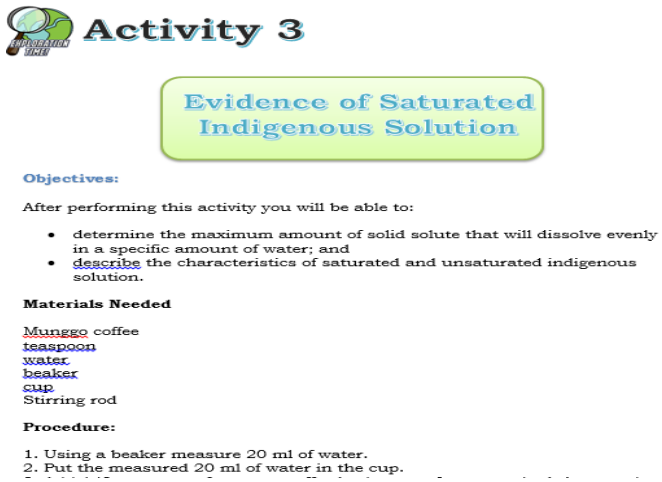
Figure 3.3
Excerpt of Indigenized Material Prerequisite Knowledge Activity in Module 1

4. Main Activity

The formulation of the objectives in this phase was patterned in the learning competency of the prescribed curriculum guide in Science. This phase aims to meet the suggested learning competency that will strengthen the understanding of the students on a specific lesson and to enhance the manipulative and thinking skills of the students. (See Appendix C)

In module one, the first activity is entitled Evidence of Saturated Indigenous Solution and the second activity is entitled Diluted or Concentrated: Indigenous Solution. The *munggo* coffee and brown sugar were used as materials in understanding the main objectives of the lesson. In module one, the first activity is entitled Evidence of Saturated Indigenous Solution and the second activity is entitled Diluted or Concentrated: Indigenous Solution. The *munggo* coffee and brown sugar were used as a material in understanding the main objectives of the lesson. In the activity, the students will determine the maximum amount of solute that will evenly dissolve in a specific amount water and they will describe the solution regarding to its texture and identify if the solution is saturated or unsaturated.

The main material being used was *munggo* coffee and water. The students will measure a specific amount of water using a beaker then the students will add ½ teaspoon of *munggo* coffee and they will stir the solution. The students will keep on adding *munggo* coffee until the solvent cannot dissolve it anymore. Through the activity the students will answer the given questions followed by abstraction to correct the misconceptions of the students and to strengthen their understanding they will proceed to application.



Activity 3

Evidence of Saturated Indigenous Solution

Objectives:

After performing this activity you will be able to:

- determine the maximum amount of solid solute that will dissolve evenly in a specific amount of water; and
- describe the characteristics of saturated and unsaturated indigenous solution.

Materials Needed

Munggo coffee
teaspoon
water
beaker
cup
Stirring rod

Procedure:

1. Using a beaker measure 20 ml of water.
2. Put the measured 20 ml of water in the cup.

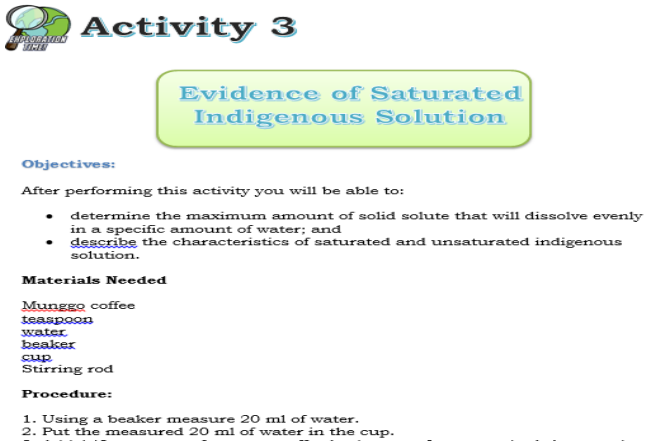
Figure 3.4
Excerpt of Indigenized Material Main Activity in Module 1

5. Enhancement Activity

This last phase is composed of activities that will follow up the learnings and understanding of the students regarding a specific topic. (See Appendix C)

In module one, there were three activities entitled It's about the size, Rate of Dissolving Munggo Coffee, Hot and Cold Water! and Rock Salt Vs. Munggo Cereal! Hot

and Cold! The materials that are used are the following: crushed and cubed *sinakob*, *munggo* coffee, rock salt, and *munggo* cereal. These materials were used to enhance and strengthen more the learnings of the students. In activity five (5), the students will create their hypothesis and they should be able to identify the independent and dependent variables through the use of water, crushed and cubed *sinakob*. The students will dissolve the two different solute and through their observation they should meet the given objectives in the activity through the help of analysis, abstraction and application.



Activity 3

Evidence of Saturated Indigenous Solution

Objectives:

After performing this activity you will be able to:

- determine the maximum amount of solid solute that will dissolve evenly in a specific amount of water; and
- describe the characteristics of saturated and unsaturated indigenous solution.

Materials Needed

Munggo coffee
teaspoon
water
beaker
cup
Stirring rod

Procedure:

1. Using a beaker measure 20 ml of water.
2. Put the measured 20 ml of water in the cup.

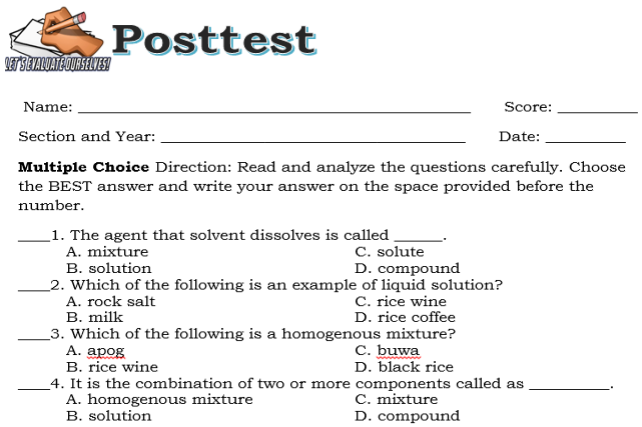
Figure 3.5
Excerpt of Indigenized Material Enhancement Activity on Module 1

6. Posttest

This is a formative assessment that will check the understanding of the students based on their earned score. The questions were all based on the content of the module similar to pretest. There were similar questions from pretest and posttest for example, question number three (3): which of the following is a homogenous mixture? Based on

the content of material that signifies if the students improved after the exposure of the material.

(See Appendix C)



Posttest

Name: _____ Score: _____

Section and Year: _____ Date: _____

Multiple Choice Direction: Read and analyze the questions carefully. Choose the BEST answer and write your answer on the space provided before the number.

____1. The agent that solvent dissolves is called _____.
A. mixture C. solute
B. solution D. compound
____2. Which of the following is an example of liquid solution?
A. rock salt C. rice wine
B. milk D. rice coffee
____3. Which of the following is a homogenous mixture?
A. apog C. buwa
B. rice wine D. black rice
____4. It is the combination of two or more components called as _____.
A. homogenous mixture C. mixture
B. solution D. compound

Figure 3.6
Excerpt of Indigenized Material Posttest on Module 1

Each module starts with a pretest to determine the prior knowledge of the students in a specific topic followed by an overview. The overview outlines the expected lessons that are about to be learned. After the overview, the students will proceed to the three phases which are the following: prerequisite knowledge activity, main activity, and enhancement activity. These activities will enhance the manipulative and thinking skills of the learners as well as it supports learner-centeredness where the students are the doer of learning while the teacher acts as facilitator of learning.

