GARLIC *(Allium sativum L.)* FLAVORED VEGGIE COOKIES:

TECHNO - GUIDE

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Abstract

This research developed a garlic *(Allium sativum L.)* flavored veggie cookies as Formulation 0 (F_o); control; Formulation 1 (F_1); 2 tsp. garlic powder, 50 grams boiled blended okra, 120 grams boiled blended eggplant as Formulation 2 (F_2); 3 tsp. garlic powder, 120 grams boiled blended okra, 180 grams boiled blended eggplant as Formulation 3 (F_3); 4 tsp. garlic powder, 180 grams boiled blended okra, 240 grams boiled blended eggplant. The Sensory Analysis of the garlic *(Allium sativum L.)* flavored veggie cookies in terms of Color, Aroma, Taste and Texture among the significant difference of garlic *(Allium sativum L.)* flavored veggie cookies on the aforementioned attributes, their findings were the bases for the Techno- Guide.

This study employed the experimental method of research questionnaires and score Cards were given to thirty-five (35) T.L.E. Teachers and twenty-five (25) students as consumers for sensory evaluation and the garlic flavored veggie cookies was subjected to general acceptability.

It was found out that the sensory analysis of garlic flavored veggie cookies in terms of **Color, Formulation 3 (F_3)** was the most acceptable with the weighted mean of **8.8**, described as **Like Very Much**; in terms of **Aroma, Formulation 3 (F_3)** was the most acceptable with the weighted mean of **8.0** described as **Like Extremely;** in terms of **Flavor, Formulation 3 (F_3)** was the most acceptable with the weighted mean of **8.9** described as **Like Moderately** and in terms of **Texture, Formulation 3 (F_3)** was the most acceptable with the weighted mean of **7.3** described as **Like Moderately.**

Findings revealed, that the **Formulation 3** with 16.7 grams garlic powder, 180 grams boiled blended okra, 240 grams boiled blended eggplant was the ideal formulation for garlic flavored veggie cookies was the most preferred in terms of color, aroma, flavor and texture. Techno- Guide for garlic *(Allium sativum L.)* flavored veggie cookies is highly recommended to be adopted.

Keywords: vocational education; garlic flavored vegetable cookies, formulation
experimental research, techno-guide, Cebu City, Philippines

1. Rationale of the Study

The problem of malnutrition is a perennial problem in our country and even in the whole world. In the recent survey conducted by the Food and Nutrition Research Institute (FNRI) of the Department of Science and Technology (DOST), our country faces the worst chronic malnutrition rate among children aged 0-2 years old at 26.2% in the last ten years. According to the FNRI, because of the rising prices of

commodities, there has been a lack of access to highly nutritious foods, thus making it the common cause of malnutrition. Aside from that, poor feeding practices such as inadequate breastfeeding and offering the wrong types of food also contribute to the poor nutritional status of the children. Malnutrition is common in far-fetched communities due to financial, educational, and sociocultural insufficiency that contribute to a child's inability to reach his ideal status in health.

Nowadays, it is generally observed that children are not encouraged to eat veggies. They are very dependent on processed foods. Because of the busy lifestyles of working mothers, they cannot prepare dishes enhanced with vegetables due to time constraints. Their cooking is marked by instant preparation relying mainly on fish, poultry, and meat. Children are now heavy eaters of junk food. Eating this kind of food could only satisfy their tummies, and it could only give the least essential nutrients to the body. Therefore, this result in poor health since the required intake of nutrients in the body is not achieved, eventually leading to malnutrition.

Many Filipino families also struggle due to poverty, leading them to consume unhealthy or less nutritious food. However, this often results in nutrition deficiencies and specific health conditions. On the other hand, affluent individuals with access to all types of foods somehow overlook the importance of choosing between healthy foods and foods that are only suitable for their palate.

Due to the above mentioned instances, schools are important venues for children to develop the habit of healthy eating. School ordinances such as school-based feeding programs, health teaching campaigns, and gardening are part of the Department of Education's efforts to solve malnutrition (DepEd, 2015).

The School-Based Feeding Program provides hot meals to the children ensuring a standardized recipe using any vegetables rich in vitamins and minerals. Enhanced nutrition and health of primary school children led to improved learning and decreased morbidity, which paves the way for healthier lives. School feeding programs alleviate child hunger in school and enhance nutrition, particularly when the food is

fortified with micro nutrients.

Moreover, the problem of malnutrition among school children could be addressed by the Gulayan sa Paaralan project, which serves as the primary source of commodities to sustain supplementary feeding. A diversity of vegetables from the garden produce is added to the menu to avoid commodity burnout. These are why schools are encouraged to establish vegetable gardens to serve as food baskets and have a prepared source of vegetables in schools.

Filipino cooking includes vegetables because it's readily available in the locality. Vegetables are also of great significance as a source of vitamins, minerals, and plant proteins in the human diet worldwide. Cultivating vegetables is an efficient technique in agriculture and it entails economic value as well.

Vegetables, too, are home to many antioxidants. These health-benefiting phytochemical compounds help protect the human body from oxidant stress, diseases, cancers, and support the body to develop the capacity to fight against these by boosting immunity. Additionally, vegetables contain soluble and insoluble dietary fiber known as non-starch polysaccharides (NSP). Examples of NSP are cellulose, mucilage, hemicellulose, gums, pectin, etc. These substances absorb excess water in the colon, retain a good amount of moisture in the fecal matter, and help its smooth passage out of the body. Thus, sufficient fiber offers protection from conditions like chronic constipation, hemorrhoids, colon cancer, irritable bowel syndrome, and rectal fissures.

The abundance of garlic and vegetables, like okra and eggplant, can therefore be excellent raw ingredients in making different snacks using baking as the method of cooking. Product innovation involves designing and developing new food products, improving or combining existing food products, researching food trends, and managing food.

It is essential to find cheap yet nutritious foods to eat to help combat the malnutrition problem that we are now facing. With this, the researcher was motivated to study adding vegetables as ingredients, particularly the formulation and acceptability of vegetable cookies flavored with garlic, enriched with okra

and eggplant, as a basis for developing a Nutri-snack.

1.1. CONCEPTUAL BACKGROUND

This study is anchored on DECS Memoranda confronting Presidential Decree No., 491 dated July 25, 1974, enforcing the program designating July as Nutrition Month. These mandates acknowledge the significance of good nutrition, which indirectly helps improve learners' academic performance in school. Thus, it is considered a good investment in education as it is associated with repetition, reduction, decreased dropout or truancy, increased enrolment, improved attendance, and, most of all, better performance in school.

The DepEd Order No. 37, series of 2014 is the implementation of the School-Based Feeding Program (SBFP) to take action in resolving malnutrition in cooperation with some local government units and non-government organizations. This mandate addresses the needs of the public school children regarding nutritional problems and short-term hunger.

DepEd partnered with the Department of Agriculture – Bureau of Plant Industry (DA-BPI), and established Memorandum No. 191, series of 2013 or the

Health and Nutrition Center (HNC)-funded Gulayan sa Paaralan Program (GPP). This program would mainly address malnutrition and promote vegetable production and consumption among school children. This program aims to encourage the yielding of foods rich in protein, carbohydrates, vitamins, and minerals and a prime contribution to school feeding.

