

# Sustainability Awareness, Facilities, and Laboratory Environment: Influence on Students' Cooking Performance

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DOI : <https://doi.org/10.51583/IJLTEMAS.2025.1412000038>

Received: 16 December 2025; Accepted: 23 December 2025; Published: 01 January 2026

## ABSTRACT

Cooking education in junior high school relies heavily on the quality of resources and environments that support hands-on learning. This study examined the effects of cooking facilities, laboratory environment, teacher supervision, and sustainability awareness on the cooking performance of Grade 9 students enrolled in the TLE–Cookery specialization. Using a descriptive-correlational design, data were gathered from 200 students in two national high schools in District 2, Bukidnon through a validated and reliable questionnaire and an actual performance rubric anchored on the TLE Cookery curriculum. Ethical approval, administrative permission, parental consent, and student assent were secured before administering the instruments. Findings showed that cooking facilities were rated low, while the laboratory environment, teacher supervision, and sustainability awareness were rated moderate. Students' actual cooking performance was likewise low in preparation, production, and presentation. Multiple regression analysis revealed that cooking facilities significantly predicted cooking performance, while laboratory environment and sustainability awareness did not emerge as significant predictors. These results emphasize that functional, sufficient, and well-maintained kitchen equipment is foundational to effective experiential learning, consistent with Kolb's Experiential Learning Theory and Moos' Environmental Theory. Overall, the study underscores the need for improved facilities, stronger guided practice, and deeper integration of sustainability concepts in laboratory tasks to enhance students' technical competence and engagement in cookery classes.

**Keywords:** TLE Cookery, cooking performance, learning environment, cooking facilities, experiential learning, sustainability awareness.

## INTRODUCTION

Cooking is not merely a household chore but a vital life skill that plays a significant role in education, nutrition, and cultural identity. Under the Philippine secondary education curriculum, cooking is institutionalized through Technology and Livelihood Education (TLE), which equips learners with practical skills relevant to higher education and future employment. The TLE Cookery component allows students to apply theoretical knowledge through hands-on activities, fostering self-reliance, confidence, teamwork, and creativity—skills essential for lifelong learning and employability.

The growing global recognition of technical-vocational education and training (TVET), as emphasized by organizations such as UNESCO, highlights its role in promoting workforce readiness and sustainable development. This perspective aligns with Sustainable Development Goal 4, which underscores the importance of technical and vocational skills in providing inclusive and equitable quality education. In the Philippine context, strengthening TLE cookery programs is particularly important, as these programs provide practical pathways for youth development amid resource constraints in public schools.

Despite the recognized importance of TLE Cookery, many public secondary schools in the Philippines face persistent challenges in program implementation. These include outdated or insufficient cooking facilities, limited laboratory space, inadequate sanitation measures, and lack of modern equipment. Such conditions negatively affect instructional quality and restrict students' opportunities for authentic hands-on learning, ultimately weakening their confidence and competence in essential culinary skills.

While laboratory learning has been widely studied in science education, there remains a limited body of research focused on cookery laboratories in Philippine public schools. Unlike science laboratories, cookery laboratories require specialized equipment, strict sanitation standards, and task-based demonstrations that simulate real kitchen environments. In addition, sustainability practices such as food waste management, energy conservation, and responsible ingredient sourcing are increasingly emphasized in culinary education but remain underexplored at the junior high school level, particularly in terms of their influence on actual cooking performance.

This study addresses these gaps by examining the influence of cooking facilities, laboratory environment, teacher supervision, and sustainability awareness on the cooking skills performance of Grade 9 students in selected public high schools in Bukidnon. By focusing on preparation, production, and presentation, the study aims to provide empirical evidence to inform teachers, school administrators, and policymakers in strengthening TLE cookery instruction, facility planning, and sustainability integration.

### **Research Objectives**

This study aims to investigate the influence of cooking facilities, laboratory environment, teacher supervision, and sustainability awareness on the cooking skills performance of Grade 9 students.

## **METHODOLOGY**

This study employed a quantitative research approach using a descriptive–correlational design to examine the influence of cooking facilities, laboratory environment, teacher supervision, and sustainability awareness on the cooking skills performance of Grade 9 students. This design allowed the researcher to describe the existing conditions of the independent variables and determine their relationships with students’ cooking performance without manipulating the natural school setting.

The descriptive–correlational design was deemed appropriate as it enables the systematic measurement of variables and the identification of relationships among them in an actual educational context. This approach provides a realistic understanding of how school facilities, learning environment, and sustainability practices are associated with students’ performance in cookery.

The participants of the study were Grade 9 students enrolled in the Technology and Livelihood Education (TLE) Cookery specialization from two public national high schools in District 2, Bukidnon. Students who were not enrolled in the cookery program or were absent during data collection were excluded. A total of 200 students were selected using the Taro Yamane formula to ensure adequate representation of the population.

