

12V COCONUT MEAT PROCESSOR AND THE TEACHING OF TECHNOLOGICAL CREATIVITY

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ABSTRACT

This study developed and assessed the design, materials used, functionality, safety, and instructional use of the AC-DC-Powered Three-in-One Coconut Meat Processor. Developmental research was employed. The study begun with the development of the device, followed by the assessment of the design, materials used, functionality, safety, and instructional use. Finally, the implications of the developed device to the teaching of technological creativity was determined. The developed device was assessed by BSIE and TLE teachers and students from the College of Education and College of Industrial Technology. Based from the results of the assessment, design and materials used were very good, the device was very functional, very useful, and very safe for both teachers and students' use. Teachers and students' assessment of the device has no significant difference. Results of the development and assessment of the device promotes teaching of technological creativity.

Keywords: AC-DC powered, Coconut meat, Product development, Technological creativity, Three-in-one coconut meat processor

INTRODUCTION

Teaching major subjects in vocational-technological related courses such as Bachelor of Science in Industrial Education (BSIE) and Bachelor in Secondary Education major in Technology and Livelihood Education (BSE-TLE) requires that learners be subjected to performance-based learning activities which is the main concept of Outcomes-Based Education (OBE).

In order to comply with the demand of OBE teaching, vocational-technological teachers are self-obligatorily required to be more technologically creative and scientifically resourceful in designing performance tasks with laboratory and shop activities which make use of available and teacher-made laboratory devices, apparatuses and tools designed to make students more involved and immersed to the concept being studied. That an evidence of technological creativity in teaching which shows what teachers want their students to demonstrate at the end of significant learning experience and the actions and performance that embody and reflect learners' competence in

using content, information, ideas, and laboratory tools and devices be successfully executed and observed.

Vocational-technological related subjects such as Sheet Metal, Food Technology, and Basic Electricity which are parts of the BSIE and BSE major in TLE curricular programs are best taught utilizing laboratory tools. Aside from the provisions of the University, teachers in these fields and areas voluntarily design, create, innovate, construct, test, and use teacher-made tools and apparatuses to make teaching and learning outcomes-based. These are the actions which embodied the role of a teacher in the conduct of research and form part and parcel of his duties before he sworn into the profession.

In response to this duty and to make teaching and learning with students more technologically creative, active and participative, the researcher of this study developed a device which can be used in teaching and learning selected topics in subjects such as Sheet Metal, Food Technology, and Basic Electricity. By doing such, the researcher hoped to set an example of how technological creativity is taught and transfer to learners.

STATEMENT OF THE PROBLEM

This study developed and assessed an **AC-DC-powered three-in-one coconut meat processor**. It also established the implication of the developed device to the teaching of technological creativity.

Specifically, the study aimed to:

1. Develop an AC-DC-powered three-in-one coconut meat processor?
2. Assess the developed AC-DC-powered three-in-one coconut meat processor in terms of:
 - 2.1 design;
 - 2.2 materials used; and
 - 2.3 functionality?
3. Assess the safety provisions and instructional use of the AC-DC-powered three-in-one coconut meat processor in teaching selected topics in vocational-technological related subjects such as Sheet Metal, Food Technology and Basic Electricity;
4. Compare the assessments of the teachers and students as regards the safety provisions and instructional use of the developed AC-DC-powered three-in-one coconut meat processor in teaching selected topics in vocational-technological related subjects?
5. Determine the implications of the AC-DC-Powered three-in-one coconut meat processor on the technological creativity of the students?

HYPOTHESIS

The assessment of the teachers and students on the safety provisions and instructional use of the developed AC-DC-powered three-in-one coconut meat processor in teaching selected topics in vocational-technological related subjects such as Sheet Metal, Food Technology, and Basic Electricity has no significant differences.

CONCEPTUAL FRAMEWORK

The below paradigm summarizes the concept of the study. The figure shows that the development of the device began with a concept visualized into a design. The identification of the needed materials, procedures in developing and testing of the device followed. The researcher's inert values and skills materialized the concept into an instructional device which was subjected into assessment by teachers and students as to design, materials used, functionality, safety provisions, and instructional use. The same respondents who assessed the device provided feedbacks which guided the researcher in making the device fully compliance with the set indicators.

