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DEVELOPMENT AND EVALUATION OF IMPROVISED OVEN FOR BREAD AND PASTRY COMPETENCIES

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ABSTRACT

Nowadays, it is necessary to develop an improvised oven to meet the Technology and Home Economics competencies for bread and pastry. This quantitative research aimed to improvise an oven and determined the level of evaluation of the students, teachers, and practitioners on the improvised oven in terms of design, satisfaction, cost-effectiveness, safety, durability, and functionality. The study identified 30 respondents using the stratified random sampling, and the project was evaluated using a 4-point Likert scale. Data were analyzed using mean, ANOVA or Analysis of Variance at 0.05 level of significance, and descriptive analysis was used to interpret the data. Results of the study showed that the requirements and specifications on the development of the improvised oven requires different materials, various features to enhance their design, satisfaction, cost-effectiveness, safety, durability, and functionality. Moreover, the improvised oven can be used as oven for bread and pastry as it was evaluated as "very much acceptable" along design, satisfaction, cost-effectiveness, safety, durability, and functionality by the learners, teachers, and practitioners. Results further show that there is a significant difference in the evaluation of the students, teachers, and practitioners on the improvised oven across the parameters. It is recommended to use the improvised oven as an instructional material of teachers in teaching bread and pastry production.

KEYWORDS: *alternative, bread and pastry competencies, development, improvisation, instructional materials*

INTRODUCTION

The multi-disciplinary field of Technology and Home Economics (THE) gives students the fundamental knowledge of science, society, and application to enable them to live modern lives. While technology education seeks to transmit fundamental and basic knowledge and skills linked to materials and their processing, energy conversion, and information processing. The goal of programs like instructional materials in Home Economics Education is to improve student teachers' knowledge of and proficiency with the creative application of technology to support instruction. To remain current and relevant, Home Economics education curricula must incorporate basic issues of technology applications, and students should be exposed to equipment thus enhancing their performances in the different competencies.

Meanwhile, the need for improvisation or development of an improvised oven will help address the target competencies along Quarter 1, Lesson 1 on preparing and producing bakery products specifically on the Most Essential Learning Competencies (MELCs) namely: (1.3) Use appropriate equipment according to required bakery products and standard operating procedures; (1.4) Bake bakery products according to techniques and appropriate conditions; and (1.5) Select required oven temperature to bake goods in accordance with the desired characteristics, standards recipe specifications (K to 12 TVL Track Home Economics – Bread and Pastry Production Curriculum Guide, 2013).

Furthermore, modernization and technological breakthroughs are now welcomed, and innovations are now considered needs of the modern world that must be met by effective performance to reach productivity goals. Therefore, it is crucial that home economics teachers make the most of these advancements, particularly about their baking supplies like ovens, for students to meet the required competences. Conversely, national, and local organizations and agencies thrive on producing high-quality results with relevant educational resources.

As a result, creating teaching-learning resources is thought to be one of the key factors in educational institutions that will encourage student learning and aid in the accomplishment of academic goals and objectives. It is imperative that educators prioritize the advancement and innovation of teaching-learning resources (Kapur, 2019).

There are relevant studies and literatures pertaining to the development of instructional materials, evaluation of instructional materials, as well as teaching bread and pastry competencies. Impact of localized learning materials like Niebres (2019) who demonstrated that using locally relevant learning resources significantly enhances both TLE teachers' instructional competency and students' academic achievement. Student perception of instructional materials by Albarico (2014) revealed that students perceived limitations in the adequacy of instructional materials due to curriculum requirements, suggesting a need for review to better align with curriculum goals. Components and Goals of TLE by Tayam (2018) outlined the components of TLE and its goals in preparing students for various vocational paths, emphasizing the importance of practical skills and knowledge. Carag & Briones (2021) underscored the significance of instructional materials in enhancing student performance, particularly in areas like bread and pastry production, by promoting learning objectives, clarity, and effective teaching strategies.

Likewise, there are challenges in material design: lack of resources and poor curriculum implementation, as highlighted by Calanog (2019) and Ogbu (2015). Studies like Babatunde (2020) and Beduya (2020) showcased innovative approaches to teaching tools, such

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as improvised ovens and fuel-efficient designs to enhance learning experiences and practical skills acquisition. TLE Teacher Evaluation and Observation Rubric developed by Tulsa Public Schools (2016) provided a framework for assessing the efficacy of instructional resources and teaching practices. Arakit (2016) suggested the importance of student-centered approaches in TLE, emphasizing active student participation and ownership of learning for better outcomes. Barcelona et al. (2023) pointed out common challenges faced by TLE teachers, such as lack of resources and access to technology, and advocated for further research to develop creative solutions to enhance teaching and learning processes.

In summary, the literature and studies provided find similarities to this study since this likewise underscored the importance of localized, effective instructional materials in TLE to improve both teacher competency and student outcomes, while also highlighting the need for innovation, evaluation, and student-centered approaches to address challenges and enhance educational experiences specifically in bread and pastry competencies.

The College of Teacher Education Research and Development Agenda (2023) of Nueva Vizcaya State University (NVSU)- Bambang Campus is also the foundation for this project as well as the National Research Agenda for Teacher Education (NRATE) 2019-2023 named Balanghai. It focuses on the teaching and learning process particularly on Area B: Design conducive environments for optimal learning and at the same time product development with a particular emphasis on practical arts and crafts books, monographs, and instructional materials, instructional designs, and utility models. The makeshift oven can be utilized by students enrolled in the TLE-Home Economics and Hospitality Industry Management as a teaching tool or resource, which will have a big impact on the program's implementation at NVSU and among schools in the Department of Education (DepEd) offering TVL track majoring in Home Economics.

Considering these agreements, the issue facing Technology Livelihood and Education (TLE) is the lack of suitable educational instruments, machinery, and equipment that may be used as a foundation for obtaining corrective measures in order to achieve an efficient learning process. Additionally, the researcher and TLE teachers noted that it can be difficult to teach practical skills and prepare students for the workforce while covering certain subjects. Additionally, students majoring in bread and pastry for the 2023–2024 academic year are struggling because the school's TLE laboratory is equipped with very little, including a single oven that has a 1:30 ratio.

