



Eggshalk

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February 08, 2019

Table of Contents

Chapter 1 - The Problem and It's Background.....	1
Introduction.....	1
Overview of the Current State of Technology.....	3
Objectives of the Study.....	4
Synthesis of the Study.....	4
Statement of the Problem.....	4
Theoretical Framework.....	5
Conceptual Framework.....	7
Significance of the Study.....	8
Scope and Delimitation.....	9
Definition of Terms.....	10
Chapter 2 - Related Studies and Literature.....	11
Related Studies.....	11
Related Literature.....	13
Chapter 3 - Research Methodology.....	16
Method of Research.....	16
Population and Sampling Technique.....	16
Description of Respondents.....	17
Research Instrument.....	17
Data Gathering Procedure.....	18
Statistical Treatment of Data.....	19
Chapter 4 - Presentation, Analysis, and Data Interpretation.....	20
Teachers and Students Level of Satisfaction.....	20
Weighted Mean and Verbal Interpretation of Level of Satisfaction.....	21
Chapter 5.....	22
Summary of Findings.....	22
Conclusions.....	22
Recommendations.....	23
References.....	25

Chapter 1

Introduction

Chalk is very useful tool when it comes to teaching. It has been used for many years. First attested use of chalk on chalkboard in the United States dated back September 21, 1801, in a lecture course in mathematics given by George Baron. Light weight and easy to use when writing a lecture on the blackboard. Most of the schools here in the Philippines are using chalk in teaching, especially those in public schools. Lessons are often presented to entire class on blackboard using sticks of chalk because this method has been proven cheap and easy.

As found in nature, chalk has been used for drawing since prehistoric time. According to archaeologists, it helped to create some of the earliest cave drawings. Later, artists of different countries and styles used chalk mainly for sketches and drawings, protected with shellac or similar substance. The method was to grind natural chalk to a fine powder, then add water, clay as a binder, and various dry colors. The resultant putty was then rolled into cylinders and dried. Although impurities produce natural chalk in many colors, when artists made their own chalk they usually added pigments to render these colors more vivid. Carbon, for example, was used to enhance black, and ferric oxide (Fe_2O_3) created a more vivid red.

Chalk did not become standard in schoolrooms until the nineteenth century, when class sizes began to increase and teachers needed a convenient way of conveying information to many students at one time. Not only did instructors use large blackboards,

but students also worked with individual chalkboards, complete with chalk sticks and a sponge or cloth to use as an eraser.

Chalk is beneficial to teachers as well as the students, but then even it is beneficial, we cannot neglect the fact that it is also harmful to that person who inhales its dust. It causes asthma, skin irritation, pulmonary diseases and other illness in skins and respiratory system. Usually students inside the classroom who inhales the dust particles or even having a contact with their skins are suffering from this illness.

As the chalk is scraped across the rough surface of the board, particles of it are sent out into the surrounding air. Some of this dust settles to the ground or is ventilated outside, but much of it falls on clothing, furniture, electronic equipment and shelves. Teachers and students also inhale a portion as well, which usually becomes trapped in the mucus layers of the throat and upper lungs. A small amount of inhaled dust is not considered harmful. Those with healthy respiratory systems can expel it through coughing, and the remaining material should be absorbed safely into the body. For those with chronic breathing issues such as asthma, however, exposure can trigger a reaction.

The potential acute health effects of calcium sulfate or calcium carbonate in chalk dust include irritation to the eyes, skin, respiratory tract, mucous membranes, and digestive tract; the potential chronic health concerns are lung and liver damage resulting from exposure to calcium sulfate and calcium carbonate particles, respectively (Sciencelab.com, 2005). Furthermore, epidemiological studies have suggested that long- and short term exposure to particulate matter (PM) is associated with adverse health effects, including cardiovascular mortality, histopathology markers of sub-clinical

chronic inflammatory lung injury, and mortality resulting from cardiovascular illness (Pope and Dockery, 2006; Downs et al., 2007). Therefore, the potential health risks of chalk dust particles cannot be overlooked when using chalk in classrooms.

Based on the problem, the researchers have found, the researchers develop an alternative chalk made up of eggshell; this is because the research shows that the components of an eggshell are almost entirely made of calcium carbonate (CaCO_3) crystals. It is a semipermeable membrane which means that air and moisture can pass through its pores. The shell has a thin outermost coating called the bloom or cuticle that helps keep out bacteria and dust.