PRESIDENTIAL DECREE (P.D.) NO. 491 s. of 1974

DEPED MEMORANDUM NO. 191, S. 2013

DEPED ORDER NO. 37, s. 2014

Nutritive Value of Garlic, Okra & Eggplant Sensory Attributes

**TECHNO-GUIDE for
Garlic *(Allium sativum* L) Flavored Veggie Cookies**
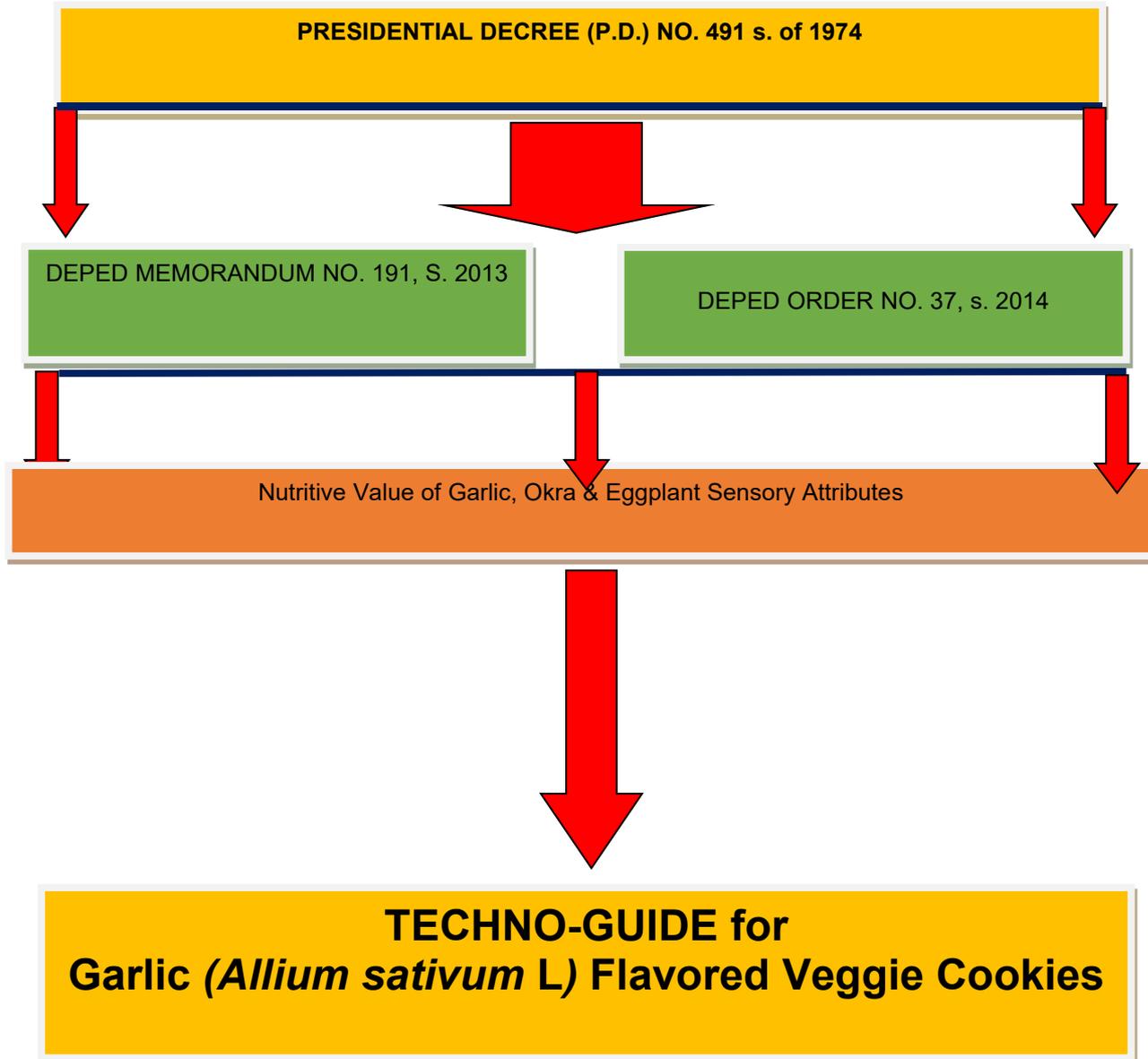
Figure 1. Conceptual Framework

It also promotes food security in schools and communities through self-help food production activities and values among learners and appreciation of agriculture as a life support system. Primarily, public elementary and secondary schools nationwide are encouraged to enjoin the implementation of the programs, as presented in Figure1.

Garlic (*Allium sativum L.*) is from the *Alliaceae* family, where onions, shallots, leeks, and chives belong. Its pungent and spicy flavor that eventually mellows and sweetens when cooked makes it an essential ingredient for dishes, seasonings, and condiments. It is also widely used in medicine.

It contains beneficial compounds in it. Garlic has allicin, an antibiotic, and phytoncide, an antifungal compound. Its antibiotic properties help fasten recoveries from strep throat and other minor conditions. It also has sulfur-containing compounds alliin, ajoene, diallyl sulfide, dithiin, S-allyl cysteine, enzymes, vitamin B, proteins, minerals, saponins, flavonoids, and Maillard reaction products, which are non-sulfur containing compounds. Its bulbs have organic thiosulfate compounds such as diallyl disulfide, diallyl trisulfide, and allyl propyl disulfide. When crushed or sliced, these compounds are converted into allicin through an enzymatic reaction.

Moreover, garlic cloves may also contain unique phytonutrients, minerals, vitamins, and antioxidants with proven health benefits. The bulbs are rich sources of potassium, iron, calcium, magnesium, manganese, zinc, and selenium. Garlic contains many flavonoid antioxidants, like β-carotene and zeaxanthin, and vitamins like vitamin C.

Some studies claim that garlic help prevents certain conditions. Allicin facilitates nitric oxide release, which reduces the stiffness of blood vessels. Relaxed blood vessels mean lower blood pressure. Furthermore, allicin helps prevent blood clot formation, which decreases the chances of cardiovascular diseases. A Czech study showed that garlic helped reduce cholesterol accumulation in the vascular walls in animals.

The health benefits of garlic were used by Chinese, Egyptian, and Roman civilizations. There is substantial documentation of their usage of garlic for its medicinal properties.

Though it was not widely known, experts now understand that sulfur compounds in garlic are the primary cause of its beneficial effects on health. By slicing, chopping, or crushing garlic bulbs, the thio-Sulfinite chemicals in them are converted into allicin. Allicin is a fantastic substance. However, while this appears to be true in theory, what are the actual health benefits of using garlic?

It helps boost your body's immune system; reduce high blood pressure; reduce cholesterol levels; help with prevention of cancer; has antibiotic properties; may prevent alzheimer's and dementia; can improve athletic performance; and helps detox your body.

Garlic is widely recognized for its ability to fight bacteria, viruses, fungi, and even parasites. Garlic is usually consumed cooked but can be eaten raw, which is even better because the raw form preserves all its beneficial nutrients. Most of the benefits of raw garlic come from an enzyme called allicin. Allicin has anti-inflammatory, antioxidative, antibacterial, and anticancer properties.

Garlic (*Allium sativum*), Nutrient value/100 g. Total-ORAC value 5346 μmol TE/100 g. (Source: USDA National Nutrient data base)		
Principle	**Nutrient Value**	**Percentage of RDA**
Energy	149 Kcal	7.5%
Carbohydrates	33.06 g	25%
Protein	6.36 g	11%
Total Fat	0.5 g	2%
Cholesterol	0 mg	0%
Dietary Fiber	2.1 g	5.5%
Vitamins		
Folates	3 μg	1%
Niacin	0.700 mg	4%
Pantothenic acid	0.596 mg	12%
Pyridoxine	1.235 mg	95%
Riboflavin	0.110 mg	8%
Thiamin	0.200 mg	17%
Vitamin A	9 IU	<1%
Vitamin C	31.2 mg	52%
Vitamin E	0.08 mg	0.5%
Vitamin K	1.7 μg	1.5%
Electrolytes		
Sodium	153 mg	10%
Potassium	401 mg	8.5%
Minerals		
Calcium	181 mg	18 %
Copper	0.299 mg	33%
Iron	1.70 mg	21%
Magnesium	25 mg	6%
Manganese	1.672 mg	73%
Phosphorus	153 mg	22%
Selenium	14.2 μg	26%
Zinc	1.160 mg	10.5%
Phyto-nutrients		
Carotene-ß	5 μg	--
Crypto-xanthin-ß	0 μg	--
Lutein-zeaxanthin	16 μg	--

Source: USDA National Nutrient data base

Figure 2. Nutritional Value of Garlic

Okra (Abelmoschus esculentus), also called lady's fingers, is a vegetable with remarkable medicinal and nutritional properties. This could be used in many recipes and prepared differently - raw, cooked or streamed. It is easily grown in tropical and warm temperate regions for its fibrous fruits or "pods" harvested by hand.

Okra pods are rich sources of vitamins, minerals, and other essential compounds. It contains vitamin A and flavonoid antioxidants such as beta-carotene, xanthin, and lutein. Vitamin A is necessary for maintaining healthy mucosa and skin. Oxidants like flavonoids in okra help prevention of lung and oral cavity cancers. It has high amounts of vitamin C, K, and B-complex (niacin, pyridoxine, thiamin, pantothenic acid). It also possesses minerals like iron, calcium, manganese, and magnesium. Okra, too, contains folate, which is essential in pregnancies.

Moreover, the sliminess of okra pods is a rich source of mucilage substance, aiding in the peristalsis movement and constipation.

Okra is a nutritious food with many health benefits. It's rich in magnesium, folate, fiber, antioxidants, and vitamin C, K1, and A. Okra may benefit pregnant women, heart health, and blood sugar control. It may even have anticancer properties. Okra is low in calories but packed full of nutrients. The vitamin C in okra helps support healthy immune function. Okra is also rich in vitamin K, which helps your body clot blood. Antioxidants are natural compounds that help your body fight off molecules called free radicals that can damage cells.