To measure the students' academic performance, posttest is given at the end of the module. This determines the level of achievement of each student in each lesson. There are original icons used in the module that serve as sign to the students.

Figure 3.7
Module Icons

The Validity and Reliability of the Indigenized Material on Matter 7

The development and validation of the indigenized material on Matter seven (7) was patterned on the prescribed K to 12 curriculum guide for Science education provided by the Department of Education. The course outline on the K to 12 in the first grading of Science seven (7) was used in developing the material considering the content and learning

competency. Upon the review of the curriculum guide, teacher's guide, and learner's module, the researcher started developing the indigenized material to be used in the first quarter. A plagiarism test was also administered to the learning materials to establish the originality and authenticity of the material. The organization and effectiveness, face and content validity were established based on the expert's assessment. To determine the effectiveness of the material, pretest and posttest were subjected to t-test dependent means.

Experts Assessment

The developed Indigenized Material on Matter seven (7) were assessed by the experts based on the given criteria: objectives, content, organization, material and resources and effectiveness.

There were three chosen experts and they were asked to validate the learning materials using the Assessment Checklist. The mean rating of the experts in each module in the first and second validation is presented on table 3.1.

In the first validation of the module, the mean rating of the three experts on module one was 3.24 which is described as "satisfactory." All the modules in the first validation were described by the three experts as "satisfactory" based on the given data on the table 3.1. This means that the modules are good enough as a learning material for grade seven (7) students. The experts agreed that there's no problem in the content, objectives, organization, and effectiveness of the developed indigenized material based on the results.

Hence, suggestions and comments of the experts were noted, Expert 1 commented "*Dagdagan mo pa ng indigenous materials."(Add more indigenous materials.)* and expert 2 commented: "*Maglagay ka nang madaling mahanap na indigenous materials."(Include*

indigenous materials which are easy to find.) Another expert commented as, *"Enlarge the image in the module."* These were the basis of the researcher in modifying the material which concerns to the format and material and resources specifically indigenous materials and to be used in each activity of the module for further improvement. Nonetheless, the module is still defined as satisfactory which means the material is good enough but the experts agreed that the material needs improvisation. There is a need for

second validation to improve "satisfactory" were comments and suggestions of the experts were considered.

Thus, in the second validation of the revised learning materials, the mean rating of module one and two was 4.40 and 4.49 which means "highly satisfactory" while the mean rating of the third, fourth and fifth modules were 4.60, 4.71, and 4.68 which is described as "outstanding." Based on the given data on table 3.1 there was a remarkable improvement of the material. This means that the three experts agreed that the learning materials were not difficult to follow; the directions were substantial and clear; the lesson were well-organized; it offers progressive and continuous depth of realization; presented with distinct structure used as an overall module style; provide appropriate and comprehensible questions, activities, and problems; and the learning materials is appropriate to the objectives.

In addition, the expert's suggestions and comments that were incorporated in the modules were useful and effective in improving the learning materials. In comparison to the study of Agorilla (2015), were the researcher noted and incorporated the comments of the experts for the revision of the material resulting to an overall mean rating of 4.03 which is described as "highly satisfactory" which is the same process the researcher did to

improve the low rating of the indigenized material resulting to a more reliable and effective learning material.

Table 3.1
Descriptive Statistics on Validation Questionnaire

Module no.	Expert 1	Expert 2	Expert 3	Mean Rating	Remarks

	Mean	SD	Mean	SD	Mean	SD	Mean	SD	
1	3.24	.54	3.24	.54	3.24	.54	3.24	.35	S
2	3.43	.60	3.48	.60	3.29	.56	3.40	.45	S
3	3.33	.58	3.33	.73	3.38	.50	3.35	.44	S
4	3.48	.60	3.48	.51	3.48	.51	3.48	.42	S
5	3.52	.60	3.43	.68	3.48	.51	3.48	.49	S
1	4.38	.50	4.43	.51	4.38	.50	4.40	.47	HS
2	4.48	.51	4.57	.51	4.43	.51	4.49	.44	HS
3	4.67	.48	4.57	.51	4.57	.51	4.60	.40	O
4	4.76	.44	4.67	.48	4.71	.46	4.71	.35	O
5	4.62	.59	4.76	.44	4.67	.48	4.68	.44	O

Legend: **O**-Outstanding **HS**-Highly Satisfactory **S**-Satisfactory

The table 3.2 shows the grand mean of the Indigenized Material on Matter based on the evaluation of the experts. In the first validation, the obtained grand mean was 3.39 which is described as “satisfactory” indicating that the learning material needs further revision and the comments and suggestions by the experts were noted in improving the learning material. While in the second validation, the obtained grand mean was 4.58 indicating “highly satisfactory”.

This means that there was a significant improvement of the material resulting to effective and efficient learning material. In addition, in the study of Salcedo (2016), the revision of the module based on the expert’s suggestions from the first validation obtained a grand mean of 4.40 which increased in the second validation obtaining 4.65. This then denotes that the material is much better after the revisions.

The obtained value from the study of Salcedo (2016), and the obtained value of the researcher implies that the learning material undergone further revision which was based on the comments and suggestions of the experts resulting an increase of grand mean in the second validation. The increase of grand mean signifies that the experts

agreed that the materials were enhanced that can contributes to the learning process of the students.

Table 3.2
Grand Mean of Experts' Validation

Area	Grand Mean	Remarks
First Validation	3.39	Satisfactory
Second Validation	4.58	Highly Satisfactory

The rating of the experts were subjected to internal consistency. It measures the accuracy between the measuring instruments and the objectives used in the study. This is used to help the researcher predict the scores' value and the limitations among the variables and interpret the gathered data. The most common indicator of internal consistency is the Cronbach Alpha Coefficient.

In order to measure the inter-rater consistency of the evaluators' assessment in assessing the Indigenized Material on Matter 7, the Cronbach's Alpha Coefficient was considered. Table 3.3 shows the level of experts' agreement throughout the first and second

try outs in assessing the Indigenized Material on Matter 7 using the assessment tool utilized in the study of Agorilla (2015). In the first try out, the experts agreed resulting a Cronbach's Alpha Coefficient of 0.626, a value lower that the critical limit of 0.7 considered as "moderate" indicating for further revision of the modules.

In the second try out, Cronbach's Alpha Coefficient obtained 0.823, a value higher

than the critical limit of 0.7, which implies "exemplary" according to the expert's agreement in terms of the content, relevance and clarity of the material. The experts agreed that the material has a definite framework in the formulation and revision of the Indigenized Material that contributed to the efficiency and effectivity of the module. In the study of Agorilla (2015), the overall computed Cronbach Alpha was 0.925 a value higher than the critical limit of 0.7, which indicates "excellent".

Thus, it implies that the higher the value from the critical limit established for the validity of the learning material, the better. Based on the obtained Cronbach Alpha of Agorilla (2015), and the obtained Cronbach Alpha of the researcher, it was agreed by the experts that the learning material was well-organized and appropriate learning material encourages and motivates the students to study and learn more because better understanding of the lesson starts with a seasoned and organized presentation of the lesson. Therefore, the validity of the material is evident which can be used in the field of teaching-learning process.