Chalk has the same compound used to make it. This is why the researchers think it may be possible to make chalk using eggshells. The researchers want to make chalk to help schools, particularly public schools, for they do not have enough funds or resources of money to buy chalks for the teachers to use.

Overview of the Current State of Technology

Technology is a major part of students' lives, and their academic training requires an introduction to scholarly uses of technology. It is also part of the classroom: faculty and Teachers Association use tools from multimedia presentations to computer simulations to clickers to enhance their teaching. Instructors do not just experiment with different ways of using technology; they focus on using technology to reach educational goals more effectively and efficiently. With the use of technology, teachers can enhance their teaching by giving their students enough visuals of their lesson and examples of it, where their students can understand and learn faster.

Objectives of the Study:

- To be able to produce a product that will be no harm to both students and teachers health;
- To be able to lessen the cases of pulmonary illness and skin irritations;
- To make the eggshells an effective raw material in making a chalk;
- To be able to produce new and unique type product.

Synthesis of the Study

Eggshalk is a new type of chalk that is made up of eggshells. Eggshells are thrown after they take the yolk and the white, having no idea what they are throwing. Eggshells have the chemical components that are very rich in natural minerals, such as calcium and protein. Eggshells also can be used as fertilizer, also as found in nature that eggshells has the same component as the chalk that we are using which is Calcium Carbonate. This product has been made for the teacher and students to lessen the harm that they may encounter in the school premises.

Statement of the Problem

Most of the teachers in public schools in Bulacan use commercial chalk in presenting their lesson to the whole class, and they can't avoid instances of inhaling or their skin having contact with the dust produce by the chalk when they are writing or erasing. This research wants to find out if eggshalk can be an alternative for the commercial chalk. Eggshalk that will produce no harm to health dust.

The research specifically wanted to test out these questions:

1. What are the benefits students can gain from this product and what are the benefits teacher can gain from this product?
2. What are the advantages of this product in terms of writing on blackboard and erasing it and what are the disadvantages of this product in terms of writing on blackboard and erasing it?
3. Will this product have bad effect when it comes to health?
4. Will the eggshalk that produces harmless dust be more effective to use than the commercially produced chalk?

Theoretical Framework

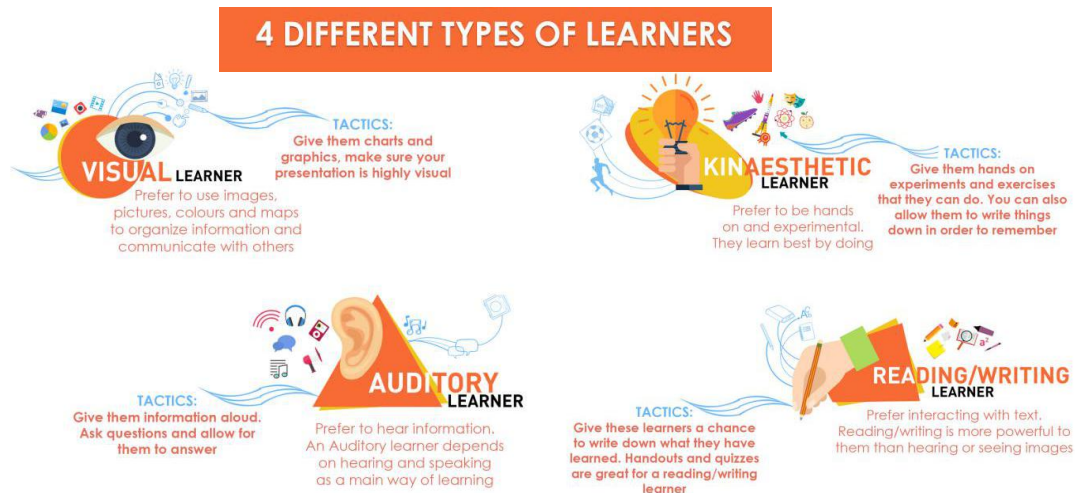


Table 1.0 Vark's Model (4 Different Types of Learner)

One popular theory, the VARK model, identifies four primary types of learners: visual, auditory, reading/writing, and kinaesthetic. Each learning type responds best to a different method of teaching. Auditory learners will remember information best after reciting it back to the presenter, while kinaesthetic learners will jump at the chance to participate in a hands-on activity.