Data were collected using a structured questionnaire and a performance-based rubric. The questionnaire measured cooking facilities, laboratory environment, teacher supervision, and sustainability awareness, while the rubric assessed students’ cooking skills performance in terms of preparation, production, and presentation. The instruments were developed based on relevant theories and related studies in technical-vocational education.

The research instruments were subjected to content validation by experts in Home Economics, educational research, and educational measurement. Pilot testing was conducted among Grade 9 students from a comparable school. Reliability analysis using Cronbach’s alpha yielded coefficients ranging from 0.799 to 0.927, indicating high internal consistency. Inter-rater reliability of the performance rubric was also established using Krippendorff’s alpha.

Prior to data collection, approval was obtained from school administrators and ethical clearance was secured. Parental consent and student assent were obtained to ensure voluntary participation. Confidentiality and anonymity of responses were strictly maintained throughout the research process.

Descriptive statistics such as frequency, percentage, mean, and standard deviation were used to summarize the data. Multiple regression analysis was employed to determine the predictive influence of cooking facilities, laboratory environment, teacher supervision, and sustainability awareness on students’ cooking skills performance after satisfying the assumptions of normality.

This research aims to explore the association between cooking facilities, laboratory environment, sustainability awareness, and the cooking skills performance of Grade 9 students, as shown in the schematic diagram.

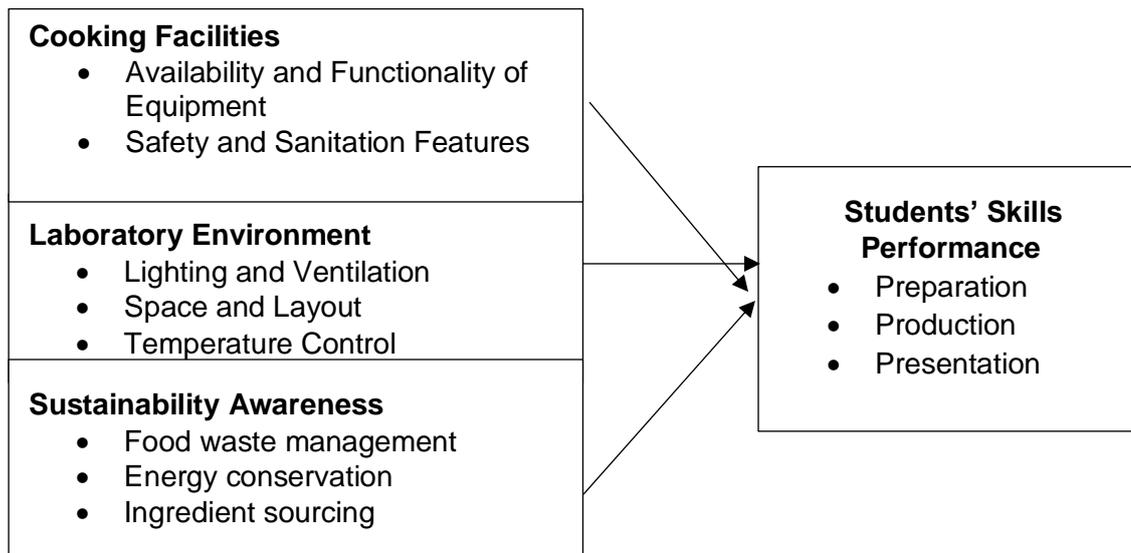


Figure 1: Schematic Presentation of the Variables in the Study

## RESULTS AND DISCUSSION

**Problem 1. What is the participants' assessment of the cooking facilities in their school in terms of:**

**1.1 Availability and functionality of equipment; and**

**1.2 Safety and sanitation features?**

**Table 1. Summary Table of Cooking Facilities**

<b>Dimensions of Cooking Facilities</b>	<b>Mean</b>	<b>Interpretation</b>	<b>SD</b>
Availability and functionality of equipment	2.47	Low	0.18
Safety and sanitation	2.92	Moderate	0.14
<b>Overall Cooking Facilities</b>	<b>2.70</b>	<b>Moderate</b>	<b>0.12</b>

The moderate assessment of cooking facilities indicates that while basic safety and sanitation measures are present, limitations in equipment availability and functionality restrict students' opportunities for hands-on practice. In a skills-based subject such as TLE Cookery, insufficient or shared tools can disrupt workflow, reduce practice time, and hinder the development of technical competence. Although safety features may create an organized learning environment, they do not compensate for the lack of functional instructional resources necessary for experiential learning. These findings suggest that improving the quality and accessibility of cooking equipment is essential to support effective skill acquisition and meaningful laboratory engagement.