Nutritive value per 100 g

Principle	Nutrient Value	Percentage of RDA
Energy	24 Kcal	1%
Carbohydrates	5.7 g	4%
Protein	1 g	2%
Total Fat	0.19 g	1%
Cholesterol	0 mg	0%
Dietary Fiber	3.40 g	9%
Vitamins		
Folates	22 µg	5.5%
Niacin	0.649 mg	4%
Pantothenic acid	0.281 mg	6%
Pyridoxine	0.084 mg	6.5%
Riboflavin	0.037 mg	3%
Thiamin	0.039 mg	3%
Vitamin A	27 IU	1%
Vitamin C	2.2 mg	3.5%
Vitamin E	0.30 mg	2%
Vitamin K	3.5 µg	3%
Electrolytes		
Sodium	2 mg	0%
Potassium	230 mg	5%
Minerals		
Calcium	9 mg	1%
Copper	0.082 mg	9%
Iron	0.24 mg	3%
Magnesium	14 mg	3.5%
Manganese	0.250 mg	11%
Zinc	0.16 mg	1%

Source: USDA National Nutrient data base

Figure 3. Nutritional Value of Okra

Eggplant (*Solanum melongena*) belongs to the Solanaceae, or the nightshade family, making it related to tomato and potato. It is also called other names like aubergine in British English or brinjal in South Asia, Southeast Asia, and South Africa. The fruit is widely used in cooking as an ingredient in various sauces, soups, stews, or separate dishes.

Eggplants specifically contain anthocyanins, a type of phytochemical called flavonoids. These give eggplants their dark purple color of skin. Many nutrients in eggplant can be found in its skin. It contains fiber, potassium, magnesium, and antioxidants like phenol. Phenols are powerful free radical scavengers, preventing cancer and heart diseases.

Eggplant has antioxidants like vitamins A and C, which help protect your cells against damage. It's also high in natural plant chemicals called polyphenols, which may help cells do a better job of processing sugar if you have diabetes. The fiber, potassium, vitamin C, vitamin B-6, and antioxidants in eggplants all support heart health.

In addition to the antioxidants, nutrients, and fiber eggplants provide, they may offer protection against the top killer of men and women in the U.S.: heart disease. Eggplant anthocyanins have been shown to help reduce artery stiffness and central blood pressure in women. Central blood pressure, the pressure in the aorta, which sends blood from the heart out to the body, is a predictive measure of heart disease and stroke. Anthocyanins also help prevent the oxidation of "bad" LDL cholesterol, a precursor to artery hardening, which can lead to either heart attack or stroke.

Aubergine (Brinjal), (*Solanum melongena*), raw,
Nutritive value per 100 g

Principle	Nutrient Value	Percentage of RDA
Energy	24 Kcal	1%
Carbohydrates	5.7 g	4%
Protein	1 g	2%
Total Fat	0.19 g	1%
Cholesterol	0 mg	0%
Dietary Fiber	3.40 g	9%
Vitamins		
Folates	22 µg	5.5%
Niacin	0.649 mg	4%
Pantothenic acid	0.281 mg	6%
Pyridoxine	0.084 mg	6.5%
Riboflavin	0.037 mg	3%
Thiamin	0.039 mg	3%
Vitamin A	27 IU	1%
Vitamin C	2.2 mg	3.5%
Vitamin E	0.30 mg	2%
Vitamin K	3.5 µg	3%
Electrolytes		
Sodium	2 mg	0%
Potassium	230 mg	5%
Minerals		
Calcium	9 mg	1%
Copper	0.082 mg	9%
Iron	0.24 mg	3%
Magnesium	14 mg	3.5%
Manganese	0.250 mg	11%
Zinc	0.16 mg	1%

(Source: USDA National Nutrient database)

Figure 4. Nutritional Value of Eggplant

BASIC INGREDIENTS USED IN BAKING COOKIES

Flour

It is a powdery substance produced by milling grain. Flour classification is based on the amount of protein which also determines the gluten strength of each type of flour.

Butter

Its main functions are to shorten or tenderize the product, trap air during creaming and aerate the cake during baking to give good volume and texture, assist with layering in puff pastry, help prevent curdling by forming an emulsion, and to add flavor.

Milk

It is used in baked products to improve texture and mouthfeel. The protein in milk gives a soft crumb structure in cakes and contributes to a baked product's moisture, color, and flavor. Cakes that contain milk also tend to have a longer shelf life.

Shortening

It is another word for fat used in baking. The taste of the baked product depends significantly on the flavor of the shortening. It surrounds the dough's gluten, shortens the strands, and makes it a tenderer product.

Sugar

It is responsible for the attractive golden-brown color of baked products, which contributes to the development of good flavor and aroma.

Leavener or Leavening Agent

In baking, it is used to make a product rise, making it light and proportionate to its size. It is different from another leavening agent because it is alive.

Eggs

They perform essential functions in cakes that other ingredients cannot do. Eggs are critical because they hold together the other ingredients during mixing and baking. They also maintain the tender structure of the cake or baked product.

Salt

It is essential to produce a satisfactory yeast product. It gives the bread a more refined texture and removes its flatness or lack of flavor.

Vanilla extract

It is a solution that contains vanillin, its flavor compound, as the primary ingredient. Macerating and percolating vanilla pods make pure vanilla extract in a solution of ethanol and water. The most common vanilla used today is vanilla extract.

BASIC UTENSILS USED IN BAKING COOKIES

Measuring Cups

They are used for precisely measuring the volume of liquid or solid cooking ingredients. Great design can extend down to measuring cups.

Measuring Spoon

These precisely measure smaller amounts of liquid or solid cooking ingredients than measuring cups. It can range from measurements of ¼ tsp up to 1 tb

Mixing Bowl

The different sizes of bowls can accomplish many other culinary uses, including mixing, whipping, separating, combining, and storing.

Wooden Mixing Spoon

It can be used to prevent scratching non-stick surfaces.
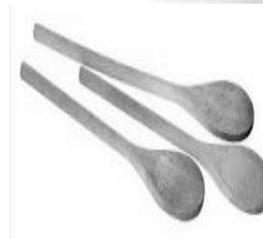
Rubber Scraper

It is used to remove food from plates before washing; its use has evolved to a more practical execution, the bowl scraper.

Rolling Pin

A rolling pin is a cylindrical-shaped utensil for shaping and flattening the dough.

Weighing scale

It is usually just "scales," and the weights/ masses against which to weigh them are placed.

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Whisks

Whisks are helpful in quickly blending ingredients or incorporating air into certain ingredients to increase the volume of the mixture.

Standard Recipe of Cookies

Ingredients:

384	grams	all-purpose flour
7	grams	baking soda
2	grams	baking powder
113	grams	butter
200	grams	brown sugar
51	grams	large egg
4.20	grams	vanilla extract

Procedure:

1. Preheat the oven to 375°F (190°C). Mix in a bowl the flour, baking soda, and baking powder. Set the mixture aside.

2. Cream together in another bowl the butter and sugar until smooth. Add beaten egg and vanilla into the mixture. Gradually blend in the dry ingredients. Roll rounded several teaspoonfuls of dough into balls and placed them on the ungreased cookie sheets.

3. Bake in the preheated oven or until golden for eight to ten minutes. Let it stand on the cookie sheet for two minutes before removing it to cool on wire racks.

II. Statement of the Problem

The primary purpose of this research was to develop cookies flavored with garlic and vegetables at Cebu Technological University for School Year 2016 -2017.

Specifically, this study answered the following:

1. What is the formulation of cookies flavored with garlic and vegetable, as to:

   1.1 F_0 = no garlic powder (standard recipe);

   1.2 F_1 = 14g garlic powder + 50g boiled okra + 120g boiled eggplant;

   1.3 F_2 = 21g garlic powder + 120g boiled okra + 180g boiled eggplant;

   1.4 F_3 = 28g garlic powder + 180g boiled okra + 240g boiled eggplant?

2. Based on the sensory evaluation of the panelists, what is the most preferred

   formulation in terms of the following attributes:

   2.1   flavor;

   2.2   aroma;

   2.3   color;

   2.4   texture; and

   2.5   general acceptability?

3. Based on the findings, what techno guide can be developed?

Null Hypothesis

The given null hypothesis was tested at 0.05 level of significance.

H_0: There is no significant difference between the treatments as perceived by the respondents.

III. Significance of the Study

The findings of this study will become valuable and essential to the following:

Cebu Technological University. The results of this study will benefit this University in achieving its Vision, Mission, and Goals.

Department of Education. The output of this study could be used in providing Quality Snacks for school children for it contains nutritional benefits.

Teachers. They can improve the quality of dishes for their family's consumption and create dishes that meet the nutritional requirement for good health and diet.

CTU - MAVED Program. The output of the study will benefit the program in promoting healthy foods and eradicate malnutrition.