Table 3.3
Measure of Inter-rater Reliability and Statistics of Experts' Validation

Validation No.	Intraclass Correlation	95% Confidence Interval		Remarks
		LB	UB	
1 Single Measures	.358	.237	.480	

	Average Measures	.626	.482	.735	Moderate
2	Single Measures	.609	.508	.700	
	Average Measures	.823	.756	.875	Exemplary

In the first and second administration of the developed indigenized material, each module was covered with pretest and posttest. The t-test of dependent means was administered to determine whether there was any difference between the pretest and posttest before and after the exposure of the developed indigenized material to the students. As shown in Table 3.4 there is significant difference in the scores of the students during the pretest and posttest of all modules. The summarized result of the pretest and posttest of all five modules shown on table 3.4 obtained a significant difference at 0.05 level of significance which is considered as "highly significant" exhibiting the significant effect after the exposure of the learning material to the students.

Furthermore, Agorilla's (2015) study showed that the developed materials had a significant difference concerning the student's achievement based on the result of their pretest and posttest. Hence, similar case was shown on the obtained value of the researcher

in the pretest and posttest among the modules which implies that the learning materials contributed to the students which significantly changed their performance after their exposure on the developed indigenized material. The significant difference between the pretest and posttest denotes that there was an improvement in the student's achievement.

Table 3.4
Summarized Descriptive Statistics Pretest and Posttest

		Paired Differences			df	Sig. (2-tailed)	Remarks
		Mean	SD	SEM			
Pair 1	Module1PreTest - Module1PostTest	3.72	1.60	0.17	84	.000	Highly Significant
Pair 2	Module2PreTest - Module2PostTest	3.90	1.62	0.18	83	.000	Highly Significant
Pair 3	Module3PreTest - Module3PostTest	4.32	1.63	0.18	84	.000	Highly Significant
Pair 4	Module4PreTest - Module4PostTest	4.01	1.29	0.14	84	.000	Highly Significant
Pair 5	Module5PreTest - Module5PostTest	3.71	1.40	0.15	84	.000	Highly Significant

Pilot testing

Table 3.5 offers the learning gain of the students in the first and second trial of the module. The mean and standard deviation was used to identify the performance of the students based on their scores. In the first trial, the mean of the first module was 4.17 with a standard deviation of 1.71. In the second trial, the mean was 3.28 with a standard deviation of 1.37. This means that the learning was negative because it affect the level of excitement, the level of interest, and the level of enjoyment because of the delay of the lesson in the second batch of respondents.

On the other hand, the learning gain of the module two up to five was positive based on the data shown below. The average learning gain mean of trial one was 3.80 with a standard deviation of .58 and the average learning gain mean of trial two was 4.05 with a standard deviation of 0.80 resulting positive average learning gain of the entire

indigenized module. In the study of Javier (2017), there were different responses of the students regarding the Reflective Journal items. The total percentage was not equal to a hundred percent (100%), since, there were some students who did not pass or did not write on their journal. This means that the enjoyment, interest, and excitement of the students is not a hundred percent (100%). The obtained value by the researcher and the obtained value in the study of Salcedo (2017) signifies that there were factors that can restrain the learnings of the students. The delay of the lessons can create factors which will affect the student's performance. These factors are the following: level of enjoyment, level of interest and level of excitement. Moreover, the teachers must see to it the time frame of each lesson to secure the interest, enjoyment, and excitement of the learners to assure quality education. Furthermore, comments of the students strengthen the result of the learning gain as Student 1 commented, *"Mas madaling maintindihan kasi po may review po muna na activity."(It is easier to understand because there was a review before the activity.)* Another comment was from student 2, *"Nagiging independent din po kami kasi kanya-kanya po ang pagsagot sa mga tanong pati po sa application."(We also become independent because each had to answer questions and applications on our own).* Another comment from student 3*"Narealize po naming na may pwede po pala kaming ibang gamitin sa activity." (We realized that we can also use other materials in the activity.)* Student 4 commented,

"Meron po palang mga kagamitan na makikita lang sa bahay, palengke, o paligid na pwede naming gamitin sa pag-aaral ng Chemistry." (There were materials which can be found at home, market or in the surroundings that can be used in studying Chemistry.)

Student 5 commented as, *"Pwede po palang gamitin ang indigenous material sa pag-*

aaral ng Chemistry."(We have discovered that indigenous materials can be used in studying Chemistry.) and Student 6 commented, *"Nag-enjoy po kami sa mga activity kasi kami po mismo ang gumagawa sa activity."(We have enjoyed the activity because we were the one who did the activity.)* These comments implies that the material has a positive impact to the perspective of the students in learning chemistry by the use of the developed indigenized material and based on the student's comments and result it signifies that the material is significant in improving the student's achievement.

Table 3.5
Learning Gain of the Module

Learning Gain	Trial			
	Trial 1		Trial 2	
	Mean	SD	Mean	SD
Module 1	4.17	1.71	3.28	1.37
Module 2	3.79	1.41	4.00	1.82
Module 3	4.02	1.16	4.60	1.97
Module 4	3.83	1.25	4.19	1.31
Module 5	3.19	1.02	4.21	1.54
Average	3.80	.58	4.05	.80

Authenticity and Originality of the Indigenized Material on Matter 7

A plagiarism test was administered to the developed Indigenized Material on Matter 7 together with the research paper at Philippine Normal University Main Campus, Taft Avenue, Manila on March 18, 2018 as recommended by the panelists during the presentation of the research proposal. The result shows that 9% similarity which means that 9% of the research paper and developed modules is similar to sources in Turnitin's online repository. It denotes that 8% maybe similar to internet resources, 1% to

publications and 5 % to student's papers. Since, the result of similarity is 9% which is lower than the 25 % requirement, the entire paper is authentic.

Revision and Finalization of Instructional Material on Matter 7

The final step in the development and validation of the Indigenized Material on Matter 7 is the final revision. The learning materials play an important role in the teaching-learning process; hence, these should be assessed. The assessment of the results must be used in determining the inadequacies in the material in order to enhance and increase the learning material effectiveness.

In order to revise and finalize the instructional material, comments and suggestions of the experts and students were noted during the phase of validation and testing. The information noted by the researcher must be used as a basis in enhancing the materials considering the problems encountered during the pilot testing. The researcher must look upon the loop hole of the materials that causes misconceptions and difficulties to the students. Through the criticism of the experts, the researcher can identify the weak points of the instructional material which can serve as a basis in the refinement of the material.

Moreover, experts' suggestions are important regarding in the addition of indigenous materials which can be helpful in better understanding of the students. The comments of the students are also important in enhancing the material. The personal experiences of the students in the instructional material can be used as a primary basis in

refining the instructional materials that suits to level of the students. All of these were used

as a baseline for further revisions and refinement of the Indigenized Material on Matter 7.

The comments and suggestions by the experts and students made the researcher realized that there is a lot more to do for the enhancement of the material. It was, however, noteworthy to inform that the students enjoyed the material which makes their learning promising and productive. The advocacy of the researcher to make science relatable and remarkable to the student's experiences can be achieved through the integration of indigenous materials for better and meaningful learning.

Expert 1 urged the researcher to pay attention to the adequacy of the indigenous material on the module. The researcher in effect, added more indigenous material which are appropriate in the objective of each activity considering its availability. In module 1, the researcher added indigenous materials like *munggo* cereal and coffee, *sukang basi*, *apog*, *lana*, and *sinakob*. These materials were added in improving the materials and resources of the indigenized material and same process were done in the succeeding modules.