4 Different Types of Learners

1) Visual Learner

Visual learners prefer to use images, pictures, colors and maps to organize information and communicate with others

Tactic: Give those charts and graphics; make sure your presentation is highly visual.

2) Auditory Learner

Auditory learners prefer to hear information. An Auditory learner depends on hearing and speaking as a main way of learning

Tactic: Give them information aloud. Ask questions and allow for them to answer.

3) Kinaesthetic Learner

Kinaesthetic learners prefer to be hands on and experimental. They learn best by doing.

Tactic: Give them hands on experiments and exercises that they can do. You can also allow them to write things down in order to remember.

4) Reading/Writing Learner

A reading/writing learner prefers interacting with text. Reading/writing is more powerful to them than hearing or seeing images.

Tactic: Give these learners a chance to write down what they have learned. Handouts and quizzes are great for a reading/writing learner.

Conceptual Framework

The concept of this study focused on identifying the effectiveness of eggshells as primary raw materials in making a chalk and the level of satisfaction of teachers and students upon using the product.

Figure 1.1 shows the relationship input variables which contains the respondents profile and the quality of eggshalk in terms of writing on blackboard. Upon the process, it contains the Data Gathered, Statistical Statements, and the Analysis and Interpretation. While the output variables contain the analyzed data upon the effectiveness of eggshells in making a chalk.

