



Technology Utilization and Culinary Skills Among Public Senior High School Home Economics Learners in Legazpi City Division

RICHELL M. MELECIO 

University of Saint Anthony, Legazpi City, Albay, Philippines

Corresponding author: bc.richellm.melecio@gmail.com

Originality: 100% • Grammarly: 95% • Plagiarism: 0%

ABSTRACT

Article History

Received: 25 Jan 2026

Revised: 23 Aug 2026

Accepted: 10 Sept 2026

Published: 31 Oct 2026

Keywords— Technology Utilization, Culinary Skills, Home Economics, Technology Integration, Culinary Education, Public Senior High School Students, Technical-Vocational-Livelihood (TVL), Legazpi City, Philippines

Technology has transformed vocational education, particularly in culinary arts, by bridging theory and practice. This descriptive-correlational study examined the influence of technology use on the culinary skills of 176 Grade 11 and 12 Home Economics students in five public senior high schools in the Legazpi City Division during the 2026 academic year. School-profile variables included equipment availability, teacher specialization, teacher training, and industry cooperation; student outcomes measured were competence in cooking techniques, food safety, nutrition, and menu planning. Weighted means indicated that technology use was highly evident ($WM = 4.35$), with teacher specialization and training as the strongest drivers of technology adoption.



©Capil, M. I., & Dasig, D. D., Jr. (2026). Open Access. This article published by JPAIR Multidisciplinary Research is licensed under a Creative Commons Attribution-Noncommercial 4.0 International (CC BY-NC 4.0). You are free to share (copy and redistribute the material in any medium or format) and adapt (remix, transform, and build upon the material). Under the following terms, you must give appropriate credit, provide a link to the license, and indicate if changes were made. You may do so in any reasonable manner, but not in any way that suggests the licensor endorses you or your use. You may not use the material for commercial purposes. To view a copy of this license, visit: <https://creativecommons.org/licenses/by-nc/4.0/>

Although students demonstrated high proficiency in cooking techniques and food safety, Spearman's rho correlation revealed a negative association between differences in technological infrastructure and overall culinary competence. According to Fuentes and LaBad 2025 greater technology availability did not predict higher student competence. Instead, universal pedagogical practices and repeated hands-on cycles (teacher expertise and instructional design) were more closely associated with student performance. The findings suggest that basic technology is necessary but insufficient; human factors, particularly teacher specialization and training, are critical determinants of culinary competence. For policy and instruction, the study recommends implementing the TECH-CUL initiative, which pairs targeted investments in essential equipment with systematic teacher training and strengthened school–industry partnerships to address resource and exposure gaps and improve student outcomes.

INTRODUCTION

Technology has become one of the major forces of change in education worldwide, transforming how students learn practical skills across many sectors. In the vocational and technical fields, computerized simulations, instructional videos, and multimedia presentations have become indispensable adjuncts to traditional teaching. Traditional teaching approaches are not meeting the needs of 21st-century learners, and this understanding is driving a global revolution. The problem of costly equipment and space in culinary education worldwide is addressed by integrated technology that enables students to view demonstrations multiple times and practice procedures digitally, reinforcing retention and mastery of skills, regardless of physical limitations (Clark & Mayer, 2023; Pregowska et al., 2021).

In Southeast Asia, educational institutions have placed importance on Information and Communications Technology (ICT) to produce graduates ready for the global workforce. The Philippines is mandated to use digital tools to enhance student progress and global competitiveness under the Enhanced Basic Education Act of 2013 and DepEd Order No. 78, s. 2010 (Guidelines on the Implementation of the DepEd Computerization). However, despite these frameworks, research at the regional level shows the persistence of challenges in public senior high schools, including high student-to-equipment ratios and limited individual practice time. A recent study in the ASEAN region shows that ICT-enhanced systems do facilitate the theoretical–practical integration of high school culinary programs, but provincial schools often face specific infrastructure deficits that hinder equal access to these advances (Albirini, 2006; Assefa et al.,

2025; Espinosa et al., 2025).