Students. They would realize the importance of creativity in substituting usual ingredients in the recipe with those common in the locality.

Entrepreneur. In this way, entrepreneurs who are devoted can make their day a more productive one.

Farmers. For them to eat vegetable dishes that are cheap, palatable, and nutritious, dishes that contain almost all the nutrients essential for normal growth and development. Based on the study, it opens an opportunity for additional income and inspiration to plant more of the identified vegetables.

Entrepreneur. The output of the study will give an opportunity to the food business sector to adopt and disseminate nutrition information of the new food product developed.

Researchers. The need to have more experiments like this can lead to innovative techniques in cooking and even come out with less expensive products, thus making the activity more productive.

Housewives' dissemination of the finding of this study in the community should encourage people to use raw materials available in the locality in food production.

IV. RESEARCH METHODOLOGY DESIGN

The experimental method was used in this research in order to find out which of the three formulations was the most acceptable by the trained and consumer panelists based on the sensory attributes. The first formulation was (F_1) contained 14 grams garlic powder + 50 grams boiled blended okra + 120 grams boiled blended eggplant + other ingredients. The second formulation was (F_2) contained 21 grams garlic powder + 120 grams boiled blended okra + 180 grams boiled blended eggplant + other ingredients. The third formulation was (F_3) contained 28 grams garlic powder + 180 grams boiled blended okra + 240 grams boiled blended eggplant + other ingredients.

This research was an experimental study in formulating Garlic Flavored Veggie Cookies. The main objective was to determine which formulation should be recommended. All other ingredients were held constant in all three treatment formulations.

There were sixty (60) panelists in two groups; 35 Technology and Livelihood Education (TLE) teachers and 25 students who major in TLE. The samples were subjected to sensory evaluation and testing using the 9-point Hedonic Scale Rating and Quality Scoring. Sensory score cards were used to evaluate the sensory attributes like color, aroma, flavor, texture, and general acceptability. The evaluation result was collated, tabulated, analyzed, and interpreted statistically.

The output of this study was to produce a techno-guide for laboratory instruction and Graduate School extension-related activities.

V. Flow of the Study

The study used Input-Process-Output technique, Figure 2 to arrive at the expected end results of this experimental research. The "input" contained the three recipe formulations of garlic flavored vegetable cookies using okra and eggplant at three different Quantity Levels. The "process" included the sensory evaluations descriptive and preference test as evaluated by the trained and consumer panelists. The "output" is

a technological guide that would be used by the teachers and students in the laboratory instruction and projects. This practical guide would be used during community extension and encourage the housewives and other unemployed individuals to engage in small business enterprise in their own locality.

INPUT

PROCESS

OUTPUT

1. Recipe Formulation of Garlic-Flavored Veggie Cookies in terms of:
2. Perception of the respondents as to the following attributes:
   - color
   - aroma
   - flavor
   - texture
   - general acceptability

A. Sensory Analysis on three (3) formulated Garlic-Flavored Veggie Cookies

B. One Factor ANOVA

T E C H N O L O G Y

G U I D E
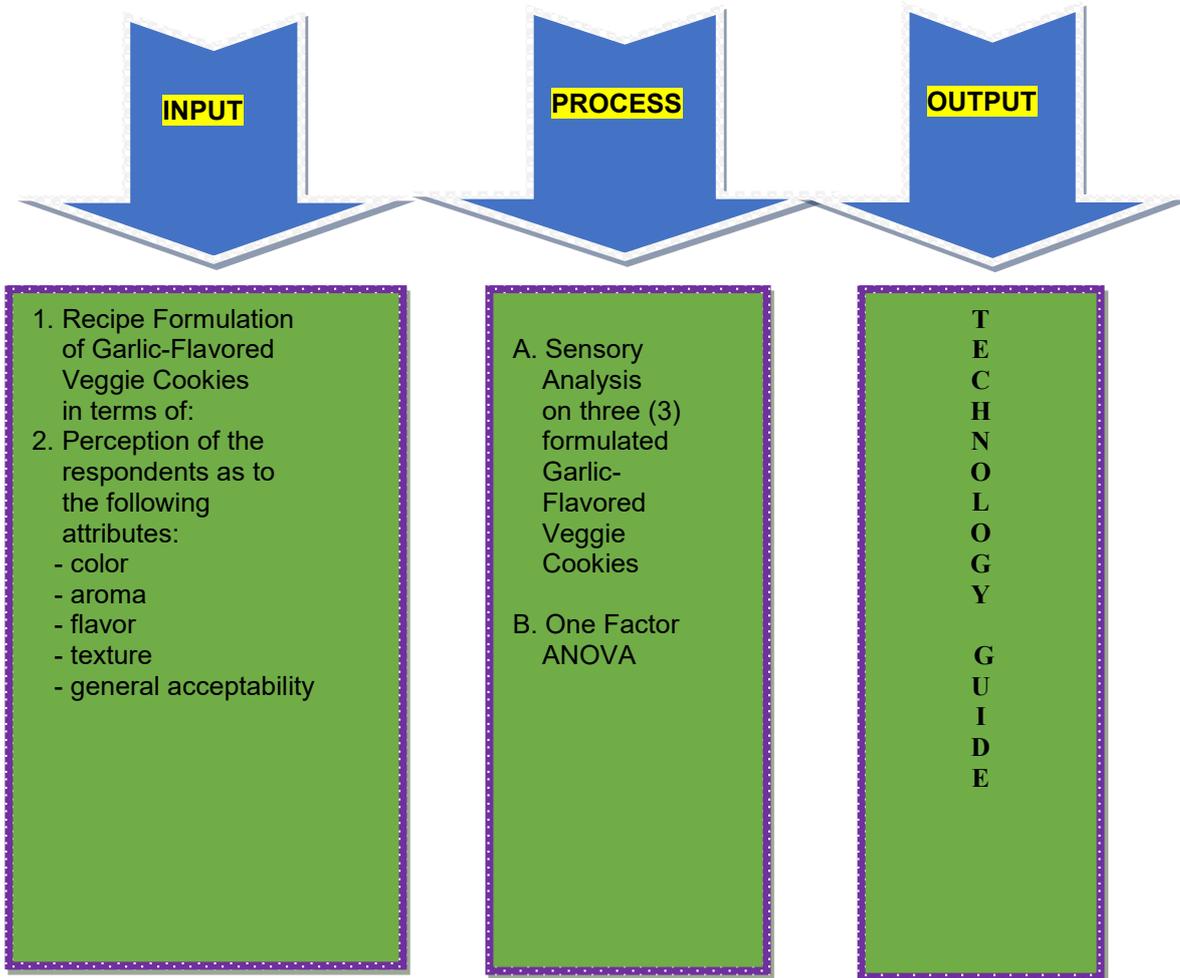
Figure 5. Flow of the Study

VI. Research Environment

The study was conducted at the Main Campus of Cebu Technological University. Figures 3 and 4 show the location of the research study.

The experiment was performed at the Graduate School Food Laboratory, third floor of the new Graduate School Building, Cebu Technological University, Main Campus- Cebu City, under the close supervision of the adviser.

The venue of the study was in Cebu Technological University Main Campus along the corners of R. Palma St. and M.J. Cuenco Avenue, Cebu City. Cebu Technological University is a premier multidisciplinary-technological university is an ISO 900 1:2008 certified by the Anglo Japanese American Registrars. On November 10, 2009, President Gloria Macapagal Arroyo signed Republic Act 9744, converting the State University, formerly known as Cebu State College of Science and Technology. The Cebu Technological University Main Campus dates back to 1911 when the Cebu Trade School began as one of the country's first vocational colleges. College of Engineering, College of Arts and Sciences, College of Education, College of Technology, and Graduate School are the five divisions that make up the Main Campus.

Cebu Technological University is now regarded as a technology education center of excellence, as it continues to lead in the IP Statistics-Utility Model in the area of Home Technology. CTU has been ranked first among other state universities and colleges (SUCs) in the Philippines since 2015, according to the Intellectual Property Office of the Philippines (IPOPHL).

Figure 6. Location Map of the Study

Figure 7. School Building of CTU-Main

VII. Research Respondents

The respondents of the study were the 35 TLE teachers and 25 Dep.Ed. students. Each of them was given samples of the three formulations which were evaluated based on the given criteria.

Table 1

Distribution of Respondents

Respondents	Number (N)	Percentage %
TLE Teachers (Trained panelist)	35	58.00
Dep.Ed. Students (Consumer panelist)	25	42.00
Total	**60**	**100.00**

As shown in Table 1, 35 or 58% of the respondents were Technology and Livelihood Education teachers enrolled in Master of Arts in Vocational Education in the same university for the First Semester of S. Y. 2016-2017. Meanwhile, 25 or 42% of the respondents were students of San Vicente National High School, San Vicente, Agusan del Sur, as consumer panelists. They were also sensory evaluators for the descriptive test and hedonic scale rating. The respondents were selected randomly to avoid bias in the evaluation.