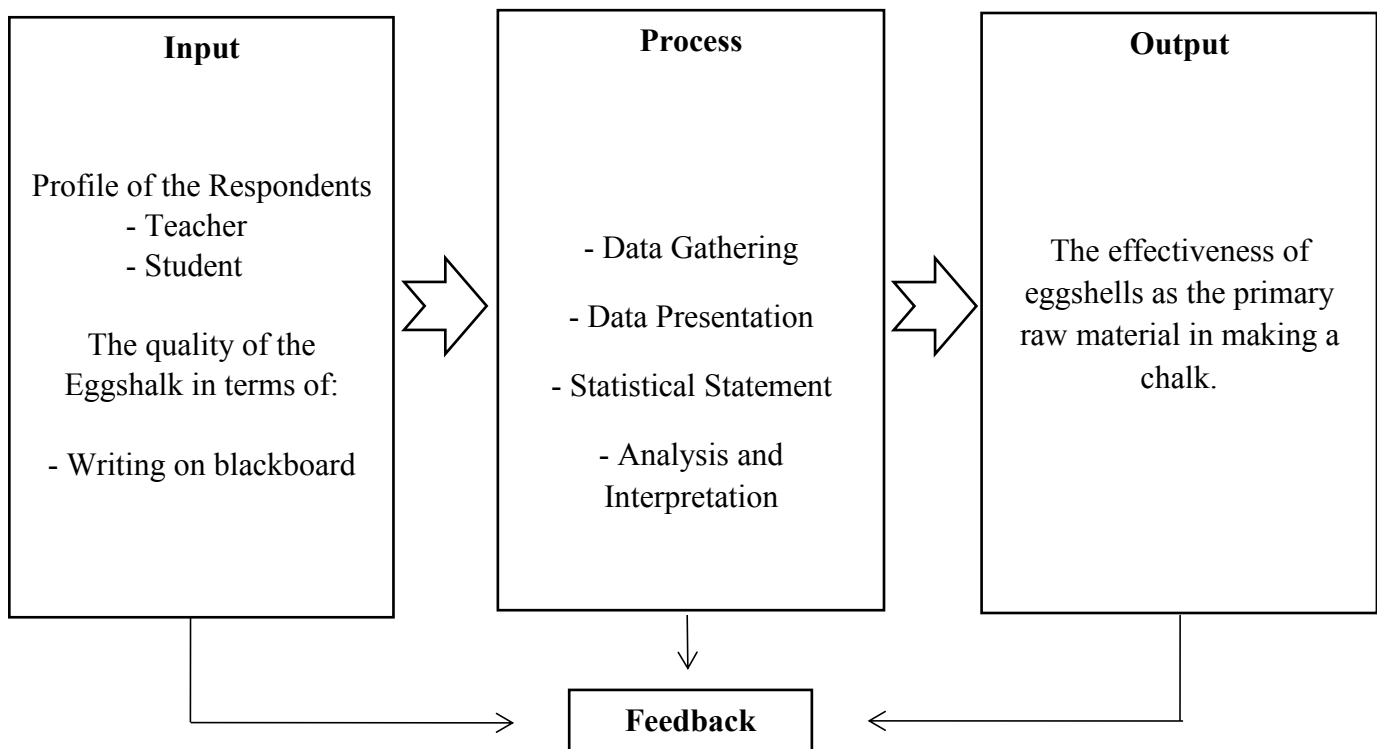


Figure 1.1

Significance of the Study

The importance of this study is for us to understand the gathered information regarding the dealings on how effective is the eggshalk to students and teacher in using the product. Furthermore, the results of this study will give a great benefit to the following:

Students can benefit from this study because the proposed project will help them to know the advantages and disadvantages of the said product as they use it. With the use of the proposed product student can make their own chalk made of eggshells to lessen the expenses on buying commercial chalks.

Teachers may find the product beneficial because this will make them comfortable when using it, at the same time they can use this study as the basis of teaching, if they want to teach how to make chalk with the use of eggshells.

It is also beneficial to parents, because if this product will be successfully launched to the market and will be used by the public schools in teaching, it will assure the parents that their children's in school are safe from inhaling the dust produces by the chalk.

The researchers had conducted this study, to help the future researchers who will come up with the same idea. They can benefit from this study because the researchers already stated the possible ideas and factor in measuring the effectiveness of using the eggshalk. If they found out that there is something missing from this study or the study went wrong, they can continue the research and make it strong to prove how effective the eggshalk is.

Scope and Delimitation

The scope of this study focused to know how effective the eggshalk as an alternative for the commercial chalk for the students and teachers in the public schools in Sta. Maria Bulacan. The researchers did not include the private schools in Sta. Maria Bulacan, because they are usually using whiteboard and whiteboard markers in presenting their lesson to the whole class. This study will only limit in production of chalk, writing it on blackboard and erasing it.

Definition of Terms

- **Archeologist** - A person who studies human history and prehistory through the excavation of sites and the analysis of artifacts and other physical remains.
- **Calcium Carbonate** - A chemical compound with the formula CaCO_3 . It is a common substance found in rocks and the main component of pearls and shells.
- **Cardiovascular Mortality** - is a class of diseases that involve the heart or blood vessels. Cardiovascular disease includes coronary artery diseases (CAD) such as angina and myocardial infarction (commonly known as a heart attack).
- **Epidemiology** - Is the study and analysis of the distribution (who, when, and where) and determinants of health and disease conditions in defined populations.
- **Ferric Oxide** - (Iron III Oxide) is the compound with the formula Fe_2O_3 . It is one of the three main oxides of iron, the other two being iron(II) oxide(FeO), which is rare, and iron(II,III) oxide(Fe_3O_4), which also occurs naturally as the mineral magnetite.
- **Histopathology** - Refers to the microscopic examination of tissue in order to study the manifestations of disease.
- **Mammillary** - Having several smoothly rounded convex surfaces.
- **Semipermeable** - Allowing certain substances to pass through it but not others, especially allowing the passage of a solvent but not of certain solutes.
- **Poriferous** - Bearing or having pores.

Chapter 2

Related Literature's

James (2011) of 9 slap-up shipway To Recycle Eggshells stated that some people are moving away from commercial products in favor of much instinctive alternatives. There is no assurance that people can stomach continuous supply of a commercial chalk that is wherefore in this study; researchers tried to find a better, low-cost and more convenient way of producing chalk which is peer in quality to commercial chalk. Chalk is a soft, white, poriferous aqueous rock, a form of limestone composed of the mineral calcite, an atomic number 20 carbonate, or CaCO_3 which comprises more than 4% of the earth's pertness and is found. Ancient Egyptians (1400 BCE) According to Aristotle, when he opened chicken eggs at various time points of incubation, he noted how the organism changed over time. Through his writing of *Historia Animalium*, he introduced some of the earliest studies of embryology based on his observations of the chicken in the egg. Aristotle (350 BCE) They used the chick to demonstrate tissue differentiation, disproving the widely held belief of the time that organisms are "preformed" in their adult version and only grow larger during development. Boron (2004) Moreover, the use of these shells as an alternative source for calcium Carbonate may reduce the impact on the natural reserves of limestone, a non-renewable natural source.