The concepts offered caused certain ambiguities and challenges for both educators and students, as well as the necessity for ovens to prepare pastries and bakery goods such tarts, pandesal, pizza, buko pie, pineapple pie, and egg pie. These days, industrial ovens can be very costly and scarce for students, especially in institutions that offer TVL Home Economics as a course. Furthermore, budgetary constraints are common problems for educational institutions when it comes to purchasing such technology. Teachers have a significant responsibility to address these issues in order to meet the standards of the most essential learning competencies and to facilitate a productive and successful learning environment.

Furthermore, the researcher observed and identified these concerns most especially in the DepEd which is confronted with the lack of bread and pastry equipment most especially in far flung schools or barrio schools. There are existing materials, tools, and equipment, however, they are found to be obsolete and not functional because of rapid change in the science and technology.

Hence, this study was premised to design, construct, and improvised an oven utilizing local materials which is functional and durable enough when compared to commercially available ovens. Considering these literature and experiences, this study was conceptualized to evaluate the design, satisfaction, cost-effectiveness, safety, durability, and functionality of the improvised oven for bread and pastry production competencies.

RESEARCH METHODOLOGY

Research Design

This study employed the quantitative type of research design. Quantitative research was used to quantify the problem by way of generating numerical data or data which was transformed into useable statistics. Moreover, quantitative data was interpreted with statistical analysis and since statistics are based on the principles of mathematics, the quantitative approach was viewed as scientifically objective and rational (Simply Psychology, 2023).

Additionally, this study focused on the design, development, and evaluation of the improvised oven. To evaluate the functionality of the developed laboratory equipment for bread and pastry competencies, evaluators rated the following parameters namely: design, satisfaction, cost-effectiveness, safeness, durability, and functionality using a 4-point Likert scale questionnaire. With this, the researcher used the descriptive quantitative research design to quantify collected data and establish significant differences through statistical tools. Hence, the data obtained from the respondents through this design are by nature of comparing its result which can be represented numerically in the forms of table.

Research Method

This study employed the descriptive-evaluative method of research evolving the Product Development Method (PD), wherein the researcher conceptualized the design, developed, and the respondents evaluated the improvised oven. Additionally, the comparative approach was employed with the evaluation of the different classifications of the respondents such as students, teachers, and practitioners.

The descriptive method dwelt on the exploration of existing improvised oven by emphasizing its present condition. Moreover, this study described the output as to the nature on how it worked thus prevailing conditions or practices and seeks accurate description.

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Furthermore, the designing of the improvised oven for bread and pastry production specifically the dimensions of each part was described.

On the other hand, the product development (PD) method or design involves on both improving, innovating existing product, as well as making an original machine. This design further aimed to give researchers the theory of constructivism and putting this knowledge into practical applications which starts from conceptualization of the improvised oven up to the actualization.

Moreover, this study used the quantitative approach as it generated data on the level of acceptability of the improvised oven along user design, functionality, cost-effectiveness, safety, durability, and functionality.

RESULTS AND DISCUSSIONS

This chapter presents the highlights of the research study titled, "Development and Evaluation of Improvised Oven for Bread and Pastry Competencies."

Problem 1: What are the design, requirements, and specifications of the improvised oven for bread and pastry competencies?

The figures below show the frontal, left, right and rear elevation of the improvised oven.