The sensory product evaluation was used to evoke, measure, analyze, and interpret sensations perceived using their four senses: vision, smell, taste, and touch. The researcher developed this evaluation process for an accurate, formal, and structured methodology that is continually being updated to achieve a more refined existing technique.

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VIII. Research Instrument

This study utilized a 9-point Hedonic Scale Rating. An orientation on the use of score sheets was made so that the panelists fully understand the meaning of qualitative interpretation of the Hedonic scale as reflected in the instrument.

Data Gathering Procedure

This study gathered the sensory data from the sensory evaluation responses using score sheets. The 60 panelists consisting of 35 technology and livelihood education teachers and 25 students as consumers in CTU-Main Campus, Cebu City, were made to answer the score sheets in terms of color, taste, flavor, and texture of the product. The sensory panelists described the attributes of the four (4) samples using the 9-point Hedonic Rating as reflected in Appendix A.

The data gathering was done according to the following manner:

a. Preliminary preparation

b. Experiment process, evaluation of sensory attributes panelists

c. Data collection and analysis

A. Preliminary Preparations

The researcher obtained permission from the Office of the Dean of the Graduate School of Cebu Technological University to conduct the experimental study at the Graduate School.

B. Experiment process, evaluation of sensory attributes

Since this study aimed to find out which of the four (4) formulations produced a better quality of garlic-flavored veggie cookies, an experimental method was employed. The treatment formulation included a different quantity of ingredients like vegetables and seasonings. These treatments were prepared four times to serve as a replication of the study.

The 60 panelists tasted the different treatments three times and rated the sensory attributes of the other preparations using a prepared score card.

The sensory evaluation was conducted to assess the sensory attributes of the prepared Garlic Flavored Veggie Cookies treatments. Four (4) different treatments were presented and tasted by the panelists. The descriptive test evaluated the product's sensory attributes in terms of color, aroma, flavor, and texture. In contrast, the hedonic scale test evaluated the sensory acceptability of the product using the 9-point hedonic

scale test with an equivalent rating of 1 or dislike extremely or 9 or like extremely.

Evaluation of Sensory Attributes by the board

Sensory evaluation data were obtained to determine the sensory attributes of garlic-flavored veggie cookies at four (4) different formulations levels. The panel of tasters consists of 35 Technology and Livelihood Education teachers and 25 students as consumer panelists on product evaluation. The sensory attributes were evaluated using a 9-point Hedonic Rating Scale with an equivalent rating 1-Dislike Extremely to 9-Like Extremely. Score sheets were used in rating during the sensory evaluation.

The Scoring and Scaling Procedure

Below shows the scoring and scaling procedures for the descriptive test to facilitate the gathering and interpretation of data analysis of the four (4) formulations based on the attributes identified in the score sheets. The mean results of the descriptive test were interpreted using the Nominal Scale.

Nominal Scale used for Descriptive Test Results

Average Mean Range	Weighted Points	Sensory Attributes with their Qualitative Descriptions			
		COLOR	**AROMA**	**TASTE**	**TEXTURE**
4.20-5.00	5	Golden Brown	Excellent	Highly Palatable	Most Chewy
3.40-4.19	4	Yellow Brown	Very Good	Very Palatable	Very Chewy
2.60-3.39	3	Light Brown	Good	Moderately Palatable	Chewy
1.80-2.59	2	Brown	Fair	Less Palatable	Less Chewy
1.00-1.79	1	Dark Brown	Poor	Not Palatable	Not Chewy

The data above shows how the panelist classifies the four (4) treatment formulations using a range of 1-5. The rating of every attribute was dependent on the perception of the panelists.   32

The color attributes were Golden Brown, Yellow Brown, Light Brown, Brown, and Dark Brown. In terms of aroma, the products were characterized as Excellent, Very Good, Good, Fair, and Poor. The flavor attribute included Highly Palatable, Very Palatable, Moderately Palatable, Less Palatable, and Not Palatable. The texture attributes of the products were described as Most Chewy, Very Chewy, Chewy, Less Chewy, and Not Chewy.

Hedonic Sensory Qualities Acceptability

A 9-point Hedonic Scale Rating was used to determine the level of acceptability among the respondents and experienced panelists. The data below presents the non-parametric scale and score with a specific verbal description. The 9-point Hedonic Scale ranged from 1 or Dislike Extremely to 9 or Like Extremely.

Mean Range	Hedonic Interpretation
8.50-9.00	Like Extremely (LE)
7.50-8.49	Like Very Much (LVM)
6.50-7.49	Like Moderately (LM)
5.50-4.50	Like Slightly (LS)
4.50-5.49	Neither Like nor Dislike (NLOD)
3.50-4.49	Dislike Slightly (DS)
2.50-3.49	Dislike Moderately (DM)
1.50-2.49	Dislike Very Much (DVM)
1.00-1.49	Dislike Extremely (DE)

The panelists accomplished the Hedonic Rating Scale test to determine their degree of liking or disliking of the products. The degree of liking was categorized in the Hedonic Rating Scale of 9 points, the highest scale with Hedonic interpretation of Like Extremely, and 1 is the lowest with Hedonic interpretation of dislike extremely. The score sheets given to the panelist during the sensory evaluation indicated the sensory qualities.

The attributes considered were color, aroma, taste, and texture:

Score	Scale	Qualitative Interpretation
9	8.50-9.0	Like Extremely refers to the highest degree of satisfaction in terms of characteristics of qualities being studied.
8	7.50-8.49	Like Very Much refers to a higher degree of product satisfaction at 45% quality in terms of the sensory attributes.
7	6.50-7.49	Like Moderately refers to a high degree of satisfaction with the product quality being studied.
6	5.50-6.49	Like Slightly refers to a low degree of satisfaction with product quality being studied.
5	4.50-5.49	Neither Like nor Dislike refers to the neutral grounds of acceptance between satisfaction and dissatisfaction with the product quality being studied.
4	3.50-4.49	Dislike Slightly refers to the least degree of satisfaction with the product quality being studied.
3	2.50-3.49	Dislike Moderately refers to lower dissatisfaction with the product quality being studied.
2	1.50-2.49	Dislike Very Much refers to the higher degree of dissatisfaction with the product quality studied.
1	1.00-2.49	Dislike Extremely refers to the higher degree of dissatisfaction with the product quality studied.

Treatment of Data

The data gathered from the sensory evaluation from the panelists as product evaluators were treated statistically employing the following formula:

1. Average Weighted Mean was utilized to determine the mean score of the ratings.

2. Analysis of Variance (ANOVA) was used to determine the significant mean difference between

Treatments. The statistical treatments of contributing factors were subject to p-value and F critical value.

3. Post Hoc Analysis was used to compare different attributes of each treatment.

Definition of Terms

For clarification purposes and to ensure a better understanding of the concepts in the study, the following terms are defined.

Acceptability. It describes the extent to which the approval of the panelist during the sensory evaluation period.

Aroma. It refers to the pleasing odor or fragrance of the food product on how it will affect the appetite as it can excite the senses and encourage them to eat more.

Color. It refers to the appearance of the food product on how it will affect the appetite as it can excite the senses and encourage them to eat more.

Consumers. It refers to the vendors outside the school and the consuming public who will be part of the panelist.

Flavor. It means special senses that perceive and distinguish the sweet, sour, bitter, or salty quality of dissolved substances and is mediated by the tongue's taste buds.

Hedonic Scale. It is anchored verbally on nine different categories ranging from Dislike Extremely with a weighted point of 1 to Like Extremely with a weighted point of 9. These hedonic ratings were converted to scores and treated by rank or analysis of variance.

Ingredients. It refers to the part of the mixture and the physical appearance, which are very important in this study.

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Sensory Evaluation. This term is defined as the scientific discipline that a sensory analyst evokes, measures, analyzes, and interprets human relation to characteristics of food and materials as perceived by

vision, olfaction, gustation, audition, and tactile.

Taste. It determines the flavors of food or other substances.

Texture. It refers to what things are made of and how they feel. It is rough, smooth, hard, soft, liquid, lumpy, gritty, etc.

Techno-Guide. It is a guide that aims to extend the information of the innovated product using the available ingredients at the market. It is also a list of information on the recipe that guides the production of Garlic Flavored Veggie Cookies.

Treatment. An experimental condition where different variations of the Garlic Flavored Veggie Cookies were prepared.