Another theme of comment aims to improve the format uses. Specifically, expert 3 commented, *"Enlarge the image in the module."* Through this comment the researcher enhance the images of the module for better appearance and same enhance were done in all modules.

Through the comments and suggestions given by the experts and students, the researcher was able to create a comprehensible learning material that suits the Filipino

learners. The indigenized material supports Higher Order Thinking Skills (HOTS), since it

follows PNU ACES as strategy together with Inquiry-Based as an approach where activity, analysis, abstraction, and application challenges the students to think critically and creatively based on the activities, questions, and enhancement activity which is beyond knowledge level. The target of the material is not only the knowledge level of the students; hence, it aims to achieve higher order thinking skills to elevate the Filipino learners that can be globally competitive. Based on steps in making learning possible through the use of Indigenized Material the ability of the students will be enhanced as a result of the elevation from knowledge level to higher order thinking skills that can create more competitive Filipino learners.

CHAPTER 4

SUMMARY, FINDINGS, CONCLUSIONS AND RECOMMEDATIONS

This chapter contains the summary, findings, conclusions, and recommendations of the researcher based on the gathered data and results of the study.

Summary of the Study

The primary aim of the study was to develop and validate an Indigenized Material on Matter 7 for Grade 7 students under the Basic Education Curriculum within the prescribed features and structures of Enhanced Basic Education Curriculum (K to 12). The guidelines in developing instructional materials was based on PNU ACES and Inquiry Based approaches with the integration of Indigenous material were considered in writing the Indigenized Material on Matter 7.

This study administered the Input-Process-Output paradigm in the development and validation of the material.

The input elements were the following: K to 12 Curriculum guide, K to 12 Learning Modules, Science books, Indigenous Knowledge System and Practices in Chemistry, Inquiry Based and PNU ACES approaches.

The preparation stage included the following: selection of the content, formulation of the objective, selection of the appropriate teaching-learning competencies, and identification of teaching-learning strategies.

The development stage was production of appropriate learning material which involved the writing of the Indigenized Material on Matter 7, proofreading, editing, printing, evaluation of the experts, initial revision of the Indigenized Material on Matter 7.

The validation was the submission, revision, testing, and checking of the authenticity of the Indigenized Material on Matter 7. There were three experts for validation. They evaluated the learning materials using the five (5) general criteria: objectives, materials and resources, and activity.

A Likert type scale was used for rating: 5- outstanding, 4-highly satisfactory, 3-satisfactory, 2- not-satisfactory, 1- needs improvement. In the first try out, the obtained grand mean was 3.39, which means “satisfactory” and in the second try out, the obtained grand mean was 4.58, which is interpreted as “highly satisfactory”.

The Cronbach Alpha Coefficient formula was also used to determine the Internal Consistency Reliability. In the first try out, the obtained values was 0.626, which is below the critical limit of 0.7 indicating that the material is “moderate”. In the second try out, the obtained value was 0.823, which is above the critical limit of 0.7, thus indicating that the material is “exemplary”. The increased calculated alpha value signifies that there was an improvement, which resulted to a high degree of accuracy and efficacy. The Indigenized Material were tested twice at Cauayan City National National High School,

Turayong, Cauayan City in the first quarter of the class. The subjects in the first pilot testing were the forty-three (43) Grade 7 students of Talisay in the Basic Education Curriculum and the second pilot testing involved forty (40) Grade 7 students of Hermalite in the same Curriculum. The paired sample t-test was also used to check the learning achievement of the students based on the p-values ≤ 0.05 indicating a very significant difference among

the pretest and posttest in each module. This can be used as a basis that the Indigenized Material on Matter 7 can truly contribute in the achievement level of the students.

Major Findings

The gathered data revealed the following:

1. The five (5) modules were developed for Grade 7 junior high school. It has three major parts: Prerequisite Knowledge Activity, Main Activity, and Enrichment Activity. All the activities used the PNU ACES format.

2. Based on the grand mean of the second pilot testing, the obtained value by the experts' rating was 4.58 (highly satisfactory) that the Indigenized Material on Matter 7 were measurable and attainable objectives, the PNU ACES and Inquiry Based approaches match in the need of the learning process of the students, instructional events were appropriate to the objectives. Indigenous materials were used to link and deepen the access of knowledge to enhance learning.

3. The inter-rater reliability coefficient obtained by validators' rating was 0.823, which means "good". The obtained values in the Reliability Coefficient Alpha in the Instruments used in all areas are accepted.

4. The paired sample t-test was used within each pretest and posttest of the five (5) modules were statistically significant at $p \leq 0.05$

Limitations

The developed and validated Indigenized Material on Matter 7 did not include the rituals performed by indigenous people and the materials were not tried out among learners in rural areas.

Conclusion

Based on the findings, the following conclusions were drawn:

1. The Indigenized Material on Matter 7 can be a tool in nurturing the concepts in Matter for Grade 7 students.

2. The developed and validated Indigenized Material on Matter 7 is a reliable instrument in the delivery of the concepts.

3. The use of the Indigenized Material can be a factor in contributing to the students' achievement level in Matter 7.

Recommendations

The following recommendations were drawn from the conclusions:

1. The developed and validated Indigenized Material on Mater 7 may be used as a guide in addressing Matter concepts and in improving performance of the students towards Matter concepts in Chemistry.

2. The developed and validated Indigenized Material on Matter 7 may be used not only by those enrolled in Basic Education Curriculum but may be tried for use also in the Special Science Curriculum.

3. Development and Validation of complete set of indigenized module on Science 7 is recommended.

References

Agorilla, Y.T., (2015). *Development and validation of an inquiry-based learning module on science investigatory, for grade 7 students.* Unpublished Master's Thesis. Philippine Normal University-North Luzon, Isabela Philippines.

Aikenhead, G.S. (2001). *Integrating western aboriginal sciences: cross-cultural science teaching.* Research in Science Education, 31 (2). Retrieved from https://link.springer.com/article/10.1023/A:1013151709605

Arquiza, Y. (2005). *A Journey of hope, implementing the Indigenous Peoples' Rights Act of the Philippines: Cultural revival in a changing world.* Retrieved from http://www.worldcat.org/title/-journey-of-hope-implementing-the-indigenous-peoplesrights-act-of-the-philippines/ oclc/173221761.

Barrientos, K., (2015). Factors affecting performance in science of fourth year students in the national achievement test. Unpublished Master's Thesis. Retrieved from https://www.slideshare.net/KennethBarrientos4/factors-affecting-performance-in-science-of-fourth-year-students-in-the-national-achievement-test-nat

Blancia, Ethel C. (2003). *Factors affecting academic achievement of students in chemistry and physics of the national high schools in the island of tablas romblon*. Unpublished Master's Thesis. Romblon State College, Odiongan , Romblon

Boven,K. & Morohashi, J. (2002). *Best practices using indigenous knowledge*. Retrieved December 15, 2017 from http://unesdoc.unesco.org/images/0014/001478/ 147859e.pdf

Espinosa, A., Monterola, S. L., & Punzalan, A., (2013). Career-oriented performance tasks: Effects on students' interest in chemistry. Retrieved from: https://www.eduhk.hk

Indigenous (2010). *Merriam-Webster Dictionary*. Retrieved from http://www.merriam webster.com/ dictionary/Indigenous

Javier, J.P., (2017). *Development and case evaluation of the differential chemistry instructional module based on the 4c's of learning*. Unpublished Master's Thesis. Philippine Normal University, Manila, Philippines.