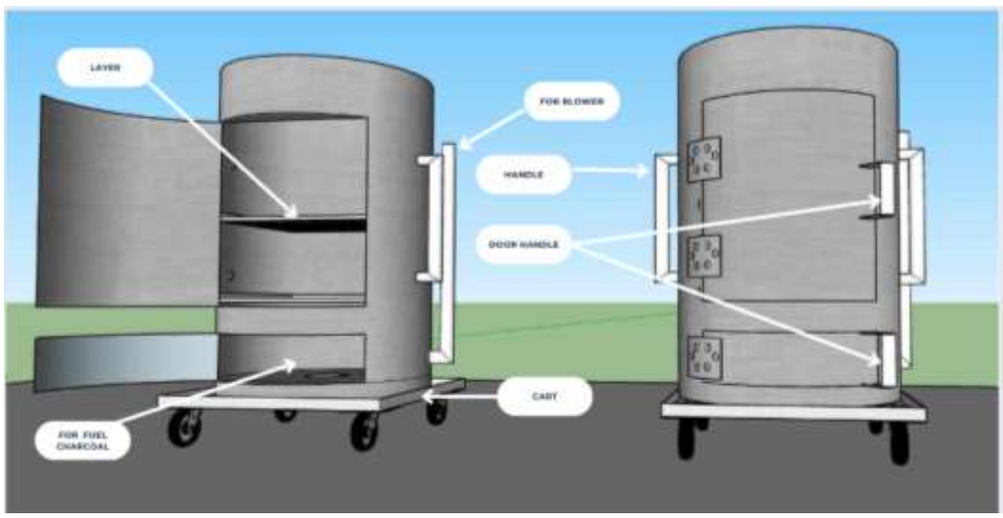

Figure 4a. ***Fontal View and Design of the Improvised Oven***

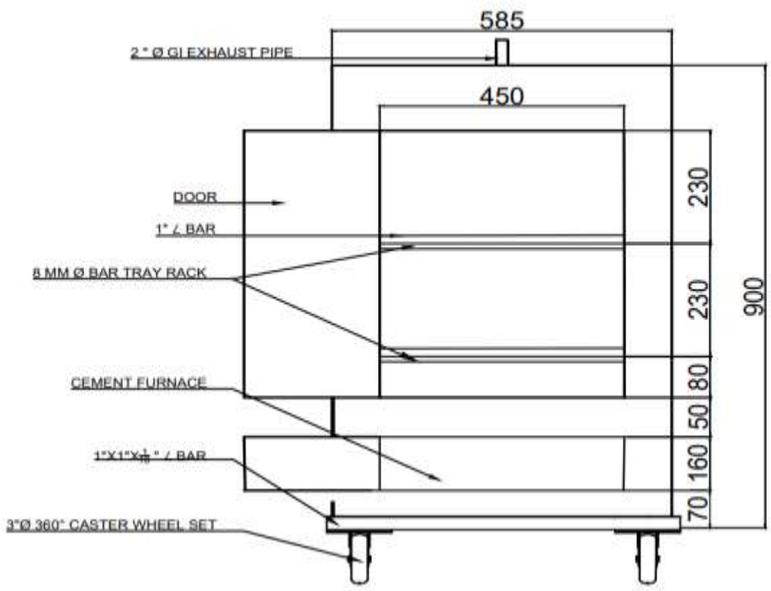

Figure 4b. ***Front Elevation (Open Door)***

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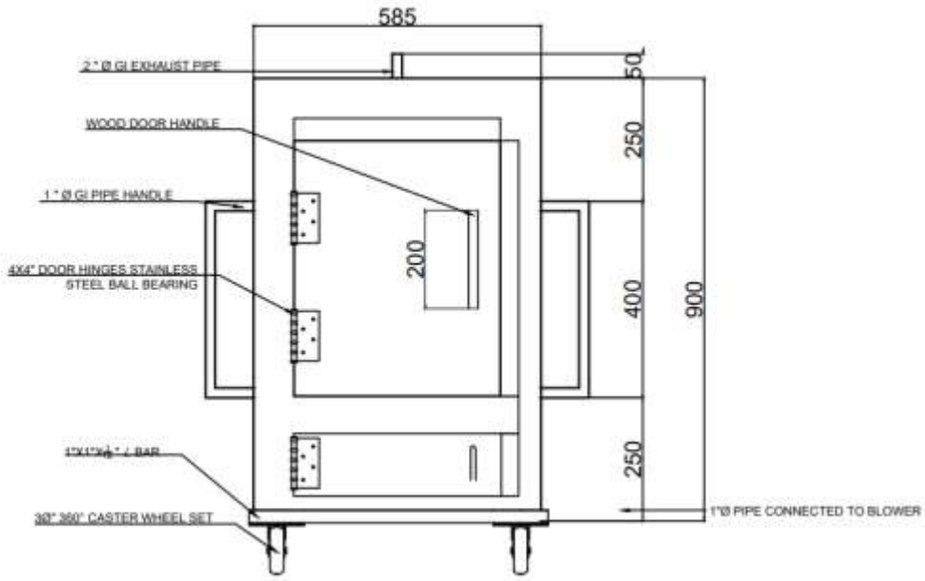

Figure 4c. ***Front Elevation (Closed Door)***

The improvised oven has two-layer compartments with doors for the bread and pastry production. The layer below is intended for the charcoal that is for ignition.

According to Babatunde (2020), to guarantee that the improvised oven is an effective teaching tool that improves learning, several important designs, features, and procedures must be taken. It is important to identify the object that must be improvised and then comprehend the fundamental ideas that underpin its operation. Essential steps in the development process include designing and sketching a rough drawing of the oven, listing the materials required, and building the oven in accordance with the instructions to create the prototype. Other crucial factors to think about include using the oven to test and assess it, redesigning it as needed, and mass-producing it if feasible. Additionally, the improvised oven needs to have a few special qualities to be suitable for use in a learning environment. These characteristics include being straightforward in design, having the capacity to increase the efficacy of lessons by providing students with the necessary knowledge and abilities, being safe to reduce risks, saving time in both creation and use, producing the desired results as expected, being inexpensive and plentiful, and involving the student to promote comprehension and memory of the material.