Vegetables. They are "crops usually grown for culinary purposes" under the following classifications: leafy vegetables, cole crop or crucifers, root and bulb crops, legumes or pulses, solanaceous vegetables, and cucurbits.

Chapter 2

PRESENTATION, ANALYSIS, AND INTERPRETATION OF DATA

This chapter presents the interpretation and analysis of data gathered from the experiment's outcomes on the acceptability of Garlic (Allium sativum L.) Flavored Veggie Cookies for a techno-guide. The nine-point Hedonic Rating Scale test was used with 1 as the Dislike Extremely and 9 as the Like Extremely. This test served as the basis for determining the general acceptability of the product.

Formulation of Garlic-Flavored Veggie Cookies

Table 2 given below presents the formulation of four (4) formulations.

Table 2

Formulations of Garlic-Flavored Veggie Cookies

Formulation 0 (F$_0$)	Formulation 1 (F$_1$)	Formulation 2 (f$_2$)	Formulation 3 (F$_3$)
384 grams all-purpose flour	384 grams all-purpose flour	384 grams all-purpose flour	384 grams all-purpose flour
7 grams baking soda	7 grams baking soda	7 grams baking soda	7 grams baking soda
2 grams baking powder	2 grams baking powder	2 grams baking powder	2 grams baking powder
113 grams butter	113 grams butter	113 grams butter	113 grams butter
200 grams brown sugar	200 grams brown sugar	200 grams brown sugar	200 grams brown sugar
102 grams large eggs	102 grams large eggs	102 grams large eggs	102 grams large eggs
4.20 grams vanilla extract	4.20 grams vanilla extract	4.20 grams vanilla extract	4.20 grams vanilla extract
	50 grams blended okra	120 grams blended okra	180 grams blended okra
	120 grams blended eggplant	180 grams blended eggplant	240 grams blended eggplant
	14 grams garlic powder	21 grams garlic powder	28 grams garlic powder

It is shown in Table 2 that there were four (4) treatment formulations from F_0-F_3 with different amount of garlic powder, okra, and eggplant. All other ingredients were held constant. F_0 was the control/standard recipe; F_1 used 14 grams garlic powder, 50 grams blended okra, and 120 grams blended eggplant. F_2 had 21 grams of garlic powder, 120 grams of blended okra, 180 grams of blended eggplant, and F_3 used 28 grams of garlic powder, 180 grams of blended okra, and 240 grams of blended eggplant. Other ingredients were held constant.

Sensory Analysis of the Garlic-Flavored Veggie Cookies Based on Sensory Quality Attributes

The panelists rated the sensory analysis of different treatment formulations with varying amounts of garlic, okra, and eggplant as to their sensory characteristics in terms of color, aroma, flavor, and texture.

The researcher had undertaken two phases of the study to come up with the result of the study. The first phase was the formulation process. The preparation of baking ingredients and the materials or utensils needed were secured in formulating the four treatments.

The second phase was the sensory evaluation of the four (4) levels of treatment formulations to identify the most acceptable treatment. In this phase, a Scoring Sheet for Descriptive Test and a 9-point Hedonic Scale Rating were prepared. There was an orientation done by the researcher on the selected sensory evaluators consisting of 35 T.L.E teachers and 25 students as consumers.

Samples were labeled before sensory analysis using five-digit codes. Indicated in the score sheet in the serving tray was coded with a combination of numbers and a letter. An orientation on the product characteristics was done to the panelist before the sensory evaluation to understand the product being studied, which the researcher would like to discover. The product's sensory attributes studied were color, aroma, flavor, and texture.

Color

The characteristics of a food product can be evaluated through the sense of sight. The color of the product affects the attractiveness of the appearance of the product.

Table 3 presents the sensory analysis of the formulated garlic-flavored veggie cookies in terms of color.

Table 3

Mean Rating of the Panelists of the Garlic-Flavored Veggie Cookies

in terms of Color

Formulation	Mean	Std. Dev	Qualitative Interpretation
F_0 (Control)	4.6	0.50	Neither Like nor Dislike
F_1	7.1	1.05	Like Moderately
F_2	6.9	0.85	Like Moderately
F_3	8.8	0.39	Like Extremely

As presented in Table 5, the panelists rated F_3 **Like Extremely** with a weighted mean of 8.8 and a standard deviation of 0.39. Furthermore, F_1 was rated **Like Moderately** with a weighted mean of 7.1 and standard deviation of 1.05, F_2 was rated **Like Moderately** with a weighted mean of 6.9 and standard deviation of 0.85, while F_0 as **Neither Like or Nor Dislike** with a weighted mean of 4.6 and standard deviation of 0.50.

It means that in terms of color acceptability, Formulation 3 (F_3) was the most acceptable in terms of the panel's sensory analysis of color. It could be attributed to the amount of garlic and vegetables, which is highest in this treatment.

Aroma

Aroma is recognized through the sense of smell. Good aroma indicates good quality of the product and attracts people. Aroma plays a significant role when it comes to food acceptability.

Table 4 presents the sensory analysis of the formulated garlic-flavored veggie cookies in terms of aroma.

Table 4

Mean Rating of the Panelists of the Garlic-Flavored Veggie Cookies

in terms of Aroma

Formulation	Mean	Std. Dev	Qualitative Interpretation
F_0 (Control)	4.0	1.03	Dislike Slightly
F_1	7.3	0.93	Like Moderately
F_2	7.7	0.99	Like Very Much
F_3	8.7	0.48	Like Extremely

As presented in Table 4, the panelists rated F_3 **Like Extremely** with a weighted mean of 8.7 and standard deviation of 0.48. Meanwhile, F_2 was rated **Like Very Much** with a weighted mean of 7.7 and standard deviation of 0.99, F_1 **Like Moderately** with a weighted mean of 7.3 and standard deviation of 0.93, and F_0 as **Dislike Slightly** with a weighted mean of 4.0 and standard deviation of 1.03.

It means that in terms of aroma, F_3 was the most acceptable in terms of the panel's sensory analysis of the products' aroma. It could be attributed to adding more garlic and vegetables to this treatment.

Flavor

The palatability of the product will be determined by the sense of taste. It is the deciding role to tell the different flavors in the mouth.

Table 5 presents the sensory analysis of the formulated garlic-flavored veggie cookies in terms of flavor.

Table 5

Mean Rating of the Panelists of the Garlic-Flavored Veggie Cookies

in terms of Flavor

Formulation	Mean	Std. Dev	Qualitative Interpretation
F_0 (Control)	5.7	0.80	Like Slightly
F_1	6.9	0.64	Like Moderately
F_2	7.5	0.85	Like Very Much
F_3	8.9	0.35	Like Extremely

It can be gleaned in Table 5 that raters rated F_3 as **Like Extremely** with a weighted mean of 8.9 and a standard deviation of 0.35. Moreover, they rated F_2 as **Like Very Much** with a weighted mean of 7.5 and standard deviation of 0.85, F_1 was rated **Like Moderately** with a weighted mean of 6.9 and standard deviation of 0.64, while F_0 was **Like Slightly** with a weighted mean of 5.7 and standard deviation of 0.80.

Based on the figures, F_3 was the most acceptable regarding the panel's taste of the product with the verbal description of Like Moderately. It could be because of the amount of garlic and vegetables that made the cookies most aromatic in flavor.

Texture

The mouth plays an important role in examining the texture characteristics of the product.

Table 6 presents the sensory analysis of the formulated garlic-flavored veggie cookies in terms of flavor.

Table 6

Mean Rating of the Panelists of the Garlic-Flavored Veggie Cookies

in terms of Texture

Formulation	Mean	Std. Dev	Qualitative Interpretation
F_0 (Control)	5.6	0.57	Like Slightly
F_1	7.2	0.61	Like Moderately
F_2	7.3	1.35	Like Moderately
F_3	9.0	0.13	Like Extremely

Table 6 shows that the panelists rated F_3 as Like Extremely with a weighted mean of 9.0 and a standard deviation of 0.13. On the other hand, F_2 and F_1 were rated as **Like Moderately** with a weighted mean of 7.3 and 7.2, respectively. Lastly, F_0 was rated **Like Slightly** with a weighted mean of 5.6 and a standard deviation of 0.57.

Based on the figures, F_3 was the most acceptable in terms of the panel's evaluation of the product's texture. The difference in texture could be due to the different amount of vegetables in this formulation.

Test of Significant Difference in the Attributes of the Garlic-Flavored Veggie Cookies among the Treatments

Table 7

ANOVA Results for Each Attribute of the Different Treatments

Attributes	*df*	*F*	*p-value*
Color	239	325.00	< 0.01
Aroma	239	315.54	< 0.01
Flavor	239	230.06	< 0.01
Texture	239	187.28	< 0.01

Table 7 shows the Analysis of Variance results for each attribute of the four treatments prepared for this study at a 0.05 level of significance. All the p-values less than 0.01 show a significant difference in panelists' ratings of each treatment in terms of color, aroma, flavor, and texture. It means that one of the treatments had significantly higher ratings than the rest.