(Cenidoza, 2014) As scientist Joe Regenstein has studied, the cell of a chicken eggshell is made up of about 94% calcium carbonate, 1%chicken egg is made up of about 94% calcium carbonate, 1%calcium phosphate, and about 4% organic matter, mainly protein. Calcium phosphate, and about 4% organic matters, mainly protein. The

eggshell has pores through which air, moisture, and bacteria can pass. The shell represents about 11% of the weight of bacteria can pass. The shell represents about 11% of the weight of an egg. The shell is made up of three parts – the mammillary or an egg. The shell is made up of three parts – the mammillary or inner layer is adjacent to the shell membranes and has a “knob “inner layer is adjacent to the shell membranes and has a “knob “like appearance. The middle layer, the bulk of the shell is made up like appearance. The middle layer, the bulk of the shell is made up of small calcite crystals, mostly randomly arranged with the pores of small calcite crystals, mostly randomly arranged with the pores running through it. The cuticle or top layer is thin film of protein that running through it. The cuticle or top layer is thin film of protein that covers the egg when it is laid, but which dries up and flakes over covers the egg when it is laid, but which dries up and flakes over time.

(Smith, Live Strong, 2010) Eggshell powder reduce pain from osteoarthritis, increase mobility and stopped loss of bone density in post-menopausal women who participated in a study published in 2003 in the International Journal of Clinical Pharmacology Research, led by J. Rovensky of the National Institute of Rheumatic Diseases. Calcium and sunlight prevent metabolic bone disease in turtles, also known as “soft-shell syndrome,” states Anchorage, Alaska teacher, Mary Hopson.

Her website, “The Turtles Puddle,” has provided information about turtle health since 1999. Boiled, crushed eggshells provide turtles with a natural source of calcium, according to Hopson. Eggshells powder also helps chickens and other birds produce eggs with thicker shells.

Related Studies

(George Pope, 2006) The potential acute health effects of calcium sulfate or calcium carbonate in chalk dust include irritation to the eyes, skin, respiratory tract, mucous membranes, and digestive tract; the potential chronic health concerns are lung and liver damage resulting from exposure to calcium sulfate and calcium carbonate particles, respectively (Sciencelab.com, 2005). Furthermore, epidemiological studies have suggested that long- and short term exposure to particulate matter (PM) is associated with adverse health effects, including cardiovascular mortality, histopathology markers of sub-clinical chronic inflammatory lung injury, and mortality resulting from cardiovascular illness (Pope and Dockery, 2006; Downs et al., 2007). Therefore, the potential health risks of chalk dust particles cannot be overlooked when using chalk in classrooms.

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(Mercola, 2017) Eggshells also contain protein, magnesium, selenium, strontium and numerous other compounds to help augment your bones and joints, and may prevent you from having to take a calcium supplement. In spite of the calcium sources that are readily available, calcium deficiency is still quite common, causing a condition known as hypocalcaemia, evidenced by low levels of the mineral in your blood.

As you've cracked eggs over a skillet or mixing bowl over the years, it may never have occurred to you that the eggshell, and not just the egg, may offer considerable nutritional benefits. A study entitled "Eggshell Membrane: A Possible New Natural Therapeutic for Joint and Connective Tissue Disorders," was recently published in *Clinical Interventions in Aging*. The study tested the concept of using natural eggshell membranes in supplement form, or NEM, as a:

"Novel dietary supplement as it contains naturally occurring glycosaminoglycan's and proteins essential for maintaining healthy joint and connective tissues ... 500 mg taken once daily, significantly reduced pain, both rapidly (seven days) and continuously (30 days)."¹

It may interest you to know that the researchers involved in the study concluded that none of the participants exhibited any adverse effects in the course of the study. A significant percentage of the participants experienced considerable improvements, and the authors deemed the crushed eggshell treatment to be "well tolerated."²

Learning that not only were eggshells from hens "suitable for human consumption" but even nutritious, the blogger behind Healthy Food Tribe notes that for

others interested in the science behind it, it's important to understand a few things like: Crushed, powdered eggshells may be a good addition to your diet.