Side and Rear Elevation

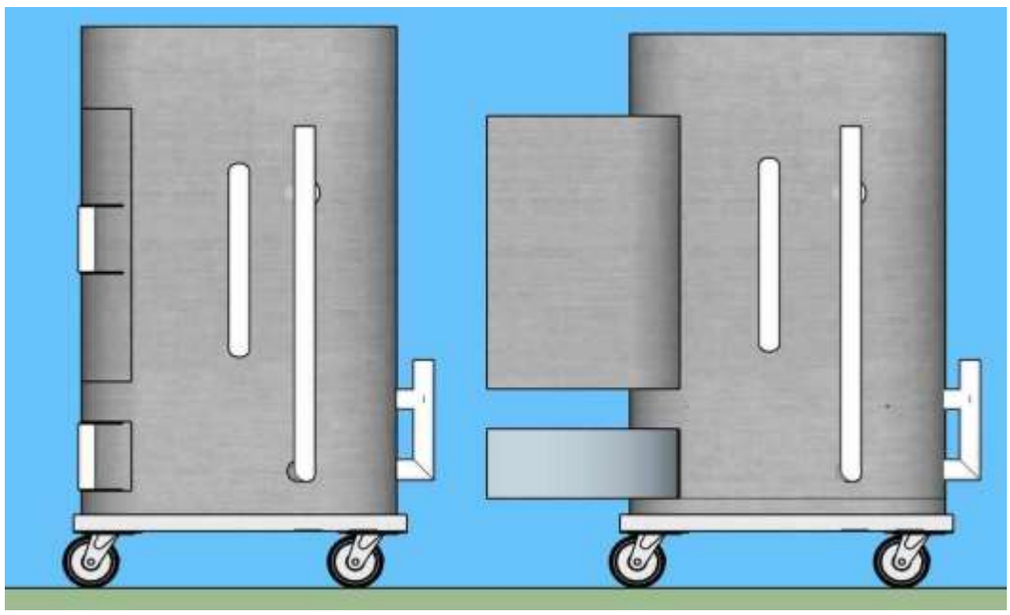

Figure 4d. ***Back View and Design of the Improvised Oven***

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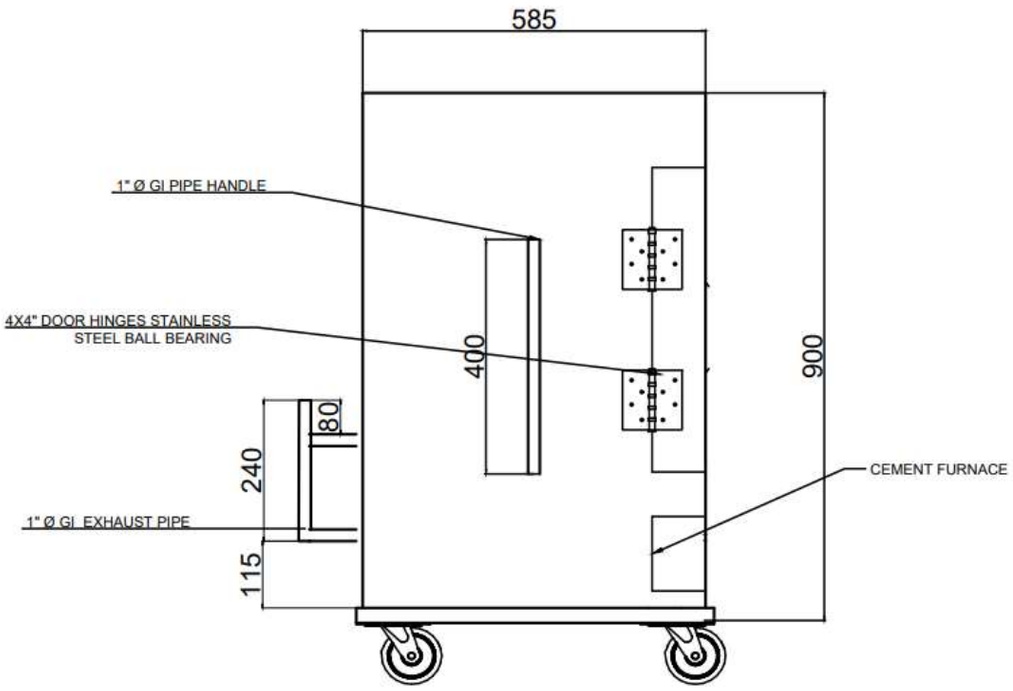

Figure 4e. ***Left Elevation***

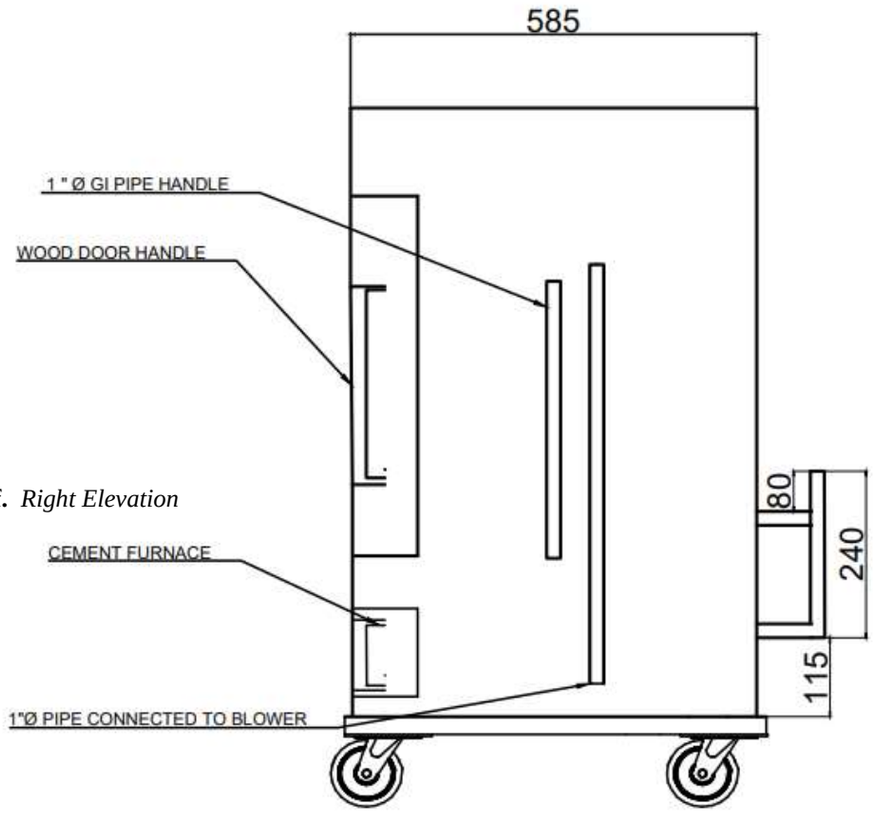

Figure 4f. *Right Elevation*

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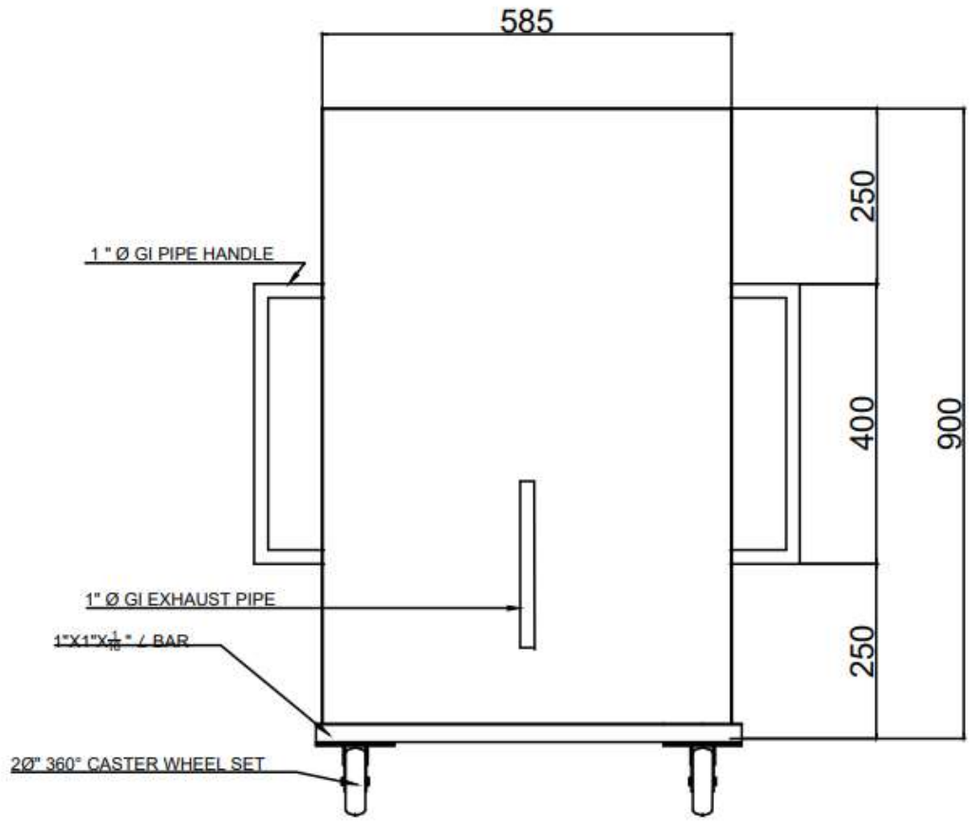

Figure 4g. ***Rear View***

The sideview of the improvised oven shows the door handle out of wood, exhaust, including its blower to supply air into the burning charcoal. On the other hand, the wheel casters are installed for easy transfer to other places once it is needed.