Chapter 3

SUMMARY, FINDINGS, CONCLUSIONS, AND RECOMMENDATIONS

Summary

This study determined the most acceptable garlic-flavored veggie cookies among formulations with varying amounts of garlic, okra, and eggplant and then created a techno-guide from it.

This research followed an experimental research design. It underwent two phases: first was the preparation of three different formulations of garlic-flavored veggie cookies with varying amounts of garlic, okra, and eggplant, and the second was the sensory evaluation of the said formulations.

The researcher prepared different formulations: F_0 as the control group using the standard recipe; F_1 with 14 grams garlic powder, 50 grams boiled blended okra, and 120 grams boiled blended eggplant; F_2 with 21 grams garlic powder, 120 grams boiled blended okra, and 180 grams boiled blended eggplant; and F_3 with 28 grams garlic powder, 180 grams boiled blended okra, and 240 grams boiled blended eggplant.

Sixty respondents consisting of 35 TLE teachers and 25 students who major in TLE from Cebu Technological University were asked to rate the different formulations of the cookies in terms of color, aroma, flavor, and texture using the nine-point Hedonic Rating Scale.

The results gathered from this study were the basis for the techno-guide.

FINDINGS

The following findings were gathered from this study:

1. In terms of color, F_3 was rated with the highest mean rating of 8.8 or "Like Extremely" while F_1 had 7.1 and F_2 had 6.9, both "Like Moderately", and F_0 had 4.6 or "Neither Like nor Dislike".

2. In terms of aroma, F_3 was rated with the highest mean rating of 8.7 or "Like Extremely" while F_2 had 7.7 or "Like Very Much", F_1 had 7.3 or "Like Moderately" and F_0 had 4.0 or "Dislike Slightly".

3. In terms of flavor, F_3 was rated with the highest mean rating of 8.9 or "Like Extremely" while F_2 had 7.5

or "Like Very Much", F_1 had 6.9 or "Like Moderately" and F_0 had 5.7 or "Like Slightly".

4. In terms of texture, F_3 was rated the highest mean rating of 9.0 or "Like Extremely" while F_2 had 7.3 and F_1 had 7.2, which are both "Like Moderately" and F_0 had 5.6 or "Like Slightly".

5. There is a significant difference in the rating of the panelists in each attribute being studied, as evidenced by a p-value of less than 0.01. Post hoc analysis results show that F_3 had significantly higher ratings than the other treatments.

CONCLUSION

It can be concluded that the most acceptable formulation for a garlic-flavored veggie cookie was F_3 in terms of color, aroma, flavor, and texture. Such cookies should contain 28 grams garlic powder, 180 grams boiled blended okra, and 240 grams boiled blended eggplant along with the other ingredients.

RECOMMENDATIONS

Considering the findings of this study, the following are recommended:

1. Food processors should adopt Formulation 3 (F_3) because it was proven to have acceptable color, aroma, taste, and texture.

2. Teachers should introduce and encourage eating healthy snacks such as garlic-flavored veggie cookies. It can also be included in the list of foods in school canteens.

3. Entrepreneurs can adapt this recipe as this can be a potential source of income.

4. Consumers should patronize food products like this innovation because of their nutritional value and health benefits.

OUTPUT OF THE STUDY

GARLIC *(Allium sativum L.)* FLAVORED VEGGIE COOKIES:

TECHNO - GUIDE

Rationale

Food is any substance consumed to provide nutritional support for the body. It is usually of plant or animal origin, and contains essential nutrients, such as carbohydrates, fats, proteins, vitamins, or minerals.

The substance is ingested by an organism and assimilated by the organism's cells to provide energy, maintain life, or stimulate growth. People secured food through two methods: hunting and gathering and agriculture. Today, the majority of the food energy required by the ever increasing population of the world is supplied by the food industry.

Vegetables are of a great significance as a source of vitamins, minerals and plant proteins in human diet all over the world. Vegetable cultivation is one of the more efficient and major branches of agriculture and of economic value as well.

Vegetables too are home for many antioxidants. These health benefiting phyto-chemical compounds firstly; help protect the human body from oxidant stress, diseases, and cancers, and secondly; help the body develop the capacity to fight against these by boosting immunity

8 TOP BENEFITS OF GARLIC Organic Facts

Provides relief from acne and asthma

Beneficial in digestion	Helps cure hypertension
Useful for curing ear aches	Reduces high cholesterol levels
Aids in treating eye infections	Helps treat cough and cold

Gives relief from intestinal ailments

www.organicfacts.net

Specific Objectives

1. Give importance to the role of vegetables in improving the Nutritional Status of the family.
2. Dessiminate nutrition information to the community extension beneficiaries on utilizing garlic, okra and eggplant for food processing and product development.
3. Employ a livelihood program to develop income-generating projects in cookie production that could lead to productivity.
4. Invigorate farmers to plant more of these vegetables, which will provide them additional income.

Ingredients

28 grams	Garlic powder
180 grams	Blended okra
240 grams	Blended eggplant
120 grams	Butter
240 grams	Brown sugar
2 large	Eggs
1 tsp	Vanilla extract
720 grams	All-purpose flour
1 tsp	Baking soda
½ tsp	Baking powder

Procedure

1. Wash the vegetable (okra and eggplant).
2. Boil the fresh eggplant and okra separately until tender.
3. When it cooks, remove it from the pot.
4. Blend the boiled eggplant and okra separately.
5. Set aside.
6. Evenly place two racks in the middle of the oven, preheat to 375°F, then, using parchment paper or silicone sheets, line two baking sheets.
7. Melt the butter. Whisk the sugar, eggs, butter, and vanilla in a large bowl until smooth.
8. Whisk the flour, baking soda, salt, garlic powder, blended okra, and blended eggplant in a separate bowl. Add this mixture to the wet ingredients using a wooden spoon.
9. Put heaping tablespoons of the dough into the prepared pans. Roll the dough into balls with hands slightly wet. Set the cookies on the pans with about two inches of space. Bake until cookies become golden, about 12 to 16 minutes, depending on the chewiness or crunchiness you like for the cookies. Then transfer them with a spatula to a rack to cool.

INCREDIBLE BENEFITS OF EGGPLANT

TOP 7

Improves Brain's Cognitive Skills	Improves Blood Flow
Prevents Anemia	Prevents Birth Defects
Good For Your Blood	Controls Cancer Cells
	Keeps Your Bones Strong

www.liveALittleLonger.com

LIVE LONGER

Cost Analysis

INGREDIENTS	QUANTITY	COST
All-purpose flour	3 cups	Php 27.00
Brown Sugar	3/4 cup	Php 5.00
Baking Soda	3/4 tsp	Php 1.00
Butter	1/2 cup	Php 20.00
Eggs	2 pcs	Php 12.00
Vanilla	1 tsp	Php 2.00
Garlic	2 tsp	Php 5.00
Okra	1 1/4 cup	Php 20.00
Eggplant	12/2 cup	Php 30.00
Total Cost		**Php 122.00**

Yield: 30 servings
Price per Serving: 5.00

Return of Investments (ROI)

It is a concept of an investment of some resources yielding a benefit to the investor.

$$ROI = \frac{(Gain\ from\ Investments - Cost\ of\ Investments)}{Cost\ of\ Investments}$$

$$= \frac{Php\ 150.00 - Php\ 122.00}{Php\ 122.00} \times 100$$

$$= 23\ or\ 23\%$$

Health Benefits of Okra (Lady's Finger)

- Prevents Liver Disease
- Lowers Bad Cholesterol
- Promotes a Healthy Pregnancy
- Improves Eye Health

Use this remedy to Reduce Blood Sugar Levels

1. Cut off the ends of 4 to 5 okras & prick the body using a fork
2. Soak the pricked okras in a glass of water overnight
3. Next morning, remove the okras & drink the water on an empty stomach

TOP 10

VISION

A premier, multidisiplinary-technological university.

MISSION

The university shall primarily provide advanced professional and technical instruction for special purposes, advanced studies in industrial trade, agriculture, fishery, forestry, aeronautics and land-based programs, arts and sciences, health sciences, information technology, and other relevant, fields of study. It shall also understake research and extension services, and provide prgressive leadership in its areas of specialization. (SEC 2 RA 9744)

GOAL

The university shall produce scientifically and technologically oriented human capital equipped with appropriate knowledge, skill, and attitude. It shall likewise pursue relevant research, strengthen linkage with the industry, Community and other institutions and maintain sustainable technology for the preservation of the environment.