Studies Analyze the Benefits of Eggshell Consumption

According to the International Journal of Food Sciences and Nutrition, ³ the ingredient that makes eating eggshells beneficial is calcium, or more specifically, calcium carbonate. Perhaps not surprisingly, that's what 95 percent of the total makeup of eggshells consists of, which is similar to your own bones and teeth.

Researchers noted that consuming just half an eggshell can supply you with the recommended reference daily intake (RDI)⁴ of calcium, an amount the U.S. Food and Drug Administration (FDA) has determined fulfills the nutrient needs by infants, children and adults.

(Lacca, 2019) First chalk (the natural one) was used in prehistory for cave drawings. Later, artists used chalk for sketching and some of these drawings survive until today because they were protected in shellac (a resin secreted by the female lac bug).

The first chalk in sticks appeared when artists found them convenient. They made it by grinding the natural chalk (calcium carbonate), mixing it with water, clay and pigment (natural pigments were used like carbon for black or rust for red). Mix was then formed in sticks and dried. Blackboard chalk became popular in 19th century when classrooms became larger with more students and there was a question how to teach such a number at the same time. Chalks were used on large blackboards where teachers wrote

to the whole class but also on small ones that were used by students at their desks. These boards were used for practice and had a small sponge for clearing the board. Blackboard chalk for use in classrooms was at first only white because the blackboards were... well, black (because they were made from slate) and white gave good contrast to the black.

Later, in the 20th century, classroom boards were made of synthetic materials. Although some thought that classroom boards should be yellow and chalk blue or purple to simulate written text, manufacturers started making classroom boards in green because that color does not train the eyes. As a good contrast teachers started using yellow chalk. Chalk is still manufactured in many different colors which helps with drawing of diagrams and in geometry.

Until now, the researchers found out that the eggshells can be used to make chalk, and trying to prove if it can be effectively use in writing on blackboard.

Chapter 3

Method of Research

The researchers used the descriptive method in finding out if the eggshalk can really be an alternative for the commercial chalk to avoid the diseases that they may be caught from inhaling or their skin having contact with the dust of the chalk. The researchers decided to use descriptive to obtain the classified information about the study, it is a given method to help the researchers to gain knowledge and understanding about the research findings. According to the ResearchMethodology.net it's effective to analyze non-qualified topics and issues, the possibility to observe the phenomenon in completely natural and unchanged natural environment, the opportunity to integrate the qualitative and quantitative methods of data collection, and it is less time-consuming than qualitative experiment.

Population and Sampling Technique

The population of the study will be composed of one forty (40) respondents consist of students and teachers coming from different public schools places within the vicinity of Sta. Maria Bulacan, who had been chosen to try to use chalk made from eggshell in writing on the blackboard. The researchers utilize a simple random sampling technique in order to gather/collect data and information that are needed in the study in a short period of time. The researchers choose the random sampling technique because it is said to be the basic type of sampling and it is an unbiased surveying technique. Each student has the same probability of being chosen to be a respondent of the study.

Description of Respondents

There are 40 respondents consisting 20 students and 20 teachers from the public schools within the vicinity of Sta. Maria Bulacan who had been chosen to test the product. These respondents are from the specific public schools which is Guyong Elementary School and Central Elementary School. They will be given a questionnaire consisting of questions that they need to answer. These respondents had been selected and qualified for this study because they are the one who often and currently using the chalk when writing on the blackboard.

Research Instrument

One of the most important components of a research design is the research instruments because it allows the researchers to gather or collect data information in a short period of time. The data gathering instrument is a key component of research because it strengthens the foundation of reliability and validity of the study with the chosen questionnaire.

The questionnaire is consisting of a number of questions that the respondents have to answer in a set format. This questionnaire is consisting of two (2) parts. The first part will be the measurement of their satisfaction when using the eggshalk whether they are **Satisfied, Very Satisfied, Neutral, Dissatisfied, or Very Dissatisfied**. The second part will be the interview questions.

Each statement was given one set of five check boxes. The five check boxes were ranked as:

5 - Very Satisfied

4 - Satisfied

3 - Neutral

2 - Dissatisfied

1 - Very Dissatisfied

Data Gathering Procedure

With the help of the related studies and literature's that have been accumulated by the researchers, they prepare set of questions that would be used for the survey. The researchers assure that there were enough materials that will cover all the possible outcomes in collecting the data that are related to the statement of the problem. After which the questionnaires are formulated and had been validated, it is personally distributed to the respondents which is the students and teachers of public schools in Bulacan.