In a similar study, Albarico et. al (2014) also evaluated how well the instructional materials on bread and pastry were thought to have addressed learning objectives, learning content, activities, evaluation, design/layout, and material clarity. Additionally, it looked at the students' performance in written and practical assignments. The study's conclusions shed light on how additional teaching resources affect students' performance when making bread and pastries, which is useful information for teachers and curriculum designers.

Table 2 shows the requirements and specifications on the development of the improvised oven.

Table 2

Requirements and Specifications on the Development of the Improvised Oven

Requirements and Specifications				
Qty	**Unit**	**Material**	**Description**	**Cost (Php)**
1	unit	Drum	587cm x 58.5 cm (1.2mm thk)	800.00
8	meters	Round Bar	8 mmø stainless	600.00
5	meters	Angle Bar	1” x 1” x 1/8” thk	850.00
3	pcs	Hinge Door	4” x 3” stainless steel ball bearing	230.00
4	sets	Caster wheels	Heavy Duty 3 “diameter with lock	1,000.00
3	meters	Flat bar	1 inch x 2mm thk, stainless	114.00
3.5	meters	GI Pipe	2 “ ø for the handle, stainless	508.00
2	sets	Wood	1” ø x 20cm door handle	50.00
1	set	Sheet	950cm x 500cm	1,800.00
5	kg	Cement	Furnace	100.00
1	pail	Sand	S1	50.00
1	unit	Blower	Air blower Kalan DC 12 V	200.00
1	pc	Thermometer	Stainless steel	139.00
1	kg	Welding Rod	Stainless	450.00
1	L	Paint	Boysen (Green) for metal	450.00
6	cd	Laborer	Labor	3,670.50
			Total	11, 011.50

Table 2 shows the requirements and specifications on the development of the improvised oven: 1 unit drum (587cm x 58.5 cm (1.2mm thk) amounting to 800.00 pesos, 8 meters round bar (8 mmø stainless) amounting to 600.00 pesos, 5 meters angle bar (1” x 1” x 1/8” thk) amounting to 850.00 pesos, 3 pieces hinge door (4” x 3” stainless steel ball bearing) amounting to 230.00 pesos, 4 sets caster wheels (Heavy Duty 3 “ diameter with lock) amounting to 1,000.00 pesos, 3 meters flat bar (1 inch x 2mm thk, stainless) amounting to 114.00

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pesos, 3.5 meters GI Pipe (2 " ø for the handle, stainless) amounting to 508. Pesos, 2 sets of wood (1" ø x 20cm door handle) amounting to 50.00 pesos, 1 set sheet (950cm x 500cm) amounting to 1,800.00 pesos, 5 kilogram cement (furnace) amounting to 100.00, 1 pail of sand (S1) amounting to 50 pesos, 1 unit blower (Air blower Kalan DC 12 V) amounting to 200 pesos, 1 piece thermometer (stainless steel) amounting to 139.00 pesos, 1 kilogram welding rod (for stainless steel) amounting to 450.00 pesos, 1 liter paint (Boysen (Green) for metal) amounting to 450.00 pesos and 6 calendar days labor for the skilled laborer amounting to 3,670.50. Overall, the total expenses in constructing and fabricating the development of improvised oven is 11, 011.50 pesos.

These requirements and specifications are essential for the successful development of an improvised oven that is safe, functional, and efficient for bread and pastry purposes. Each of the materials was planned carefully to fit the into the design and requirements for it to be functional and can be used for bread and pastry competencies. The key materials used in making an improvised oven included recycle containers such as the metal drum, heat resistant materials like the stainless steels, supporting structures such as the metals and its caster for portability, ventilation and airflow using a blower, as well as wooden insulation materials on its handles to avoid burns when opening the doors.

Problem 2: What is the level of evaluation of the students, teachers, and practitioners of the improvised oven in terms of design, satisfaction, cost-effectiveness, safety, durability, and functionality.

The table presents the data on the level of evaluation of the students, teachers, and practitioners of the improvised oven in terms of design, satisfaction, cost-effectiveness, safety, durability, and functionality.

Table 3
Summary of Respondents' Evaluation of the Improvised Oven in terms of Design, Satisfaction, Cost-effectiveness, Safety, Durability, and Functionality

Parameters	Students	Teachers	Practitioners	Overall Mean
Design	3.82 Very Much Acceptable	3.96 Very Much Acceptable	3.60 Very Much Acceptable	3.79 Very Much Acceptable
Satisfaction	3.90 Very Much Acceptable	3.96 Very Much Acceptable	3.66 Very Much Acceptable	3.84 Very Much Acceptable
Cost-Effectiveness	3.90 Very Much Acceptable	3.94 Very Much Acceptable	3.66 Very Much Acceptable	3.83 Very Much Acceptable
Safety	3.94 Very Much Acceptable	3.90 Very Much Acceptable	3.66 Very Much Acceptable	3.83 Very Much Acceptable
Durability	3.94 Very Much Acceptable	3.98 Very Much Acceptable	3.54 Very Much Acceptable	3.82 Very Much Acceptable
Functionality	3.90 Very Much Acceptable	3.98 Very Much Acceptable	3.60 Very Much Acceptable	3.83 Very Much Acceptable
Overall Mean	3.90 Very Much Acceptable	3.95 Very Much Acceptable	3.62 Very Much Acceptable	3.82 Very Much Acceptable

Table 3 presents the summary of the respondents' evaluation of the improvised oven in terms of design, satisfaction, cost-effectiveness, safety, durability, and functionality. It can be gleaned from the table that grand mean across all parameters are: 3.79 for design; 3.84 along satisfaction; 3.83 along cost-effectiveness, safety, and functionality; and 3.82 along durability. Meanwhile, the overall grand mean of student is 3.90, teachers is 3.95, and practitioners is 3.62, which are all described as "very much acceptable".