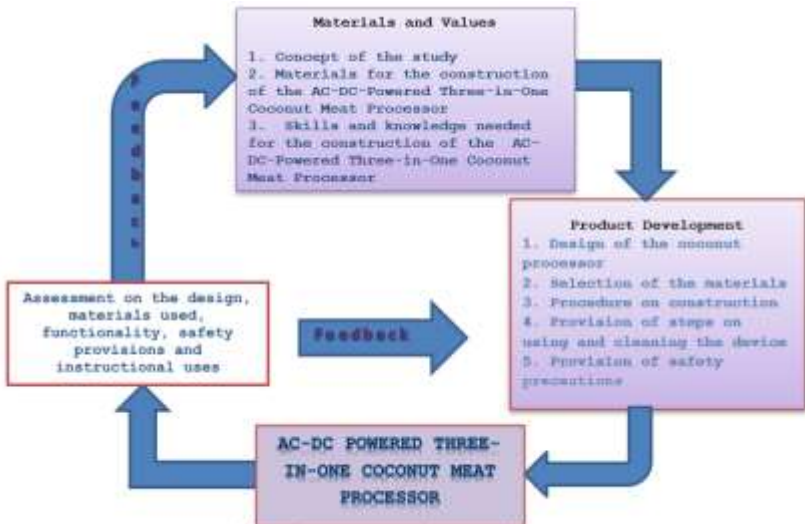


Figure 1: Research Paradigm

SCOPE AND DELIMITATION

The AC-DC-Powered Three-in-One Coconut Meat Processor will be utilizing locally available even discarded materials which can be secured from local sources. The product-output of this study intended primarily for teaching selected topics in vocational-technological related subjects such as Sheet Metal, Food Technology and Basic Electricity.

After its construction, the AC-DC-powered three-in-one coconut meat processor was assessed as to its design, material used, functionality, safety provisions, and instructional use as applied to teaching selected topics in subjects such as Sheet Metal, Food Technology, and Basic Electricity. The respondents were teachers of the College of Education and College of Industrial Technology and students of the BSIE and BSE major in TLE programs of the Nueva Ecija University of Science and Technology during the second semester of school year 2017-2018.

METHOD OF RESEARCH

Developmental method of research through product development was utilized in the study. According to Leedy and Wiersma (2008), developmental research is a method which focuses on the progressive changes that occur in a subject. In the case of the project at hand, the researcher developed a device by utilizing locally available and discarded materials and observed changes that took place as these materials turned into a useful device. After construction, the device was subjected to assessment by teachers and students as to design, materials used, functionality, safety provisions, and instructional use. Feedbacks were noted, considered and followed which made the device acceptable for instructional use in teaching selected topics in Basic Electricity, Sheet Metal and Food Technology.

RESEARCH LOCALE

The development and testing of the device for instructional use was conducted at Nueva Ecija University of Science and Technology in Cabanatuan City. The subject locale is where the researcher teaches as one of its faculty member. The selected teachers and students who assessed the design, materials used, functionality, safety provisions, and instructional use of the device were also from the subject locale.

THE RESPONDENTS

Two sets of respondents, 10 teachers teaching vocational-technological related subject such as Sheet Metal, Food Technology and Basic Electricity from the College of Education and College of Industrial Technology and 60 BSIE and BSE major in TLE students enrolled in any of the above men-

tioned subjects were randomly selected to assess the design, materials used, functionality, instructional uses, and safety provisions of the developed AC-DC-Powered Three-in-One Coconut Meat Processor.

The teacher-respondents were selected on the basis of their field of specialization and expertise in teaching any of the identified vocational-technological related subjects. The sample teachers came from the College of Education and College of Industrial Technology of the identified research locale.

Student-respondents were selected employing stratified random sampling where the total student population were the total number of BSIE and BSE major in TLE students who are presently enrolled or are previously enrolled in any of the identified vocational-technological related subjects for second semester of school year 2017-2018.

THE INSTRUMENT

Three types of questionnaires were prepared by the researcher. Two sets of questionnaires were utilized in assessing the developed device – one set for the teacher respondents, and another set for the students enrolled in any of the subjects such as Sheet Metal, Food Technology and Basic Electricity. The third questionnaire was devoted to determining the implication of the developed device in the teaching of technological creativity.

Description of the Instrument for assessing the design, materials used, functionality, safety, and instructional use of the device.

The first set of questionnaire was for the teacher-respondent composed of items defining the design, materials used, and functionality of the developed device. The second set of questionnaire assessed the safety provisions and instructional uses of the apparatus and was filled-up by both teachers and students. The scale used in answering the items is as follows:

3 –	Very Good/Very Functional/ Very Safe/Very Useful	The apparatus meets the intended purpose of the indicator
2 –	Good/Functional/Safe/Useful	The apparatus partially meets the intended purpose of the indicator
1 –	Poor/Not Functional/Not Safe/	The apparatus is not useful, does not meet the intended purpose of The indicator

Description of the Instrument for Determining the Implication of the Developed Device to the Teaching of Technological Creativity

The third set of questionnaires was for student-respondents only. The questionnaire determined the implication of the developed device in teaching technological creativity. The implication of the teaching of technological creativity was expressed in terms of two constituents namely technological creativity inclination and technological creativity capability. The scale used in expressing technological creativity implications is as follows:

- 3 – The device and its development promote technological creativity constituents
- 2 – The device and its development partially promotes technological creativity constituents
- 1 – The device and its development does not promote technological creativity constituents

Validation of the Research Instrument

The research instruments were submitted to the research adviser, statistician, and teachers teaching BSIE and BSE major in TLE and vocational-technological related subjects for validation of the content, construct and face. As to content validity, the research adviser together with the statistician in coordination with the experts in the field from the College of Industrial Education decided on the content based from the approved research questions. The face and construct of the research questionnaire was approved by the research statistician, likewise in consultation with the experts from the areas under scope.