Montelon, D. R., (2014). *K12 science program in the Philippines: Student perception on its implementation.* Philippine Normal University, Manila, Philippines

Natividad, M.B., (2014). *Development and validation of contextualized modules for grade 7 science teachers.* Master's Thesis. Available from ProQuest Dissertations and Theses database.

Salcedo, E.M., (2016). *Development and validation of strategic intervention materials (SIMs) using synectics in grade seven physics.* Unpublished Master's Thesis. Philippine Normal University-North Luzon, Isabela, Philippines.

SEI-DOST & MATHTED, (2011). Framework for Philippine mathematics teacher education. Manila: SEI-DOST & MATHTED. Retrieved from http://www.sei.dost.gov.ph/images/downloads/publ/sei_mathteach.pdf

Ogunniyi, M.B. (2007). *Teachers' stances and practical arguments regarding a science indigenous knowledge curriculum*: Part 1. International Journal of Science Education, 29, *963-986*

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Appendix A

EXPERTS RATINGS AND SUGGESTIONS

Expert's Assessment Checklist For Content Validation of Instructional Material
(Adapted from Libranda (2004), Hernandez (1999), Salvador (2005), and Rivera (2011)

Directions: Please evaluate the learning modules using the criteria below by checking the descriptive rating that corresponds to your evaluation. Likewise, please write your comments if any, for the improvement of the learning modules.

Outstanding (O), Highly Satisfactory (HS), satisfactory (S), Not Satisfactory (NS) Needs improvement (NI)

Criteria	O 5	HS 4	S 3	NS 2	NI 1	Comments
A. OBJECTIVES						
1. Clearly stated						
2. Are attainable and Sustainable						
3. Are expressed in terms of competencies which are knowledge, skills and attitude						
B. CONTENT						
4. Provides topics in the learning outcomes						
5. Is relevant to the learning activities						
6. Provides sufficient information						
7. Features value-laden learning activities						
C. ORGANIZATION						
8. The instructional material is simple and easy to follow						
9. Instructions are clear and concise						
10. There is a systematic sequencing of the lesson						
11. The instructional material provides progression						

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

and consecutive depth of ideas						
12. The instructional material is presented with specific format and adapted in overall style						
13. The instructional material provides adequate study aids such as questions, problems and explorations						
14. Instructional events are relevant to the objective						

D. MATERIALS AND RESOURCES						
15. Various resources are tapped to widen access of knowledge and to enrich learning						
16. Material provided are fitted to the instructional event						
17. Students have pre-requisite skills to use the materials						
E. EFFECTIVITY						
18. The instructional materials can be used to guide students						
19. The instructional material involves the students active learning through appropriate activities						
20. The instructional materials utilizes practical application						
21. The instructional material can motivate learning.						
OVERALL RATING						
OVERALL VERBAL DESCRIPTION						

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Appendix B

Request Letter for Experts Validation

_____
_____
_____

Sir/Ma.am:

Greetings peace and goodwill!

I am JASMIN FE P. GARDIOLA, a Science teacher of Balintocatoc Integrated School. I am a graduate student at Philippine Normal University and presently working on my thesis entitled, **"INDIGENIZED MATERIAL IN UNDERSTANDING THE CONTENT AND PROCESSES ON MATTER 7."**

In this study the researcher aims to develop and validate an indigenized material that can help the learners to be engaged more and to learn Chemistry in a more meaningful way through the use of indigenous material in the learning process of the grade seven students.

I know that an expert like you in the field of Science Education can contribute in the betterment of my instructional materials. Any comments and suggestions to my work will be valued and appreciated.

I deeply appreciate the time and effort you spent to my humble work.

Respectfully yours,

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

JASMIN FE P. GARDIOLA
Researcher

Noted by:

MARISSA R. GUIAB, PhD.
Associate Dean, Faculty of Graduate Studies
And Teacher Education Research in IPED

Appendix C

Indigenized Material

Module 1: Solution

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Pretest 1

Name: _____Score: _____

Section and Year: _____ Date: _____

Multiple Choice Direction: Read and analyze the questions carefully. Choose the BEST answer and write your answer on the space provided before the number.

____1. Solution is considered as _____.
A. heterogeneous mixture C. elements
B. homogeneous mixture D. compounds

____2. Which of the following is an example of solution.
A. bugnay wine C. brown sugar
B. salt D. water

____3. Which of the following is a homogenous mixture?
A. halo-halo C. sago at gulaman
B. rice wine D. black rice

____4. The dissolving agent in forming a solution is called as _____.
A. solute C. mixture
B. solvent D. compound

____5. It is the combination of two or more components and considered as homogenous mixture.
A. homogenous mixture C. mixture
B. solution D. compound

____6. The agent that is being dissolved by water is called _____.
A. solute C. mixture
B. solvent D. compound

____7. If the solvent has a greater amount than dissolved solute it is called _____.
A. solute B. concentrated

C. solvent D. dilute

____8. Which of the following is NOT a solute?
A. apog C. hot water
B. tobacco D. sinakob

____9. If the solvent cannot dissolve the solute anymore, it known as _____.
A. concentrated C. dilute
B. unsaturated D. saturated

____10. Which of the following is a man-made solution?
A. air C. binallay sauce
B. seawater D. nutrients absorbed by plants

Module 1
SOLUTIONS

Our environment is affected by several processes that involved solution substances. Probably, problems in the environment are caused by the materialization of these objects. For instance, the usage of pesticides and herbicides in the farm to generate more harvest. Those products are solutions which can really affect the health of a person negatively because of their chemical content absorbed by the plants and eaten by humans and of course to the environment specifically the land.

In your past years, you were able to work on different activities wherein you combined a solid and a liquid or liquid with another liquid which led to your understanding about the different characteristics of mixtures. You have also learned that mixtures can be identified as homogeneous or heterogeneous depending on their properties and appearance.

Through your observation, you will be able to differentiate homogeneous mixture from heterogeneous mixture. For example, once rice coffee powder (solid phase) was mixed into water, (liquid) it will become one phase and it will be considered as homogeneous mixture. A mixture will be considered as heterogeneous if you can identify different phases. For instance, if crushed tobacco (solid phase) was placed into water, (liquid phase) you can identify two phases which are solid and liquid.

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

When salt was added into water, the salt dissolves in water and becomes portion of the water which you cannot see the salt particles. In this situation, the water is the solvent and the salt is the solute. Solutions can be in the form of gas, solid, or liquid. There are many solutions available in the market and sold as labeled products.

Solutions are also in the form of indigenous materials. In the sense that the basic materials or ingredients can be seen in a specific area touched by the culture or customs of the people.

Activity 1

Indigenous Solutions Available in your Locality

Objectives:

After performing this activity, you should be able to:

- describe the characteristics of the given indigenous solution by using your senses; and
- list the different characteristics of the given indigenous solution through a table form.

Materials needed:

Cups
Munggo cereal,
Boneless Bagoong,
Sukang Basi,
Bugnay wine

Procedure:

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

1. Group yourselves into four (4) groups. There will be an expert group and home group.
2. In each group identify the person/s who will be in-charge in each sample known as expert/s.
3. The expert/s will describe and list the different characteristics of a specific sample.
4. After 15 minutes, the expert/s will go back to their home group to share their observation to their group mates.