A gap remains in localized research that applies integrated theoretical frameworks to these resource-limited contexts. Much of the existing literature emphasizes well-resourced Western vocational programs or tertiary settings, whereas few studies investigate how blended frameworks—here operationalized as Technology-Supported Connectivist Experiential Culinary Learning (drawing on Connectivism, Self-Determination Theory, TPACK, and Experiential Learning)—function within Philippine senior high schools to produce industry-relevant competencies (Deci & Ryan, 2012; Mishra & Koehler, 2006; Kolb, 1984). This study responds to that gap and to DepEd and CHED compliance needs by examining how school-profile variables (equipment availability, teacher specialization and training, and industry cooperation) relate to student competence in cooking techniques, food safety, nutrition, and menu planning in five public senior high schools in the Legazpi City Division. Addressing the observed resource paradox, where greater technological resources do not necessarily translate into higher student competence, will inform policy and instructional strategies that align with national quality standards and regional (ASEAN) best practices.

FRAMEWORK

The research is guided by an integrated “Technology-Supported Connectivist Experiential Culinary Learning” framework, using the Input–Process–Output (IPO) paradigm to develop student competencies. The independent variable is Technology Utilization, which is the main input. Technology Utilization is defined as students’ use of digital resources, such as cooking applications, virtual laboratories, video courses, and online culinary communities. These tools are basic resources that augment traditional training by offering visual demonstrations and opportunities for repeated practice at a self-paced rate (Clark & Mayer, 2023; Pregowska et al., 2021).

These inputs are transformed into skill through three interrelated variables: motivation, pedagogical techniques, and experiential learning. We look at motivation through the lens of Self-Determination Theory, which posits internal motivation to improve abilities, driven by technology-enhanced autonomy and social connectedness (Deci & Ryan, 2012).

The TPACK framework (Technological Pedagogical Content Knowledge) is a guide for educational practices. The concept focuses on how educators can effectively integrate digital resources with culinary material and teaching methodologies (Mishra & Koehler, 2006). Based on Kolb’s experiential learning

theory, this ensures that students undergo a cycle of seeing digital demonstrations and reproducing them in real kitchen activities to improve retention (Kolb, 1984). Finally, the dependent variable is Culinary Skill Development, measured by improvements in practical culinary skills, food safety mastery, nutrition understanding, and menu planning design. The comprehensive paradigm portrays technology as a transformational agent that connects learners to global knowledge networks through Connectivism and establishes the psychological and practical foundation for professional culinary success, rather than as a supplement (Duke et al., 2013; Kop & Hill, 2008).

OBJECTIVES OF THE STUDY

This study aims to determine the link between technology use and improvements in the culinary abilities of public senior high school students in Home Economics in the Division of Legazpi City. Specifically, the study aims to: (1) Determine the profile of public schools in terms of the use of technology in teaching culinary by measuring the availability of equipment, teacher specialization and training, industry partnerships, and ratio of students to equipment; (2) Measure the level of students' culinary skills in the areas of cooking techniques, food safety and sanitation, nutrition knowledge, and menu planning design; (3) Determine the significant relationship between the profile of the school's technology and the resulting level of students' culinary competencies; and (4) Design a technology-driven enhancement program in the culinary based on the findings to improve the overall quality of vocational instruction and industry readiness. The study aims to achieve the following objectives, which will help lay the framework for the allocation of resources and improvements in the teaching and learning of the Technical-Vocational-Livelihood track.

METHODOLOGY

Research Design

The study used a descriptive-correlational research design to describe the characteristics of the variables and their relationships without manipulation. This design is suitable for analyzing the current use of technology and the skill levels of culinary arts in a natural environment (Creswell & Creswell, 2017).

Research Site

The study is undertaken within the administrative jurisdiction of the Legazpi City Division, Albay province, Bicol Region, Philippines. The study

settings are the following public senior high schools: Legazpi City National High School, Orosite High School, Homapon National High School, Banquerohan National High School, and Cabangan High School.

Participants

The respondents in the study are Grade 11 and 12 students in the Home Economics strand of the Technical-Vocational-Livelihood (TVL) track, along with their respective instructors. The sample size of 176 students was determined from the total population of 324 using Cochran's formula at the 95% confidence level with a 5% margin of error. The sample was proportionally allocated among the five schools: School A (25), School B (60), School C (26), School D (33), and School E (32).