Overall, the respondent's evaluation on the improvised oven for bread and pastry competencies along design, satisfaction, cost-effectiveness, safety, durability, and functionality is very much acceptable.

Design. It can be deduced from the result that the respondents assessed the design of the improvised oven based on its materials, specifications, size, capacity, its charcoal based new feature, portability, and overall design as "very much acceptable".

This imply that the design could be used in making improvised oven for baking and pastry production. The results also indicate the acceptance of the design as a framework in developing future improvised ovens.

Similarly, the result is similar to the study of Beduya (2020) that involved the innovation of a charcoal oven. The oven was made also to be lightweight and portable to accommodate mobile bakers. Also, this is also relevant to the idea of Edjec (2021) that the evaluation of the respondents could include elements such as material compatibility and availability, mobility, user-friendliness, and the oven's

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versatility for both home and commercial use. In general, the evaluation of an improvised oven's design is thorough, emphasizing both its practical functionality and its aesthetic qualities to provide a balanced appraisal of its effectiveness. Hence, the result addresses the challenges on the study of (Calanog, 2019 & Ogbu, 2015) relative to inadequate facilities and instructional materials, a lack of teaching resources, and poor curriculum implementation.

Satisfaction. The result revealed that all the respondents (students, teachers and practitioners), evaluated it as very much acceptable as it can be used as a cheap yet effective alternative oven for bread and pastry. It has an added feature to check the temperature of the oven. It can be used for multiple purposes aside from baking and pastry production such as in cookery specifically for roasting and grilling. It can be user-friendly, and it is indeed can be efficient oven in baking and pastry purposes.

Meanwhile, positive evaluations of the improvised oven along the satisfaction parameter, highlighting its effectiveness, alternative, multipurpose affordability, and user-friendliness as the learners, teachers and practitioners experienced the baking process of which contributed to the high levels of satisfaction. With these, the result further supports the claims of Babatunde (2020) which is to guarantee that the improvised oven is an effective teaching tool that improves learning.

Cost-effectiveness. The evaluation of the improvised oven in terms of cost-effectiveness among students, teachers, and practitioners showed a mean description of "very much acceptable". Relative to this, the materials that were utilized to build are cost-effective, readily available in the locality, reduces and optimizes operational cost such as fuel consumption, needs less maintenance, and reduces other expenses in baking and pastry.

These findings support the claims of Halkier (2009) that making bread and pastries can be taught using an inexpensive or cost-effective oven while an improvised oven can be made in several ways.

Safety. Results revealed that the evaluation of the improvised oven in terms of safety among students, teachers, and practitioners across the indicators posted a mean description of "very much acceptable".

The risk of burns or accidents when operating can be minimized through its new feature, the exhaust of is suited to avoid smoke build up inside the stove, thus, avoiding smoky odor of the baked product. This also implies that the key features are safe to use, and it ensures stability and structural safety before, during and after use.

Hence, safety was a key aspect of the evaluation, focusing on how well the instructional materials avoids and lessens harm or danger to users (Albarico, et al., 2014).

Durability. The respondents (students, teachers, and practitioners) evaluated the improvised oven as "very much acceptable".
Based from the inspection of the respondents, the improvised oven is resistant to wear, corrosion, or degradation over time, it can last for many years once it is used. It has structural integrity under various loads or stresses. It requires maintenance or upkeep which is considered more durable.

According to Jainey (2022), the durability might affect both its baking efficiency and safety. The quality of the construction, the materials utilized, and the oven's resistance to heat exposure and repeated use are all important considerations when evaluating an improvised oven's durability. Hence, the lifespan of the improvised oven can also be extended with appropriate maintenance and care.

Functionality. Based from the findings, when evaluating the improvised oven's functionality as "very much acceptable," the respondents looked at how well it fulfills the demands of the users and its intended objectives specifically if it meets the intended user requirements or specifications, ensuring that it performs the necessary functions effectively.

The improvised oven has features or functionalities essential for the intended purpose of the product on bread and pastry production. It is easily operated, and it is consistent to perform its intended functions without failure or errors specially along bread and pastry production. The functionality aligns with user expectations and needs.

Similarly, according to Babatunde (2020), there are a few crucial steps that need to be followed to ensure that the improvised oven is a useful teaching tool that enhances learning. It is crucial to first identify the item that needs to be improvised and then understand the basic principles that guide its functioning.

Problem 3: Is there any significant difference in the evaluation of therespondents on the improvised oven along design, satisfaction, cost effectiveness, safety, durability, and functionality?
The summary of results on the significant differences in the evaluation of the respondents on the improvised oven along design, satisfaction, cost-effectiveness, safety, durability, and functionality is shown on the table.

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Table 4
Summary of Computation on the Differences in the Evaluation of the Respondents

Component/ Variable	Groupings	Mean	Computed F-value	p-value	Remarks
Design	Students	3.82	5.49	0.01	Significant
	Teachers	3.96			
	Practitioners	3.60			
Satisfaction	Students	3.90	5.63	0.009	Significant
	Teachers	3.96			
	Practitioners	3.66			
Cost-Effectiveness	Students	3.90	5.04	0.014	Significant
	Teachers	3.94			
	Practitioners	3.66			
Safety	Students	3.94	5.04	0.014	Significant
	Teachers	3.90			
	Practitioners	3.66			
Durability	Students	3.94	12.07	0.000	Significant
	Teachers	3.98			
	Practitioners	3.54			
Functionality	Students	3.90	9.89	0.000	Significant
	Teachers	3.98			
	Practitioners	3.60			
Overall	Students	3.90	8.73		
	Teachers	3.95			
	Practitioners	3.62			

Legend:p-value lower than .05 Reject Ho (Significant); p-value higher than .05 Accept Ho (Not Significant)

Table 4 presents the summary of computation on the differences in the evaluation of the respondents. It can be seen from the table that all the parameters posted a p-value lower than the .05 level of significance. This means that the result is significant. The results further imply that there are significant differences in the evaluation of the respondents on the improvised oven along design, satisfaction, cost-effectiveness, safety, durability, and functionality. Hence, the null hypothesis is rejected.

Furthermore, the respondents' classifications affect the evaluation of the respondents on the improvised oven along design, satisfaction, cost-effectiveness, safety, durability, and functionality.