5. Based on the gathered information fill up table 1 and answer the guide questions. Write your answers in a manila paper.
6. Then afterwards, 1 representative of each group will present through an oral report.

Indigenous Solution	**Characteristics**
1. Munggo cereal	
2. Boneless Bagoong	
3. Bugnay wine	
4.. Sukang Basi	

Table 1. Characteristics of Indigenous solution

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Guide Question

1. Are these indigenous solution useful in your daily living? Why?

_____
_____
_____

2. What are the common similarities of the indigenous solution?

_____
_____
_____

3. What are the evident differences of the indigenous solution?

_____
_____
_____

4. Based on the given indigenous solution, what kind of mixture are they? (Homogeneous mixture or Heterogeneous mixture) Why?

_____
_____
_____

In this activity you observed that indigenous solutions are in liquid phase and you were not able to identify solid particles in the given sample solutions. Solutions can be colored or colorless depending on the sample.

A solution is consist of two or more components known as the solute and the solvent. Basically, the one that dissolves is called as **solvent**. The component which solvent dissolves is the **solute**.

Commonly, solvent has a greater amount than solute. For instance, in making a rice coffee drink, hot water has greater amount than the amount of rice coffee to come up with perfect coffee solution.

Based on Activity 1, it has shown that not all solutions are in one phase; solutions can be in the form of liquid, solid, or gas. Furthermore, solutions can be seen in nature or processed.

Natural Solutions

Natural solutions are widely available in the environment. People are not conscious about these materials. How Humans, plants, and animals use these materials to regulate or to continue life processes is in the form of solution.

Basically, the food, the air, and the water that we consume in our daily living are in the form of solutions. The nutrients absorbed by our body, the minerals that are absorbed by the soil and plants are also in the form of solutions.

The water in the ocean is considered as solution since it is composed of salt and minerals with a high percentage aside from the water coming from the ground and rivers.

The air we breathe is a mixture of different gases. The main gases in the air are nitrogen 78%, oxygen 21%, and argon 1% and other gases are also present in air.

Water also sustains life, it consists of dissolved gases such as carbon dioxide, oxygen and minerals like calcium, magnesium and potassium.

Solutions are very abundant in the environment and there are also man-made solutions, made for a definite purpose.

Indigenously Man-Made Solutions

The materials used in every household such as laundry bleach and vinegar are examples of solution. Household uses them for specific purpose, for instance, vinegar is actually an ingredient in cooking, and it is a mixture of 5% acetic acid and water.

There are also indigenous products in the form of solution. These indigenous products are locally processed. Binallay/Dendelot sauce came from Ilagan city, can be also considered as indigenous solution. It was made thru mixing of different ingredients. Bugnay wine was also considered as an indigenous product, Bugnay is a native fruit in the Philippines and being used nowadays as a main ingredient in making good wine.

Solid indigenous solution is also available such as musical instrument known as gong used by the Ifugao, clay pots used by Ybanags for cooking, and jewelry like Lingling-o of Ifugao a tribal brass pendant or necklace.

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Think Indigenously!

Get a partner and list down at least five solid or liquid indigenous solutions available in your locality. Write also their description and categorize them according to their uses. Write your answer in the space provided below.

Activity 2

Solution Properties!

Objectives:

Once you finished this activity you should be able to:

- describe the properties of indigenous solutions based on observation; and
- identify the indigenous sample as solution or not.

Materials Needed:

- water
- 6 pieces, spoons
- filter paper
- funnel made from 250 ml plastic bottle
- 6 pieces of teaspoon
- Lana/Traditional coconut oil, Apog, crushed tobacco, Black rice, Brown sugar, powdered atsuete
- 12 clear bottles or cups

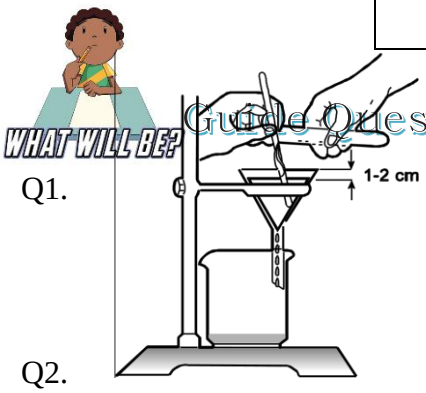
PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Procedure:

1. Fill the 6 cups of water.
2. Add 1 tablespoon/teaspoon of each cup of the eight indigenous sample. Stir it properly with the tablespoon/teaspoon to dissolve each indigenous sample evenly.
3. Filter each mixture with filter paper. Be guided with the set up similar to Figure 1. Use the improvised bottle-funnel and another cup.

*Figure 1. A filtration setup. The funnel is supported on an iron ring and the filtrate is received in another container.**

*Philippines. Department of Education. (2004).



Guide Question

Q1. Identify which among the given indigenous sample will dissolve evenly in water by answering yes or no. Write your answer in column 2.

Q2. Describe the appearance of each mixture. Write your answer in column 3.

Q3. How many phases do you see? Write your answer in column 4.

Q4.What kind of phases do you see? (solid, liquid, or gas). Write your answer in column 5.

Q5. What is the solvent and solute in each mixture? Write your answer in column 6.

Q6. Among the mixtures which was separated by filtration? Write your answer in column 7.

Q7. Identify which is not a solution among the mixtures. Write your answer in column 8.

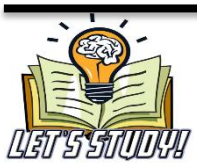
Table 1. Data table for Activity 2

(1) Indigenous sample	(2) dissolves in one cup water (yes or no)	(3) Appearance	(4) Number of phases	(5) Kind of phases	(6) Identify Solute and solvent		(7) Can be separated by filtration (yes or no)	(8) Solution or not solution
					Solute	solvent		
Lana/Traditional coconut oil								

Apog								
Crushed tobacco								
Black rice								
Brown sugar								
Powdered atsuete								

After knowing the result of the two activities, what will be your conclusion? Give at least 4 conclusions. Write your answer on the space provided below.

_____
_____
_____



In this activity, you were able to realize that when a solvent dissolves a solute, it forms a single phase that come up in a uniform appearance known as solution. In addition, particles of solution are very small that can penetrate the filter paper and it cannot be recognize by your naked eye. Solutions are transparent or cloudy depending on the component of the sample.

The characteristic properties of a solution will remain even they will undergo filtration. For instance, once munggo coffee solution was filtered, the bitterness of the coffee is present and evenly distributed in the solution.

Let's Buy Indigenous Solution!

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Think on your own at least 3 kinds of indigenous solutions you usually buy. Write the ingredients of each indigenous solution product and their uses. Write your answer on the table below.

Indigenous Solution	**Ingredients**	**Uses**
1.		
2		
3.		

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Activity 3

Evidence of Saturated Indigenous Solution

Objectives:

After performing this activity you will be able to:

- determine the maximum amount of solid solute that will dissolve evenly in a specific amount of water; and
- describe the characteristics of saturated and unsaturated indigenous solution.