**Problem 2. What is the participants' assessment of the laboratory environment, considering:**

**2.1 Lighting and temperature control;**

**2.2 Space and layout; and,**

**2.3 Teacher's supervision?**

**Table 2.** Summary Table of Laboratory Environment

Dimensions	Mean	Interpretation	SD
Lighting and temperature control	3.00	Moderate	0.15
Space and layout	3.07	Moderate	0.14
Teacher’s supervision	3.17	Moderate	0.15
<b>Overall Laboratory Environment</b>	<b>3.08</b>	<b>Moderate</b>	<b>0.09</b>

The moderate assessment of the laboratory environment indicates that lighting, temperature, space, and teacher supervision meet basic instructional requirements but do not substantially enhance students’ cooking performance. While an organized and adequately supervised environment supports safety and order, these conditions alone may be insufficient to improve technical skill execution in cookery tasks. Cooking performance relies more heavily on direct access to functional equipment and opportunities for repeated practice than on general environmental comfort. This may explain why the laboratory environment did not emerge as a significant predictor of performance, as acceptable physical conditions and supervision do not automatically translate into improved hands-on competence without adequate instructional resources.

**Problem 3. What are the participants’ self-report of their sustainability awareness in terms of:**

- 3.1 Food waste management;**
- 3.2 Energy conservation; and**
- 3.3 Ingredient sourcing?**

**Table 3.** Summary Table of Sustainability Awareness

Dimensions	Mean	Interpretation	SD
Food waste management	3.28	Moderate	0.15
Energy conservation	3.39	Moderate	0.17
Ingredient sourcing	3.50	Moderate	0.15
<b>Overall Sustainability Awareness</b>	<b>3.39</b>	<b>Moderate</b>	<b>0.09</b>

The moderate level of sustainability awareness suggests that students possess basic knowledge of food waste management, energy conservation, and responsible ingredient sourcing; however, this awareness did not significantly influence their cooking performance. This may be attributed to the largely conceptual treatment of sustainability within cookery instruction, where knowledge is introduced theoretically but not consistently embedded in performance-based tasks or assessment criteria. As a result, students’ sustainability awareness may remain declarative rather than procedural, limiting its impact on observable cooking skills. These findings indicate that sustainability concepts need to be more deliberately integrated into hands-on laboratory activities to meaningfully influence students’ practical performance.

**Problem 4. What is the level of the participants’ cooking skills considering their performance in terms of:**

- 4.1 Preparation;**

**4.2 Production; and**

**4.3 Presentation?**

**Table 4.** *Summary Table of Cooking Skills*

Range	Interpretation	Frequency	Percentage
5	Very High	0	0.0
4	High	0	0.0
3	Moderate	28	14.0
2	Low	169	84.5
1	Very Low	3	1.5
	<b>Total</b>	<b>200</b>	<b>100</b>
	<b>Overall Mean</b>	<b>2.37</b>	
	<b>Interpretation</b>	<b>Low</b>	
	<b>SD</b>	<b>0.35</b>	

The low level of cooking skills performance indicates that most students have trouble across preparation, production, and presentation stages of cooking tasks. Weak preparation skills suggest challenges in organizing ingredients, following procedures, and maintaining proper hygiene, which negatively affect efficiency during laboratory activities. Similarly, low production performance reflects limited technical proficiency, time management difficulties, and inconsistent application of cooking techniques. Although presentation obtained slightly higher ratings, it remained within the low category, indicating insufficient creativity and confidence in plating and food aesthetics. These findings imply that students' limited hands-on exposure, restricted access to functional equipment, and insufficient guided practice may collectively hinder the development of comprehensive cooking competence. Overall, the results emphasize the need for more structured, practice-oriented instruction to strengthen students' technical skills and performance consistency.

**Problem 5. Do the participants' assessment of the cooking facilities, laboratory environment, and sustainability awareness significantly influence their cooking performance in TLE?**

H<sub>01</sub>. The participants' assessment of the cooking facilities, laboratory environment, and sustainability awareness do not significantly influence their cooking performance in TLE

**Table 5.** *Regression Analysis of Cooking Facilities, Laboratory Equipment and Sustainability Awareness*

Predictor	Unstandardized Coefficients		$\beta$	95% CI		t	P
	B	SE		Lower	Upper		
Constant	2.79	.760		1.29	4.29	3.67	.000

Assessment of Cooking Facilities	.278	.118	.165	.046	.510	2.36*	.019	
Laboratory Environment	-.095	.164	-.041	-.417	.228	-.580	.563	
Sustainability Awareness	-.238	.150	-.111	-.535	.058	-1.59	.114	
<b>Model Summary</b>								
R = 0.205    R <sup>2</sup> = 0.042    Adjusted R <sup>2</sup> = 0.027    F(3,196) = 2.86*    p=.038								
<i>Note.</i> B = unstandardized beta coefficient, SE = standard error, β = standardized beta coefficient, 95% CI = 95% confidence interval, t = t statistic, p = probability value. *Significant at 0.05 two-tailed alpha level.								