After the questionnaire is formulated and personally distributed to the respondents of the study. After collecting the questionnaires from the respondents, the researchers collect and analyze the data.

The following intervals and corresponding verbal interpretation were used for interpretation:

Verbal Interpretation	Level of Satisfaction
Very Dissatisfied	4.20 - 5.00
Dissatisfied	3.40 - 4.19
Neutral.....	2.60 - 3.39
Satisfied.....	1.80 - 2.59
Very Satisfied.....	1.00 - 1.79

Statistical Treatment of Data

To evaluate the how satisfied and effective the product which is the eggshalk, the researchers uses the **Weighted Mean**.

$$\bar{x} = \frac{\sum fx}{n}$$

Where: \bar{x} = weighted mean of the level of satisfaction on how effective the eggshalk upon writing on the blackboard.

$$\sum fx = \text{total response}$$

n = number of respondents

Chapter 4

Presentation, Analysis, and Data Interpretation

This chapter presents, analyze and interprets the data gathered from the effectiveness of eggshells as a primary raw material in making a chalk.

The data gathered are presented in this chapter through tables and textual discussions in accordance to the objectives of the research.

Teachers and Students Level of Satisfaction in using the Eggshalk

Table 1 shows the average weighted mean on how satisfied the teachers and students of public schools in Sta. Maria Bulacan upon using the Eggshalk. Among questionnaire items, the statement “Eggshalk can be used to write smoothly on blackboard” has the Dissatisfied effect to the teachers and students with an average weighted mean of 3.85, but the statement “Eggshalk does not break easily” received a Neutral effect with an average weighted mean of 2.7.

The overall weighted mean of their level of satisfaction upon using the eggshalk is 3.33. This means that teachers and students have Neutral level of satisfaction of upon using the Eggshalk.

Table 1

**Weighted Mean and Verbal Interpretation of
Level of Satisfaction Upon Using the Eggshalk**

Statements	Weighted Mean	Verbal Interpretation
1. Eggshalk can last longer than the commercial chalk.	3.2	Neutral
2. Eggshalk does not break easily.	2.7	Neutral
3. Eggshalk can be used to write smoothly on the blackboard	3.85	Dissatisfied
4. Upon writing on blackboard, eggshalk produces less dust than the commercial chalk.	3.55	Dissatisfied
Average Weighted Mean	3.33	Neutral

Interview

1. Most of the respondents agreed that eggshalk is safer to use than the commercial chalk because of its natural chemical components which is said to be healthy.
2. Respondents prefer to use commercial chalk than the Eggshalk because even though it was said to be healthy and risk free, it is not effective to use to write on black board and because it leaves mark on the blackboard.
3. Respondents recommend that the researchers should run more trial and error to perfect the formulation of the product, find some other way for the eggshell to pulverize to its finest particles.

Chapter 5

Summary of Findings, Conclusions, and Recommendations

This chapter presents the summary of findings; the conclusion made and the recommendations offered.

Summary of Findings

1. The Effectiveness of Eggshells as a Primary Raw Material in Making a Chalk.

1.1 The Level of Satisfaction of Teachers and Students of Public Schools in Sta. Maria Bulacan upon Using the Eggshalk.

In terms of level of satisfaction, the total weighted mean of 3.33 signifies a Neutral effect to teachers and students in public schools in Sta. Maria Bulacan.

Conclusions

Based on the findings of the study, the following generalizations are as follows:

1. The teachers and students of public schools in Sta. Maria Bulacan have Neutral level of satisfaction upon using the Eggshalk.
2. The eggshells can be used as a raw material for making a chalk but it is not effective in terms of writing it on the board.
3. The benefits, teachers and students can gain is that they are away from skin and pulmonary irritations.

4. The eggshalk is not effective to use than the commercially produced chalk upon writing on blackboard instead it can be used by the P.E teachers upon writing on the sidewalks during their outdoor activities.

Recommendations

Based on the findings and conclusions derived from the study, the following recommendations are proposed:

1. P.E teachers can use this product when they are doing outdoor activities, they can use eggshalk when marking the floor.
2. Children may use this product to draw in the sidewalks.

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