Materials Needed

Munggo coffee
teaspoon
water
beaker
cup
Stirring rod

Procedure:

1. Using a beaker measure 20 ml of water.
2. Put the measured 20 ml of water in the cup.
3. Add 1/2 teaspoon of munggo coffee in the cup of water and stir it properly.
4. Add another 1/2 teaspoon of munggo coffee to the same cup of solution. This time, you already added 1 teaspoon.
5. Keep adding 1/2 teaspoon of munggo coffee to the same solution until the munggo coffee does not dissolve anymore. Count the number of teaspoon of munggo coffee being added to the solution.

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Guide Question

Q1. Describe the characteristics of the solution. Write your answer on the space provided.

_____

_____

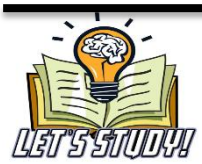
_____

Q2. How many teaspoon of munggo coffee added to the cup of water until such time it cannot be dissolved by water? Write your answer below.

_____ teaspoon of munggo coffee

Q3. What is the maximum number of teaspoon of munggo coffee that evenly distributed in a 20 mL of water?

_____ teaspoon of munggo coffee



In this activity, you have realized that a specific amount of solvent has also a maximum amount of solute that can be dissolve at a specified temperature.

A solution is considered **saturated** if the solvent with a specific amount cannot dissolve the solute anymore, meaning it reaches the maximum amount of solute. At that moment, the solvent saturation point has been reached by the solution. Excess of the solute can be seen in the solution as an evidence.

When a solution contains small or less amount of solute compared to saturated solution, it is called as **unsaturated**. Based on the activity, you observed that all solid components were dissolved which led to your conclusion that it is unsaturated solution. Being unaware that the solution already reached the maximum amount of solute which cannot determined by our naked eye. If this happens, it is considered as saturated solution.

Think of It!!!

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

You are stuck on a collapsed building and suddenly you are thirsty. There's no way out! Since, you are stuck there for 1 day and the rescue team cannot reach you because of the debris. The only source of water is your urine, is it safe to drink it? Will you drink it? Why? Justify your answer.

Activity 4

Indigenous: Dilution and Concentration

Objectives:

Once you finished this activity you should be able to:

- describe the concentrations qualitatively based on the appearance and quantitatively based on the amount or number of brown sugar in a specific amount of water; and
- identify which indigenous solution is concentrated or diluted.

Materials Needed

Beaker
Cup
Spoon
Water
Brown sugar

Procedure:

First cup
1. Using a beaker measure 40 ml of water.
2. Put the measured 40 ml of water in the cup.
3. Add 1-3 spoon of brown sugar in the cup of water and stir it properly. (Take note of the appearance and number of spoon/ amount of solute added.)

Second cup

1. Measure 40 ml of water in a beaker.
2. Put the measured 40 ml of water in the cup.
3. Add 7 spoons of brown sugar in the 40 ml cup of water and stir it properly.
(Take note of the appearance and number of spoon/ amount of solute added.)

Guide Question

1. Between the two samples, which is concentrated? Describe qualitatively and quantitatively.

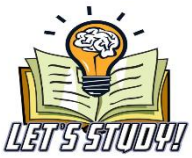
_____
_____
_____

2. Which is diluted? Describe qualitatively and quantitatively.

_____
_____
_____

3. Based on your answer in number 1 and 2, what will be your conclusion?

_____
_____
_____



Since, you can differentiate concentrated from dilute solutions quantitatively and quantitatively based from the demonstration of your teacher, we can express concentration in a mathematical form as: Percent by mass and volume.

Concentrated or Dilute

Concent

if the solvent has a greater amount than dissolved solute.

Percent by Mass

To comp

Sample problem

What is the mass percent of Apog in a solution with the amount of 3.35 g in a 8.45 g of water?

Given:
g solute (Apog) = 3.35 g
g solvent (Water) = 8.45 g

Solution:

g solution= 11.80 g

$$\%\ Apog\ in\ solution \frac{3.35\ g}{11.80\ g} \times 100 = 28.40\%$$

Percent by Volume

To compute the amount of solute in a specific amount of solution expressed in $\frac{g}{100mL}$, we can use this formula:

$$vol\ \% = \frac{volume\ of\ solute\ in\ solution}{total\ volume\ of\ solution} \times 100$$

Sample problem

Forty milliliters of ethyl alcohol is present 800 mL bugnay wine. What is the mass of ethyl alcohol expressed in mass?

Given:
Volume of solute= 40 mL
Volume of solution= 800 mL

Solution:

$$vol\ \% = \frac{40\ mL}{800\ mL} = 5\ \%$$

Concentration of solutions can be in a two form concentrated or dilute. Hence, it is easier to you to identify by just simply observing the appearance of the solution but to have a more accurate conclusion, you can use the two formula stated above.

In activity four to six you will have the factors affecting the rate of dissolving solid solute.

- Particle size effect
- Stirring effect
- Temperature effect

Indigenous Bartending!!!

You are a bartender and your task is to make a 3 unique cocktail considering the quantity and quality of the indigenous ingredients that soothes the taste of the customer.

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Activity 5

It's About the Size!

Objective:

After performing this activity you will be able to:

- construct a hypothesis and compare it to the collected data; and
- identify the independent and dependent variables.

Materials needed:

water
crushed sinakob
cube sinakob

Procedure:

1. Group yourselves into five (5). Each group will receive 2 cups, crushed and cube sinakob from your teacher.
2. Identify the independent and dependent variable. Write your answer on the space provided below.

_____
_____
_____

3. Construct your hypothesis. Write your hypothesis below.

_____
_____
_____

4. Record all your observation during the investigation.
5. Put water in the two cups with an equal volume. Then put the crushed sinakob to one cup and put cube sinakob in the other cup.
6. Observe of each substance. Then afterwards, answer the given questions.

Guide Question

1. Based on the activity, you can conclude that…

_____
_____
_____

2. Between the two substances, which of them dissolves faster in water?

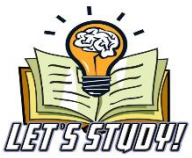
_____
_____
_____

3. Based on your answer in number 2, does the size of sinakob affects the dissolving process? Why?

_____
_____
_____

4. Do you reject or accept your hypothesis? Why?

_____
_____
_____



Particle size effect

In this activity, you learned that small particles are easier to dissolve than the larger one. Particles of water collide in any direction even the surface of the sinakob particles. This happens when solute is directly in contact in the solvent.

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Small but Useful!!!

On your own, give at least 5 example of indigenous materials which are very small or tiny. Indicate the description and their usage to your daily activity. Write your answer on the table provided below.

Indigenous Material	Description	Uses
1.		
2.		
3.		
4.		
5.		

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Activity 6

Rate of Dissolving Munggo Coffee, Hot and Cold Water!

Objective:

After performing this activity you will be able to:

- identify the rate of dissolving munggo coffee in hot and cold water; and
- differentiate the rate of dissolving munggo coffee between hot and cold water.

Materials needed:

beaker
hot and cold water
munggo coffee
spoon

Procedure:

1. Group yourselves into five (5). Each group will receive 2 beakers, spoons, and munggo coffee from your teacher.
2. Let the teacher put hot water in each beaker from each group and cold water in the other beaker having equal volume. Be careful in handling hot water.
3. Identify the independent and dependent variable. Write your answers on the

space provided below.

4. What are the variable you should control to have fair result?

5. Construct your hypothesis. Write your hypothesis below.

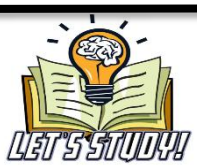
6. Record all your observation during the dissolving test.
7. Put 1 teaspoon of munggo coffee in each beaker. Stir it three (3) times.
8. Observe of each substance. Then afterwards, answer the given questions.