OUTCOMES

1. Relevant, effective and quality education for sustainable growth.
2. Access to quality education for the unpriviledged students.
3. Relevant research for economic, environmental and sustainable development.
4. Expanded community engagement.
5. Effective and efficient management of resources.

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GRADUATE SCHOOL
MAVED Program

Techno-Guide For

Garlic *(Alllium sativum)* Flavored Veggie Cookies

Gemma G. Baguio
MAVED Researcher

GEMMA G. BAGUIO

Researcher

Chapter 3

OUTPUT OF THE STUDY

GARLIC *(Allium sativum L.)* FLAVORED VEGGIE COOKIES:

TECHNO - GUIDE

Foreword

Eating a variety of foods will supply the nutrients that are essential for our bodies. Nutrition from food is necessary, and without this daily dose of nutrition, humans may not survive for long.

This techno-guide is a product of the researcher's effort to eradicate malnutrition and improve the family's food habits and good nutrition by being selective and knowledgeable enough about the nutrients acquired from the eaten foods. On the other hand, it enhances the food enthusiast to develop desirable skills and improve ideas in baking using unutilized by-product ingredients which contain health benefits.

Introduction

Food is any substance consumed that provides nutrients for the body. It can come from plants and animals, and it can contain vital nutrients like vitamins and minerals and other biological molecules like carbohydrates, fats, and proteins. The substance is taken by an organism and assimilated by the organism's cells to provide energy, maintain life, or stimulate growth. People obtain food through hunting and gathering and through agriculture. Today, the food industry supplies most of the food energy required by the world's ever-increasing population.

Vegetables are of great significance as a source of vitamins, minerals, and plant proteins in the human diet worldwide. Cultivating vegetables is an efficient agriculture technique and entails economic value as well.

Vegetables, too, are home to many antioxidants. These health-benefiting phytochemical compounds firstly; help protect the human body from oxidant stress, diseases, and cancers, and secondly, help the body develop the capacity to fight against these by boosting immunity.

General Objectives

This experimental study was designed for Garlic (Allium sativum) Flavored Veggie Cookies:

Techno-Guide.

Specific Objectives

1. Give importance to the role of vegetables in improving the nutritional status of the family.

2. Spread nutrition information on utilizing garlic, okra, and eggplant for food processing and product

  development.

3. Employ a livelihood program to develop income-generating projects in cookie production that could lead to

  productivity.

4. Invigorate farmers to plant more of these vegetables, which will provide them additional income.

Ingredients:

28 grams garlic powder	2 large eggs
180 grams blended okra	1 tsp vanilla extract
240 grams blended eggplant	720 grams all-purpose flour
120 grams butter	1 tsp baking soda
240 grams brown sugar	½ tsp baking powder

Procedures:

1. Wash the vegetable (okra and eggplant).

2. Boil the fresh eggplant and okra separately until tender.

3. When it cooks, remove it from the pot.

4. Blend the boiled eggplant and okra separately.

5. Set aside.

6. Evenly place two racks in the middle of the oven, preheat to 375°F, then, using parchment paper or

silicone sheets, line two baking sheets.

7. Melt butter on a medium heat. Whisk the sugar, eggs, butter, and vanilla in a large bowl until smooth.

8. Whisk the flour, baking soda, salt, garlic powder, blended okra, and blended eggplant in a separate bowl. Add this mixture to the wet ingredients using a wooden spoon.

9. Put heaping tablespoons of the dough into the prepared pans. Roll the dough into balls with hands slightly wet. Set the cookies on the pans with about two inches of space.

10. Bake until cookies become golden, about 12 to 16 minutes, depending on the chewiness or crunchiness you like for the cookies. Then transfer them with a spatula to a rack to cool.

Figure 8. The Three Formulations

Health Benefits of Garlic

Garlic is an excellent source of essential minerals and vitamins for optimum health. Its bulbs are rich sources of minerals like potassium, iron, calcium, magnesium, manganese, zinc, and selenium. Selenium is a heart-healthy mineral and is an essential cofactor for antioxidant enzymes within the body. At the same time, manganese acts as our body's cofactor for an antioxidant called superoxide dismutase enzyme. Iron, meanwhile, is necessary for red blood cell formation.

Health Benefits of Okra

Rich fiber source. Okra's rich fiber content helps in better bowel movement. Pectin, a soluble fiber, swells up in the intestine and helps eliminate the wastes from the intestine easily.

For pregnancy and fetal development. There is abundant folate and nutritional value in okra, which not only help in conceiving but also in the fetus' brain development, prevention of miscarriages, formation of the fetal neural tube, and preventing of defects.

For strong bones. Vitamin K is a co-factor essential in the blood-clotting process and, together with folate, helps restore bone density, strengthen bones, and prevent osteoporosis.

For asthma. Okra's antioxidant and anti-inflammatory properties and its high vitamin C level lessen the development of asthma and prevent deadly attacks.

Respiratory soother. A decoction from its leaves and flowers is a remedy for bronchitis and pneumonia. Its slimy quality makes it an excellent home remedy for treating the common cold and flu.

Relieves constipation. Okra's fiber and mucilaginous pods help increase stool bulk, facilitate proper water absorption, and ensure easy bowel movements with its natural laxative properties.

Treats sun strokes. Adding okra to the diet help reduce summer heat and sun strokes. It also relieves weakness, exhaustion, and overall depression.

Lowers colon cancer risk. The insoluble fiber in okra cleans the intestinal tract, decreasing the risk of

colon-rectal cancer. The high antioxidant level in okra helps protect the immune system against harmful free radicals and prevents the mutation of cells.

Health Benefits of Eggplant

Improves heart health. Eggplants are cardiovascular saviors packed with fiber, vitamins B1, B3, B6, C, K, and phytonutrients. Regularly eating plants that contain flavonoids is essential to lowering the risk of heart disease, which is America's leading cause of death.

Combats cancer. The polyphenols in this vegetable, such as delphinidin, protect cells from damage caused by free radicals, prevent tumor development, and stop cancer cell spread. Other compounds like anthocyanins and chlorogenic acid have potent antioxidant and anti-inflammatory benefits on the body. Chlorogenic acid can also aid in cleansing enzymes inside cells, encouraging cancer cell death and warding off other viral diseases.

Lowers 'bad' cholesterol. Baking an eggplant at 400 degrees can bring out this violet garden egg's flavorful and nutritional side. It can reduce the amount of 'bad' cholesterol in your body. However, frying it won't have any advantage since fat from the cooking oil can accumulate in it.

Improves brain function. Phytonutrients within this vegetable enhance cognitive ability and benefit overall mental health. It protects the brain from diseases and toxins by fighting off free radicals and promoting blood flow.

Better blood. With high levels of Vitamin K and bioflavonoids, regularly consuming eggplant can reduce the risks of blood clots and strengthen blood vessels.

Dynamic digestion. This fibrous and filling vegetable is a great help in maintaining a healthy digestive system since it has very little fat or cholesterol. The fiber enables the body to quickly process foods and support the absorption of nutrients by producing gastric fluids within the stomach.

Assists anemia. Those who suffer from iron deficiency may be able to battle some of the debilitating

symptoms by including eggplant in their meals. It contains many essential minerals, including iron and copper, which assist in improving the health of red blood cells within your bloodstream. These minerals can notably boost energy and strength and reduce feelings of fatigue or worry.

Regulates diabetes. Eggplants are ideal for including in meals if you are watching blood glucose and insulin levels.

Successful pregnancy. Folic acid is imperative if you are a pregnant mother because it protects infants from defects within the neural tube. Folate is essential to everyone's nutrition but should be significantly increased if you carry a baby to protect their brain development.

Costing Analysis

The cost of the product was computed to give idea for those who are interested to bake avocado bun.

INGREDIENTS	QUANTITY	COST
all-purpose flour	3 cups	Php 27.00
brown sugar	¾ cup	Php 5.00
Baking soda	¾ tsp	Php 1.00
Butter	½ cup	Php 20.00
Eggs	2 pcs	12.00
Vanilla	1 tsp	2.00
Garlic	2 tsp	5.00
Okra	1 ¼ cup	20.00
Eggplant	1 ½ cup	30.00
Total Cost		**Php 122.00**

Yield: 30 servings

Price per Serving: 5.00

Return of Investments (ROI)

It is a concept of an investment of some resources yielding a benefit to the investor.

ROI = (Gain from Investments – Cost of Investments)

Cost of Investments

= Php 150.00 – Php 122.00 x 100

Php 122.00

= 23 or   23%

Twenty-three percent (23%) is a percentage for return of investments. On this percentage, the investor will benefit or gain as he or she is investing the product. This is a good indication that you are investing the right product and business track.

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