Instrumentation

The research instrument development process was painstaking, beginning with a thorough review of relevant literature and consultations with experts in culinary education. The result was a self-administered survey divided into two main parts. The first part collected demographic profiles and measured technology-related factors, including equipment accessibility and industry collaboration. The second part focused on culinary competencies, including cooking techniques and food safety. A pilot test was conducted with students from private schools to assess the clarity of the questions and the time needed to complete the instrument to determine its usefulness. Additionally, the thesis instrument was subjected to rigorous reliability testing using Cronbach's Alpha, with results indicating "Excellent" internal consistency for both technology utilization ($\alpha = 0.911$) and overall culinary skills ($\alpha = 0.945$).

Data Gathering Procedure

The data collection procedure used a dual-mode approach to achieve a high response rate during the 2026 academic year. Printed versions of the survey were distributed personally to senior high school Home Economics students in the Legazpi City Division, while an online version was made available via Google Forms for those who preferred to complete it digitally. Before the administration, participants received a concise briefing regarding the study's goals and the voluntary, confidential nature of their involvement to ensure accurate and truthful responses. The retrieval process was carefully managed, with the researcher personally collecting printed forms on assigned dates and dispatching automatic reminders for the online survey. Finally, all gathered replies were meticulously examined for completeness and validity before being subjected to

statistical analysis in Microsoft Excel and SPSS.

Ethical Consideration

The research ethics protocol was meticulously adhered to to protect the rights and welfare of all participants. Prior to data collection, written informed consent was obtained from senior high school Home Economics students, teachers, and school administrators. For participants under 18, parental/guardian consent and student assent procedures were implemented in accordance with Department of Education regulations. Participants received a permission form detailing the study objectives, voluntary participation, confidentiality measures, and assurances that participation would not affect academic standing. School principals provided formal approval for student involvement to ensure full compliance with institutional guidelines and DepEd policies, specifically DepEd Order No. 21, s. 2019 (Policy Guideline on the K to 12 Basic Education Program) and DepEd Order No. 78, s. 2010 (DepEd Computerization guidelines), where applicable.

No personally identifiable information was included in the survey instruments to ensure the greatest standards of secrecy. Participants were expressly told that they had the right to withdraw from the study at any time without any consequences. All collected data were maintained securely and were accessible only to the researcher for academic purposes, with results published solely in aggregate form to protect individual privacy. Moreover, the study was conducted in accordance with the Data Privacy Act of 2012 (R.A. 10173) and was granted formal ethical approval and permits by the Department of Education's Schools Division Office of Legazpi City.

In this work, the author utilized artificial intelligence (AI) tools and methodologies, such as ChatGPT, to improve readability and grammar. After using this tool/service, the authors evaluated and revised the content as necessary and take full responsibility for the published content.

Statistical analyses

In this study, descriptive and inferential statistical methods were applied to provide a robust, objective interpretation of the data collected from respondents. All quantitative data were thoroughly counted, tabulated, and analyzed using Microsoft Excel and SPSS. For the objectives related to the level of technology utilization and students' proficiency in culinary skills, the weighted mean was computed for each indicator. The results were analyzed using a five-point scale, where a score of 4.20 to 5.00 was classified as "Very High" for technology utilization or "Excellent" for culinary proficiency, while lower scores were categorized as High, Moderate, Low, " or " Very Low.

During the inferential phase of the investigation, a normality test (Shapiro–Wilk test) was first performed to determine the appropriate statistical approach for assessing relationships (Shapiro & Wilk, 1965). The data were found to be non-normally distributed, which justified the use of a non-parametric test for correlation analysis. Accordingly, the researcher employed Spearman’s rho (ρ) to determine the strength and direction of the monotonic relationship between school-profile characteristics (e.g., equipment availability, teacher specialization and training, and industry cooperation) and students’ culinary skills, as Spearman’s rho does not assume normality and is robust for ordinal or skewed data (Spearman, 1961). The null hypotheses were accepted or rejected at the 0.05 significance level based on these tests. Correlation coefficients were interpreted using a priori-defined ranges: values greater than 0.71 were considered to indicate a strong association, values between 0.31 and 0.70 a moderate association, and values below 0.30 a weak association. The sample of 176 Grade 11–12 Home Economics students was drawn from five public senior high schools in the Legazpi City Division using proportional allocation by school size and strand enrollment, which enhances the representativeness of the population for this city-level study.