Design. Respondents rated the design of the improvised oven as very much acceptable. Specifically, practitioners gave the lowest rating of evaluation with 3.60 weighted mean, seconded by students with 3.82 weighted mean and followed by teachers with a 3.96 weighted mean, which shows different level of evaluation. Moreover, the computed p-value is 0.01 which is lower than the .05 level of significance, which means it is significant.

This could mean that the students and teachers have a higher level of evaluation than those practitioners along the design of the improvised oven.

Satisfaction. The satisfaction level of the respondents with the improvised oven was notably higher among students and teachers with a weighted mean of 3.90 and 3.96, respectively while the practitioners have 3.66 weighted mean rating. Meanwhile, the computed p-value is 0.009 which is lower than the .05 level of significance means significance.

The result implies that the students and teachers a more satisfied on the improvised oven than the practitioners. The practitioners' exposure to high-end oven may have had affected their rating in terms of satisfaction.

Cost-effectiveness. The cost-effectiveness was evaluated as very much acceptable by the respondents; however, the practitioners has the lowest rating with a weighted mean of 3.66 when compared to students rating of 3.90, and 3.94 for teachers. On the other hand, the computed p-value is 0.014 which is lower than the .05 level of significance. This means that it is significant.

The students and teachers have a higher-level evaluation than those practitioners along cost-effectiveness. The practitioners may have found the commercially available oven to be more practical since no manpower will be utilized, and the materials are guaranteed with quality.

Safety. The safety of the improvised oven was rated as very much acceptable; however, practitioners have the lowest rating with a weighted mean of 3.66, followed by teachers with a weighted mean of 3.90, and students with a weighted mean of 3.94. Additionally, the computed p-value is 0.014 which is lower than the .05 level of significance.

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The result means that there is a significant difference in the evaluation of the respondents on the improvised oven along safety. Hence, the null hypothesis is rejected.

This indicates further that students and teachers have higher level of evaluation along safety than the practitioners. This could mean that the practitioners are doubtful when it comes to the materials used. Considering that they are using commercially available oven, the quality of the materials used are guaranteed safe compared to the recycled ones.

Durability. The respondents found the durability of the improvised oven as very much acceptable; however, practitioners gave a lower evaluation with a weighted mean of 3.54, seconded by students with a weighted mean of 3.94 and teachers with a weighted mean of 3.98. Also, the computed p-value is 0.000 which is lower than the .05 level of significance.

The result means that the there is a significant difference in the evaluation of the respondents on the improvised oven along durability. Hence, the null hypothesis is rejected.

It implies that the practitioners have a lower agreement on the acceptability of the durability of the improvised oven compared to the students and teachers. They are more exposed to readily made oven, hence, they believe that the quality of what they are using are better than the improvised oven since the latter was made only from recyclable materials. The drum and the other materials utilized, on the perception of the practitioners, are acceptable but not to the extent compared to the commercially available ovens.

Functionality. The functionality of the improvised oven was evaluated as very much acceptable; however, practitioners have a lower agreement with a weighted mean of 3.60, followed by students with a weighted mean of 3.90, and teachers with a weighted mean of 3.98. The computed p-value is 0.000 which is lower than the .05 level of significance.

This means that the there is a significant difference in the evaluation of the respondents on the improvised oven along functionality. Hence, the null hypothesis is rejected.

This implies that the practitioners find it more practical and useful to buy commercially available ovens than developing improvised one. While the function of an oven is present in the improvised, the other features of a ready-made oven made the practitioners think that the developed one cannot fulfill other functions of what a typically and commercially made ovens can do.

Generally, though the practitioners rating on the evaluation of the improvised oven is lower than those of the student and teacher respondents in all the parameters, the overall rating is still very much acceptable. As such, it is paramount to use instructional materials like the improvised oven when teaching bread and pastries to students to improve the student performance (Carag & Briones, 2021).

This could further answer the concern on how challenging it is to create educational resources for TLE which include inadequate facilities and instructional materials (Calanog, 2019 & Ogbu, 2015).

Moreover, a few unique features are required for the improvised oven to be appropriate for usage in a classroom setting (Babatunde, 2020). Likewise, according to Albarico et al. (2014), the employment of instructional materials impacts students' performance in baking bread and pastries. As stated by Halkier (2009), a cheap or alternative oven can be used to teach people how to make bread and pastries. Thus, it addresses the concern also of Barcelona (2023), that when developing teaching materials for TLE, some common problems include instructors' lack of access to technology, instructional materials, and resources.

CONCLUSIONS

Based on the statement of the problems and the summary of the findings, the following conclusions are presented:

1. The requirements and specifications on the development of the improvised oven requires different materials, various features to enhance their design, satisfaction, cost-effectiveness, safety, durability, and functionality. The key materials used in making an improvised oven can be containers such as the metal drum, heat resistant materials like the stainless steels, supporting structures such as the metals and its caster for portability, ventilation and airflow using a blower.
2. The improvised oven can be used as an instructional material and an alternative oven for bread and pastry competencies. The design, satisfaction, cost-effectiveness, safety, durability, and functionality as evaluated by the learners, teachers, and practitioners are very much acceptable in making different bread and pastry products.
3. There is a significant difference in the evaluation of the students, teachers, and practitioners on the improvised oven along design, satisfaction, cost-effectiveness, safety, durability, and functionality. Specifically, teachers and students evaluated the improvised oven as very much acceptable while the materials and their specifications in constructing the improvised oven as well as the materials used are highly durable and is resistant to wear, corrosion, or even degradation over time were evaluated as acceptable.

Recommendations

In light of the findings and conclusion, the following recommendations were drawn:

1. The improvisation of the oven may consider other features such as designs and durability to satisfy the practitioners. Also, the use of pure stainless materials to avoid food contamination is encouraged. Other cheap or alternative materials may be used in the fabrication. The developed improvised oven may be subjected to patenting because of its innovative designs and other features. Additionally, coconut husk and other renewable fuels may be used as the fuel to generate heat.

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2. The improvised oven may be used as an instructional material when teaching bread and pastry related competencies and eventually, be used by students in their laboratory activities when cooking cookies, pandesal, muffins, tarts, pizza, buko pie, pineapple pie, egg pie, and etc. Other food products may be tested to be cooked in the improvised oven such as fish, meat, cake and others.