The regression analysis revealed that cooking facilities significantly influenced students' cooking performance, while laboratory environment and sustainability awareness did not emerge as significant predictors. This finding highlights the central role of functional and accessible equipment in enabling students to perform hands-on cooking tasks effectively. In contrast, acceptable laboratory conditions and sustainability awareness alone may be insufficient to directly enhance performance without adequate opportunities for skill practice and execution.

Despite the significance of cooking facilities, the model explained only a small proportion of the variance in cooking performance (Adjusted R<sup>2</sup> = 0.027), indicating that performance in TLE Cookery is influenced by additional factors not included in the model. These may include students' prior cooking experience, motivation, instructional time, class size, availability of consumable materials, and the extent of guided practice. The low explanatory power reflects the complex and multifaceted nature of skill development in vocational education, where performance outcomes are shaped by both instructional and contextual variables. Thus, while cooking facilities play a crucial role, improving student performance requires a more holistic approach that considers multiple interacting factors within the learning environment.

## CONCLUSION

This study examined the influence of cooking facilities, laboratory environment, teacher supervision, and sustainability awareness on the cooking skills performance of Grade 9 students in TLE Cookery. The findings revealed that students generally demonstrated low levels of cooking performance across preparation, production, and presentation, indicating challenges in developing essential culinary skills. Among the variables examined, cooking facilities emerged as the only significant predictor of performance, underscoring the importance of functional and accessible equipment in skills-based instruction.

While the laboratory environment and sustainability awareness were rated at acceptable levels, they did not significantly influence cooking performance. This suggests that favorable environmental conditions and conceptual awareness alone are insufficient to improve practical skill execution without adequate opportunities for repeated, hands-on practice. The low explanatory power of the regression model further indicates that cooking performance is shaped by multiple interacting factors beyond those included in the study, such as instructional time, guided practice, and students' prior experiences.

From an experiential learning perspective, the findings highlight that meaningful skill development depends on students' direct engagement with tasks supported by appropriate resources. Similarly, environmental learning principles suggest that while supportive conditions facilitate learning, their impact is limited when instructional resources are constrained. Overall, the study emphasizes that improving students' cooking performance in TLE requires prioritizing functional facilities and structured practice while integrating sustainability and environmental considerations more effectively into performance-based activities.

## **RECOMMENDATIONS**

On the basis of the findings, the recommendations are offered as follows:

### 1. For School Administrators

Priority should be given to upgrading, maintaining, and completing cooking laboratory facilities. Since cooking facilities emerged as the only significant predictor of students' cooking performance, ensuring the availability of functional, safe, and adequate equipment is essential to support effective hands-on learning and skill development in TLE Cookery.

### 2. For Teachers

Teachers should strengthen guided and performance-based laboratory instruction by increasing opportunities for structured practice, close supervision, and timely feedback during cooking activities. Emphasis should be placed on improving students' preparation, production, and presentation skills, which were found to be generally low.

### 3. For Curriculum Planners and Program Implementers

Sustainability concepts should be more deliberately integrated into practical cooking tasks rather than taught primarily at the conceptual level. Embedding food waste management, energy conservation, and responsible ingredient sourcing into performance criteria may help translate sustainability awareness into observable cooking skills.

### 4. For Future Researchers

Future studies may include additional variables such as students' prior cooking experience, motivation, instructional time, and availability of consumable materials to better explain variations in cooking performance, given the low explanatory power of the current regression model.

## **Compliance with Ethical Standards**

The research underwent an in-depth review and approval by an institutional research and ethics committee. Once ethical approval was obtained, the researcher proceeded to secure permission from the School Principal of the selected schools that offer Cookery as part of the Grade 8 curriculum. This was done by submitting a formal letter requesting permission to administer the questionnaire as the primary data collection tool. Prior to the questionnaire administration, a letter of assent and consent was presented to the participants. The researcher personally administered the questionnaire to Grade 8 students and collected their responses. To mitigate the risk of participants completing the questionnaire solely for compliance purposes, the researcher provided necessary assistance during the process.

After floating the survey questionnaire, the students cooked three (3) different dishes to measure the cookery performance guided with the rubrics as basis for grading. Students were oriented and guided by the teachers during the cooking process to eliminate the risk during the laboratory. The students also assessed their dishes through a self-assessment as well as the teacher and the researcher. Thirty percent (30%) of the performance was from the self-assessment done by the students while the 70% of the performance level was from the average points coming from the teacher and the researcher.

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