RESULTS AND DISCUSSION

Public School Profile in Utilizing Technology

The assessment of technology-related elements in culinary learning found that the utilization was high to extremely high. The most important factors were those concerning teachers. Teacher Specialization (WM = 4.73) and Teacher Training (WM = 4.63) scored highest. This implies that students believe their professors are highly skilled and well-prepared to use digital tools in teaching culinary arts. On the other hand, institutional support systems, although clearly visible, lagged significantly, with the Availability of Culinary Equipment (WM = 4.09) and Student-Equipment Ratio (WM = 4.14) having the lowest relative ratings.

Table 1
Summary of Utilizing Technology in Culinary Learning

Utilizing Technology for Culinary Learning	Weighted Mean	Verbal Interpretation	Rank
Availability of Culinary Equipment	4.09	Very Evident	5
Teacher Specialization	4.73	Very Highly Evident	1
Teacher Training	4.63	Very Highly Evident	2
Industry Partnership	4.17	Very Evident	3
Student-Equipment Ratio	4.14	Very Evident	4
Overall Weighted Mean	4.35	Very Highly Evident	

These findings align with international research by Assefa et al. (2025), which highlights that while digital divides persist in developing countries, teacher competence is a primary driver of successful ICT integration. Similarly, local studies by de Borja et al. (2024) suggest that while modern equipment enhances engagement, the quality of instruction remains the critical variable for skill acquisition.

Level of Culinary Skills of Home Economics Students

The second objective evaluated students’ practical and theoretical competencies. The results show a high overall level of culinary proficiency (WM = 4.18). Students demonstrated Excellent Proficiency in Food Safety and Sanitation (WM = 4.37) and Cooking Techniques (WM = 4.27). However, more complex cognitive tasks, such as Nutrition Knowledge (WM = 4.08) and Menu Planning and Design (WM = 3.99), received lower scores, indicating a need for enhanced instruction in theoretical application.

Table 2
Summary of Level of Culinary Skills

Level of Culinary Skills	Weighted Mean	Verbal Interpretation	Rank
Cooking Techniques	4.27	Very High Technology Utilization	2
Food Safety and Sanitation	4.37	Very High Technology Utilization	1
Nutrition Knowledge	4.08	High Technology Utilization	3
Menu Planning and Design	3.99	High Technology Utilization	4
Overall Weighted Mean	4.18	High Technology Utilization	

Salient findings indicate that students are most proficient with mechanical tools, such as blenders, and in maintaining basic hygiene. This supports the global observation by Clark and Mayer (2023) that video-based demonstrations are highly effective for psychomotor skills, such as knife handling, but may require more extensive pedagogical scaffolding for conceptual tasks, such as nutritional analysis. Studies in culinary virtual reality also show that technology can significantly improve learning outcomes and acceptance when aligned with pedagogical goals (Hu et al., 2025; Ma et al., 2023).

Relationship Between School Profile IN Utilizing Technology and Culinary Skills

The Spearman's rho correlation analysis revealed surprising negative associations between the availability of culinary equipment and certain skills. The availability of culinary equipment ($\rho = -0.156, p = 0.038$) and total technology usage ($\rho = -0.159, p = 0.035$) were the only statistically significant correlates of Cooking Techniques, yet both were modest and negative. This “resource paradox” suggests that in resource-limited provincial schools, greater access to tools and technology may encourage over-reliance on equipment and reduce opportunities for deliberate manual practice, potentially diluting the quality of technical mastery. Similarly, Industry Partnership showed a weak negative correlation with Nutrition Knowledge ($\rho = -0.154, p = 0.042$), indicating that industrial exposure may prioritize production efficiency and job-ready routines over deep theoretical understanding of nutrition—a pattern consistent with ASEAN-based studies that document trade-offs between workplace efficiency and holistic learning in vocational settings (Assefa et al., 2025; Espinosa et al., 2025) and aligns with Philippine reports on Senior High School TVL tracks Department of Education and CHED regulations.