Procedure of the study

The development of the AC-DC-Powered Three-in-One Coconut Meat Processor underwent two phases: development stage and assessment as to design, materials used, functionality, safety provisions, and instructional use.

The development stage started with the design of the instructional device, identification of the materials needed and the laying out of the construction procedure of the device.

The assessment stage covered assessment of the design, materials used, functionality, instructional use, and safety provisions of the device by teacher and student-respondents.

The implication of the developed device to the teaching of technological creativity was likewise determined under this stage.

DATA ANALYSIS

The researcher described the development of the apparatus through textual form.

Weighted mean was used to treat data on the assessment of both sets of respondents on the identified parameters such as design of the device, materials used, safety provisions, functionality of the device, and instructional use in teaching subjects such as Sheet Metal, Food Technology and Basic Electricity and the implications of the developed device in the teaching of technological creativity. The computed weighted means were given the following verbal meaning:

2.5 – 3.0	Very Good/Very Functional/Very Safe/Promotes
1.7 – 2.4	Good/Functional/Safe/Partially Promotes
1.0 – 1.6	Poor/Not Functional/Not Safe/Does not Promote

In comparing the assessment of the teachers and students on safety provisions and instructional use of the developed AC-DC-Powered Three-in-One Coconut Meat Processor as assessed by teachers and students, one-tailed t-test for independent variables was used. All statistical computations were carried out using SPSS v.21.

FINDINGS

The development of a device like the AC-DC-Powered Three-in-One Coconut Meat Processor begins with conceptualization and visualization of the idea, identification of the materials needed and the laying out of the construction procedure of the device.

The assessment on the design of the AC-DC-Powered Three-in-One Coconut Meat Processor was rated “very good” by the BSIE and TLE teachers with an average weighted mean of 2.77. The materials used in the development of the device was likewise rated as “very good” by the teachers with an average weighted mean of 2.93. The functionality of the AC-DC-Powered Three-in-One Coconut Meat Processor upon assessment of the teachers obtained an average weighted mean of 2.92 which was verbally interpreted as “very functional.” Accordingly, the developed device fully met the quality standards as regards the design, materials used and functionality and that a very minimal modification is required.

On the safety provisions of the device, the two sets of assessors rated the device with an average weighted mean of 2.91 (teachers) and 2.94 (students) which both verbally interpreted as "very safe." The ratings were indicators that the developed device met the full intention of the set quality standard indicators. As regards the instructional use of the developed device expressed in terms of learning engagement and usability in the teaching of vocational-technological related subjects such as Sheet Metal, Basic Electricity and Food Technology, the BSIE and TLE teachers (WM=2.94) and students (WM+2.96) rated the device "very useful."

When the assessment of the two sets of respondents were compared, t-test results revealed that all the computed values for t (-0.036728, -1.33728, 0.56434) respectively were much lower than the critical values for t (2.015048, 1.812461, 1.94318) respectively for one-tailed test and (2.57058, 2.028139, 2.446912) respectively for two-tailed test. This means that the assessment of the teachers and students has no significant differences.

On the implications of the developed device in the teaching of technological creativity expressed in terms of technological creativity inclination and technological creativity capability, the results revealed that the device promoted the teaching of technological creativity as the device followed, underwent and characterizes all the indicators set in the instrument for determining technological inclination.

CONCLUSIONS

Based from the above stated findings, the following conclusions were drawn:

- . Development of instructional devices involved careful visualization of ideas, detailed designing, step by step assembly and construction process, and several testing to establish its functionality.

- . The developed device was found very good in terms of its design and materials used while the functionality was found very functional by the BSIE and TLE teachers from the College of Education and College of Industrial Technology.

- . The developed device was very safe to use by both teachers and students and was very useful in all learning engagement by the students who used the device.

- . The assessment made by teachers and students on the safety and instructional use of the developed device was found no significant difference as they similarly rated the device.

- . The developed AC-DC-Powered Three-in-One Coconut Meat Processor promoted technological creativity expressed in terms of technological creativity inclination and technological creativity capability.

RECOMMENDATIONS

Based from the findings and conclusions of the study, the following recommendations were given:

A clamp or heavy-duty rubber to hold the device on the surface is highly recommended to steady the movement of the device while the motor is on and the device is in use.

The principles, procedures, and concept of product development involved in this study and the developed product can be extended to partner barangays and community of the University as part of its extension program.

Other products similar to the developed device utilizing 12V power supply to minimize electricity consumption is encourage to develop and promote electrical energy conservation as this study set the benchmark for this area of concern.

Encourage other researchers and students to focus on product development to assist the community by providing cheaper yet very useful innovated products for day to day needs.

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