3. Installation of valve in the exhaust to control the heat inside the improvised oven and equal distribution of heat is encouraged.

4. Oven thermometer may be placed outside the improvised oven to monitor the temperature.

5. This study may be used as a baseline for future researchers who are venturing in designing and fabricating alternative laboratory materials for instructional use.

LITERATURE CITED

1. *Albarico, S. H., (2014). Adequacy of instructional materials used by teachers in teaching technology and livelihood education. Retrieved from: ResearchGate. https://doi.org/10.15242/icehm.ed0114516*
2. *Arakit, A., (2016). Improving teaching and learning process of pastry and bakery using learner centered approaches. Retrieved from: https://oda hioa.archive.knowledgearc.net/handle/10642/3481. Accessed on February 25, 2024*
3. *Babatunde, K. (2020). Improvisation of 3-Dimensional Instructional Model to Enhance the Learning Process in Fine Arts. International Journal of Research and Innovation in Social Science (IJRISS) | Volume IV, Issue VIII, August 2020 | ISSN 2454-6186*
4. *Barcelona, K. E. P., Daling, B. a. J., Doria, P., Balangiao, S. J., Mailes, M. J., Chiang, P., & Ubatay, D. (2023). Challenges and Opportunities of TLE teachers in Philippine Public Schools: an inquiry. British Journal of Multidisciplinary and Advanced Studies, 4(4), 44–60. https://doi.org/10.37745/bjmas.2022.0247*
5. *Beduya, A. G., (2020). Techno-Package for Innovated Fuel-Efficient Oven. International Journal of Science and Research (IJSR). DOI: 10.21275/SR221016204600*
6. *Calanog MC B., (2019). Challenges in Teaching Exploratory Courses of Technology and Livelihood Education using Pedagogical Approaches. International Journal of Research in Engineering, Science and Management Volume-2, Issue-4, www.ijresm.com | ISSN (Online): 2581-5792*
7. *Carag, A. A., & Briones, E. O. (2021). Supplementary Instructional Material in Bread and Pastry Production in the Achievements of the Senior High School students. Zenodo (CERN European Organization for Nuclear Research). https://doi.org/10.5281/zenodo.5158915*
8. *Castagno-Dysart, D., Matera, B., & Traver, J. (2021, May 4). The importance of instructional scaffolding. Teacher*
9. *Magazine.https://www.teachermagazine.com/au_en/articles/the-importance-of instructionalscaffolding#:~:text=Vygotsky%20coined%20a%20definition%20of,'%20(Raymond%2C%202000).*
10. *College of Teacher Education (2023). Research and Development Agenda on Product Development.*
11. *Halkier, B. (2009). Suitable cooking? Food, Culture, and Society, 12(3), 357–377. https://doi.org/10.2752/175174409x432030. Accessed on February 25, 2024*
12. *Jainey. (2022, June 17). TOP 10 PINOY IMPROVISED OVEN (FOR BAKING). Mama's Guide Recipes. https://www.mamasguiderecipes.com/2018/10/16/top-10-pinoy-improvised-oven-for-baking/*
13. *K to 12 TVL Track Home Economics – Bread and Pastry Production Curriculum Guide December 2013.*
14. *Kapur (2019). Development of Teaching-Learning Materials. Research Gate. https://www.researchgate.net/publication/publication/334083571_Development_of_Teaching-Learning_Materials*
15. *Kurt, S. (2021). Constructivist Learning Theory. Educational Technology. https://educationaltechnology.net/constructivist-learning-theory/*
16. *Mammoths roasted in prehistoric barbecue pit. (2009, June 3). NBC News. https://www.nbcnews.com/id/wbna31085915. Accessed on January 30, 2024*
17. *National Research Agenda for Teacher Education 2019-2023 named Balanghai.*
18. *Niebres, C., (2019). Utilization of Localized Learning Materials in Technology and Livelihood Education and its effect on teachers' instructional competency at Balibago Integrated High School. Utilization of Localized Learning Materials in Technology and Livelihood Education and Its Effect on Teachers' Instructional Competency at Balibago Integrated High School. https://www.instabrightgazette.com/blog/utilization-of-localized-learning-materials-in-technology-and-livelihood*
19. *Ogbu, J. E. (2015). Influences of inadequate instructional materials and facilities in teaching and learning of Electrical/Electronics Technology Education courses. Journal of Education and Practice, 6(33), 39–46. http://files.eric.ed.gov/fulltext/EJ1083540.pdf*
20. *Ottosson S., Sri Sudha Vijay Keshav Kolla (2017). Which product development method is Best for Need Based New Product Development? 11th International Workshop on International Design Engineering. https://www.researchgate.net/publication/publication*
21. *Platon, C., Pambid, R., & Lomboy, E. (2017). Food Safety Practices among Native Delicacy Producers and Vendors in the Public Market of Bayambang in Pangasinan, Philippines. Asia Pacific Journal of Education, Arts and Sciences, 4(2), 95–102. http://apjeas.apjmr.com/wp-content/uploads/2017/10/APJEAS-2017.4.2.12a.pdf*
22. *Simkus, J. (2023). Stratified Random Sampling: Definition, Method & Examples. Simply Psychology. https://www.simplypsychology.org/stratified-random-sampling.html*
23. *Simply Psychology. (2023, December 18). Qualitative vs Quantitative Research: What's the Difference? https://www.simplypsychology.org/qualitative-quantitative.html*
24. *Shah, R. K. (2019). Effective constructivist teaching learning in the classroom. Shanlax International Journal of Education, 7(4), 1–13. https://doi.org/10.34293/education.v7i4.600*
25. *Tayam, R. (2018). K12 Learning Module in Basic Baking and Bakeshop Production. www.academia.edu.https://www.academia.edu/36057937/K12_Learning_Module_in_Basic_Baking_and_Bakeshop_Production*
26. *Tulsa Public Schools, (2016). TLE Observation and Evaluation Rubric Instructional Coaches/Instructional Technology Coaches/New Teacher Mentors.https://resources.finalsite.net/images/v1629406076/ccosaorg/omybbwu22gefnw68g9ix/TLErubrics-2.pdf*