The findings offer a complex confirmation of the “Technology-Supported Connectivist Experiential Culinary Learning” approach. The TPACK model is validated by high scores on teacher specialization and training, which demonstrate that instructors’ ability to integrate technology with content is vital to modern vocational education (Mishra & Koehler, 2006). The students’ practical techniques are excellent, which supports Experiential Learning Theory, indicating that repeating cycles of digital observation and physical practice drive competency. However, the null results for networked technology and aggregate skills question the Connectivism premise, showing that in resource-limited provincial contexts, human-centered elements such as teacher–student rapport and manual practice are more influential than digital networks alone (Duke et al., 2013; Kop & Hill, 2008).

The present situation of Legazpi City public schools was successfully mapped using the descriptive-correlational methodology, but is constrained by the use of self-reported data, which may be vulnerable to social desirability bias. The Spearman's ρ analysis was appropriate given the non-normal distribution of the data, but the "resource paradox" identified in the results suggests that the integrated theory may need to be modified for socio-economic circumstances in which technology can be a crutch rather than a catalyst. Future work should incorporate mixed techniques to better capture the qualitative aspects of teacher-student interaction that current quantitative measurements may miss.

CONCLUSIONS

The study found that technology integration among public senior high school teachers in the Legazpi City Division is generally high to very high, particularly in specialization and training. Students demonstrated strong competencies in practical cooking procedures and food safety; however, higher-order skills in nutrition application and menu planning remained at a basic "good" level. A significant finding in the study is that increased access to advanced equipment and technology shows a weak negative relationship with proficiency in fundamental cooking techniques. This suggests that over-reliance on technology in resource-constrained schools may hinder the development of essential manual skills.

These findings challenge the assumption that greater technological access automatically improves skill outcomes. While supporting TPACK and Experiential Learning theories, the study makes a key theoretical contribution by contesting Connectivism in provincial vocational contexts, emphasizing that human-centered instruction and deliberate practice are more critical in psychomotor skill development. Thus, technology is better viewed as an instructional catalyst rather than a direct determinant of technical mastery.

From a policy perspective, the study underscores the need for strategic interventions by DepEd and CHED. It is recommended that teacher training include modules on balanced technology integration and hands-on instruction, while ICT allocation should prioritize pedagogical use over mere availability. Schools should also implement structured guidelines to ensure that technology complements, rather than replaces, experiential learning in technical-vocational education.

TRANSLATIONAL RESEARCH

This study's translational research led to the development of the TECH-CUL Program, a comprehensive technology-enhanced culinary program to bridge the gap between classroom learning and industry demand. To ensure accountability and impact, the program integrates measurable success indicators, including improvements in students' culinary competency assessment scores, increased proficiency in manual cooking techniques, enhanced performance in nutrition and menu planning tasks, and documented utilization rates of digital learning resources. The research is converted into numerous new media forms, primarily a readymade Technology-Enhanced Culinary Learning Model manual, to make scientific results on technology utilization and study accessible to a variety of stakeholders. The booklet also includes QR codes that link to short instructional video clips and e-recipe templates to help students envision more sophisticated procedures that are often difficult to master from text alone.

The findings are synthesized into a Strategic Policy Framework for school leaders and policymakers and budget models that make the case for targeted ICT infrastructure and teacher training rather than simply equipment procurement, recognizing the particular finding that instructional expertise is more important than physical infrastructure. Digital Portfolios and Storytelling through video demonstrations allow students to record their learning journeys and show prospective employers that they have mastered techniques. The approach also uses Visual Infographics and Posters exhibited in culinary laboratories to distill complex food safety standards and nutritional guidelines into consumable, high-impact visual aids. Through the fusion of these many media, spanning from official policy guidelines to interactive digital content, the research has successfully translated quantitative data into practical, sustainable, and culturally relevant educational resources for the Legazpi City Division and beyond.