Guide Question

1. Based on the activity, you conclude that…

2. Munggo coffee dissolves faster in hot or cold water? Why do you say so? Based based on the gathered data.

3. Do you reject or accept your hypothesis? Why? Based on your conclusion.



Temperature effect

Basically, when the temperature increases the solubility of solid also increases. Thus, in this activity munggo coffee dissolves faster in hot water than cold water.

Hot and Cold!!!!

You are a bartender and your manager give you a task to create unique beverages using indigenous ingredients. You need to produce hot and cold beverages.

List the ingredients that you will use in hot and cold beverages and the reason why you will use those indigenous ingredients. Name the beverages and give at least two each. Write your answer in the table below.

Name of the Indigenous Beverage	Ingredients	Reason

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Activity 7

Rock Salt Vs. Munggo Cereal Hot and Cold!

Objective:

After performing this activity you will be able to:

- identify which indigenous material will dissolves faster in hot and cold water; and
- compare the effect of hot water and cold water to the solubility of solid solute.

Materials needed:

Beaker
Hot water
Cold water
Rock salt
Munggo cereal
Spoon

Procedure:

1. Group yourselves into four (4). Each group will receive 2 beakers, spoons, munggo cereal and rock salt from your teacher.
2. Let the teacher put hot water in each beaker of each group and cold water in the other beaker having equal volume. Be careful in handling hot water.

3. Identify the independent and dependent variables. Write your answer on the space provided.

_____
_____
_____

4. What are the variable you should control to have fair result?

_____
_____
_____

5. Construct your hypothesis. Write your hypothesis below.

_____
_____
_____

6. Record all your observations during the dissolving test.
7. Put 1 teaspoon of munggo cereal in each beaker (hot and cold water), repeat the same procedure for the rock salt. Stir it three (3) times.
8. Observe each substance. Then afterwards, answer the given questions.

Guide Question

1. Based on the gathered data, you concluded that…

_____
_____
_____

2. Do you reject or accept your hypothesis based on your conclusion? Explain.

_____
_____
_____

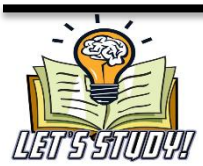
The following questions can guide you:

Does **Munggo cereal** dissolve faster in hot or cold water? Base your answer on the recorded data.

_____
_____
_____

Does **Rock salt** dissolve faster in hot cold water? Based your answer on the recorded data.

_____
_____
_____



In activity 6, you have learned that the effect of temperature vary in dissolving solid solute. It can make the dissolving processes slower or faster. In other cases, temperature does not affect the solubility of some solutes.

You already finished the activities under this module, you were able to understand the different properties of solution, ways in expressing concentration, the factors that affect solubility such as particle size, temperature, stirring and how fast does solute dissolves in water

Which of Which?

On your own choose one indigenous material and illustrate the effect of temperature in the solubility of your chosen indigenous material. You can use diagram and explain it briefly. Use the space below.

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Posttest

Name: _____Score: _____
Section and Year: _____Date: _____
Multiple Choice Direction: Read and analyze the questions carefully. Choose the BEST answer and write your answer on the space provided before the number.

____1. The agent that solvent dissolves is called _____.
A. mixture C. solute
B. solution D. compound

____2. Which of the following is an example of liquid solution?
A. rock salt C. rice wine
B. milk D. rice coffee

____3. Which of the following is a homogenous mixture?
A. apog C. buwa
B. rice wine D. black rice

____4. It is the combination of two or more components called as _____.
A. homogenous mixture C. mixture
B. solution D. compound

____5. Which of the following is an example of solute?
A. juice C. water
B. rice wine D. brown sugar

____6. All of the example is natural solution, which is not?
A. bugnay wine C. seawater
B. air D. nutrients absorbed by the body

____7. If the solute is less than the amount of solvent it is called _____.
A. concentrated C. dilute
B. unsaturated D. saturated

____8. If the temperature increases, what will happen to solubility?
A. decreases C. stagnant
B. increases D. none of the above

____9. The larger the particle, the _____ it will dissolve.
A. slower C. nothing will happen
B. faster D. none of the above

____10. Which following example of dilute solution?
A. one cup of rice coffee powder in one cup of water
B. one cup of atsuete in one cup of water
C. one cup of brown sugar in one cup of water
D. pinch of rock salt in a one cup of water

Appendix D

Philippine Normal University
The National Center for Teacher Education
PUBLICATION OFFICE
Taft Avenue, Manila 1000, Philippines

AUTHENTICITY RESULT

Date of Release:	March 19, 2018
Result Code:	2018-0401
Submission ID:	931663737
Title of Output:	Indigenized Material in Understanding the Content and Processes on Matter 7
Author (s):	Jasmin Fe Gardiola

Authenticity Report:

Similarity Report: 9%

- *Interpretation*: A similarity of 9% means that 9% of the entire paper is similar to sources in Turnitin's (authenticity software) online repository. The colored bibliographical references denote the sources of similarity to previously published work which maybe from internet sources (8%) publications (1%), and student papers (5%) for the remaining similarity percentage.

- *Highlighted text in the Manuscript:*
  - Red marks and highlights are set of texts directly or exactly copied from online sources.
  - Other color marks and highlights are set of text exactly copied from other sources (student papers and publications).

Marie Paz E. Morales, Ph.D.
Director

PNU-MN-2016-PUB-QM-001
2017
Revision No.: 01

Effective Date: August 10,

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

CURRICULUM VITAE

Name	**JASMIN FE P. GARDIOLA**
Date of Birth	December 17, 1994
Place of Birth	Echague, Isabela
Educational Attainment	
Master's Degree	
	Master of Arts in Education with specialization in Science Education Philippine Normal University-National Center for Teacher Education –North Luzon Campus (2018)
Collegiate	
	Bachelor of Secondary Education- Major in General Science Philippine Normal University-National Center for Teacher Education –North Luzon Campus (2015)
Secondary	
	School of Our Lady of Atocha (2011)
Eligibility	
	Licensure Examination for Teachers (2015)
Awards Received	
	Most Outstanding Women 3rd runner up

PHILIPPINE NORMAL UNIVERSITY
The National Center for Teacher Education

Philippine Normal University-National Center for Teacher Education –North Luzon Campus (2015)

Working/Teaching Experience

2015-2017	Science Teacher at School of Our Lady of Atocha
2017-present	Science Teacher at Balintocatoc Integrated School

Seminar/Training Attended

Strengthening Leaders' 21st Century Skills towards Quality and Service-Oriented Governance held Philippine Normal University- North Luzon Campus
Alicia, Isabela
August 23-25, 2013

Two-day In Service Training Program for Teachers (INSET)
Stakeholder Gymnasium, Cauayan City National High School
Cauayan City, Isabela
October 23-24, 2014

Two-day in Classroom Management Seminar
School of Our Lady Atocha
Magsaysay, Alicia, Isabela

In Service Training
Paul University
Tuguegarao, Cagayan
2016

In Service Training
Santiago National High School
Santiago City
2017

Second International Research Conference on Teacher Education and Indigenous Peoples Education
Subic Bay Travellers Hotel and Event Center
Subic, Zambales
March 1-3, 2018