LITERATURE CITED

- Albirini, A. (2006). Cultural perceptions: The missing element in the implementation of ICT in developing countries. *International Journal of Education and Development using ICT*, 2(1), 49–65. <http://ijedict.dec.uwi.edu/viewarticle.php?id=146>

- Assefa, Y., Gebremeskel, M. M., Moges, B. T., Tilwani, S. A., & Azmera, Y. A. (2025). Rethinking the digital divide and associated educational inequity in higher education in the context of developing countries: The social justice perspective. *The International Journal of Information and Learning Technology*, 42(1), 15–32. <https://doi.org/10.1108/IJILT-03-2024-0058>
- Clark, R. C., & Mayer, R. E. (2023). *E-learning and the science of instruction: Proven guidelines for consumers and designers of multimedia learning*. John Wiley & sons.
- Creswell, J. W., & Creswell, J. D. (2017). *Research design: Qualitative, quantitative, and mixed methods approaches*. Sage publications.
- de Borja, J. M., Sigue, A. L., Montecillo, G. B., Batalla, M. Y. C., Bolambot, E. B., & Capuno, M. E. A. D. (2024). Mapping Technical-Vocational Pathways: Rapid Assessment of Current and Future Trends and Demands. *Dangal Research Refereed Journal*, 5(1), 1-1. <https://www.ejournals.ph/article.php?id=25301>
- Deci, E. L., & Ryan, R. M. (2012). Self-determination theory. *Handbook of theories of social psychology*, 1(20), 416-436.
- Department of Education. (2019). DepEd Order No. 21, s. 2019: Policy guidelines on the K to 12 Basic Education Program. https://www.deped.gov.ph/wp-content/uploads/2019/06/DO_s2019_021.pdf
- Duke, B., Harper, G., & Johnston, M. (2013). Connectivism as a digital age learning theory. *The International HETL Review*, 2013(Special Issue), 4-13. <https://www.hetl.org/wp-content/uploads/2013/09/HETLReview2013SpecialIssue.pdf#page=10>
- Espinosa, A. A., Gomez, A. C., Miranda, P. A., David, A. P., Abulon, E. L. R., Hermosissima, V. C., ... & Gonzales, N. S. (2025). Bridging a digital divide: A critical analysis of contextual factors affecting ICT integration in Philippine schools. *Issues in Educational Research*, 35(2), 526-549. <https://search.informit.org/doi/abs/10.3316/informit.T2025102900010092026425696>

- Fuentes, R. P., & LaBad, R. (2025, September). *Impact of digital learning tools on student engagement and academic achievement in higher education: A systematic review*. Zenodo. <https://doi.org/10.5281/zenodo.16430142>
- Hu, M. L. M., Lin, H. C. K., Lin, Y. H., & Yuan, Y. H. (2025). The impact of culinary virtual reality curriculum on students' learning outcomes and acceptance. *Innovations in Education and Teaching International*, 62(2), 462-476. <https://doi.org/10.1080/14703297.2023.2287583>
- Kolb, D. A. (2014). *Experiential learning: Experience as the source of learning and development*. FT press.
- Kop, R., & Hill, A. (2008). Connectivism: Learning theory of the future or vestige of the past?. *International Review of Research in Open and Distributed Learning*, 9(3), 1-13. <https://doi.org/10.19173/irrodl.v9i3.523>
- Ma, C. Y., Wang, K. C., Liu, D. Y., & Lai, T. C. (2023). Evaluation of the comprehensive thematic teaching effectiveness and technique/technology in culinary vocational education. *Education+ Training*, 65(6-7), 795-826. <https://doi.org/10.1108/ET-09-2022-0370>
- Mishra, P., & Koehler, M. J. (2006). Technological pedagogical content knowledge: A framework for teacher knowledge. *Teachers college record*, 108(6), 1017-1054. <https://doi.org/10.1111/j.1467-9620.2006.00684.x>
- Pregowska, A., Masztalerz, K., Garlińska, M., & Osial, M. (2021). A worldwide journey through distance education—from the post office to virtual, augmented and mixed realities, and education during the COVID-19 pandemic. *Education Sciences*, 11(3), 118. <https://doi.org/10.3390/educsci11030118>
- Shapiro, S. S., & Wilk, M. B. (1965). An analysis of variance test for normality (complete samples). *Biometrika*, 52(3-4), 591-611. <https://doi.org/10.1093/biomet/52.3-4.591>
- Spearman, C. (1987). The proof and measurement of association between two things. *The American journal of psychology*, 100(3/4), 441-471. <https://doi.org/10.2307/1422689>

Zhang, M., Ding, H., Naumceska, M., & Zhang, Y. (2022). Virtual reality technology as an educational and intervention tool for children with autism spectrum disorder: current perspectives and future directions. *Behavioral Sciences*, 12(5), 138. <https://doi.org/10.3390/bs12050138>