

EFFECTIVENESS OF LAB-BASED LEARNING IN DEVELOPING KNIFE SKILLS AMONG FIRST-YEAR CULINARY STUDENTS

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Abstract

This study aimed to assess the effectiveness of lab-based learning in developing knife skills among first-year Culinary Arts students at President Ramon Magsaysay Memorial State University. Knife skills are fundamental in culinary education, as they significantly impact the quality, safety, and efficiency of food preparation. The research utilized a quasi-experimental design, employing pre-test and post-test assessments to measure students' proficiency in key knife skills, including proper grip, cutting techniques, speed, and safety practices. A performance-based rubric was used to evaluate student progress, while a perception survey explored learners' views on the impact of laboratory sessions on their skill development. Results showed a significant improvement in the students' knife-handling skills after engaging in structured, lab-based activities. Students demonstrated enhanced accuracy, confidence, and speed, as well as greater adherence to safety protocols.

Furthermore, most participants expressed positive perceptions of lab-based learning, emphasizing the value of hands-on experience, immediate feedback, and real-world kitchen simulation. Challenges noted included time constraints and limited access to kitchen tools for individual practice. The findings suggest that lab-based learning is an effective pedagogical approach in culinary education, particularly in skill acquisition for beginners. This study recommends integrating more intensive lab sessions into the curriculum to reinforce core technical competencies and calls for additional resources to support individualized training. These insights can guide educators and curriculum developers in improving instructional strategies to better prepare students for professional culinary practice.

Keywords: Lab-based learning, knife skills, culinary education, first-year students, skill development, kitchen laboratory

1. Introduction

The rapid advancement of the culinary industry and its growing demands for highly skilled professionals necessitate effective educational strategies that equip students with essential technical competencies. Among these, knife skills stand as a foundational element in culinary education, influencing not only food preparation quality but also kitchen safety and operational efficiency. Recognizing the critical role of technical-vocational education and training (TVET) in producing job-ready graduates, the Philippine government has established robust frameworks aimed at enhancing the quality and relevance of skills development. This study investigates the effectiveness of lab-based learning as a pedagogical intervention to develop knife skills among first-year Culinary Arts students at President Ramon Magsaysay Memorial State University (PRMSU), aligning with national policies and international best practices in culinary education.

Republic Act No. 7796, also known as the Technical Education and Skills Development Act of 1994 (TESDA Act), serves as the cornerstone legislation promoting and regulating technical and vocational education in the Philippines. It emphasizes the delivery of competency-based training programs responsive to industry needs, thereby ensuring graduates' employability and adaptability. TESDA's training regulations for Cookery NC II specifically outline knife skills as a core competency, underscoring the need for practical mastery in grip, cutting techniques, speed,

and safety protocols. Complementing this national policy is Republic Act No. 10968, the Philippine Qualifications Framework (PQF) Act, which mandates the alignment of educational qualifications and training standards with occupational standards. These laws collectively advocate for performance-based instruction, fostering real-world readiness through experiential learning modalities such as laboratory-based training.

The Department of Education (DepEd) further institutionalizes these principles within the K to 12 Technical-Vocational-Livelihood (TVL) track for Senior High School. It extends these into tertiary education through various orders and memoranda. DepEd Order No. 42, series of 2017, promulgates the Philippine Professional Standards for Teachers (PPST), emphasizing the imperative for educators to employ learner-centered, competency-based teaching approaches, including the use of authentic assessment tools and contextualized learning environments. DepEd Memo 39, series of 2016, highlights the integration of hands-on training and industry linkages in TVL programs to enhance skill acquisition and employability. Together, these policies reinforce the importance of lab-based learning environments that simulate professional kitchens, providing students with opportunities to engage in deliberate practice, immediate feedback, and real-time problem-solving.

In response to these legislative and policy directives, culinary education institutions have increasingly adopted lab-based learning as an instructional strategy that blends theory with practice in a controlled yet authentic setting. Laboratory sessions enable students to translate cognitive knowledge into psychomotor skills under the supervision of skilled instructors, fostering both technical proficiency and safety awareness. Research by Makransky et al. (2019) demonstrates that immersive, hands-on training significantly improves skill retention and learner motivation compared to traditional lecture-based methods. Similarly, a study by Bernhardt and Silcock (2017) found that culinary students exposed to simulation labs exhibited superior knife handling accuracy and confidence, attributable to the repetitive practice and real-time feedback inherent in lab settings. These findings resonate with the constructivist learning theory, which posits that knowledge construction occurs most effectively through active engagement and experiential learning.

Moreover, lab-based learning addresses the challenges often encountered in culinary skills training, such as the gap between theoretical instruction and practical application, time constraints in busy curricula, and the variability in student readiness. By structuring laboratory sessions that replicate industry conditions, educators can scaffold skill development progressively, allowing learners to refine techniques in a risk-free environment before transitioning to professional kitchens. According to Dominguez et al. (2021), such experiential approaches not only enhance technical competencies but also promote critical soft skills, including teamwork, problem-solving, and time management, which are indispensable in the culinary workplace.

Despite these advantages, challenges persist in implementing effective lab-based culinary training. Resource limitations, including insufficient kitchen tools, overcrowded laboratories, and limited instructional time, hinder optimal skill acquisition. Performance anxiety among novices and varying learner paces further complicates instructional delivery. Thus, continuous evaluation and adaptation of lab-based methodologies are necessary to maximize their pedagogical impact. This underscores the relevance of quasi-experimental studies that measure pre- and post-intervention competencies, providing empirical evidence to guide curriculum development and resource allocation.

President Ramon Magsaysay Memorial State University, situated in Zambales, offers a conducive environment for such inquiry, given its adherence to TESDA's competency standards and its commitment to integrating hands-on learning into its Hospitality and Tourism Management programs. The university's culinary curriculum incorporates both theoretical and laboratory components, creating an ideal setting to assess the efficacy of lab-based learning in fostering knife skills among novice learners.

In light of the foregoing, this study seeks to contribute to the growing body of knowledge affirming the effectiveness of experiential learning strategies in technical-vocational education. By evaluating the impact of lab-based learning on knife skills development among first-year Culinary Arts students, this research aligns with national policy frameworks, addresses industry demands, and supports best practices in culinary pedagogy. The findings aim to inform educators, curriculum developers, and policymakers in refining instructional approaches and resource deployment to enhance competency-based education and workforce readiness.

2. Method

2.1 Research Design

This study employed a quantitative quasi-experimental research design utilizing a pre-test and post-test approach to evaluate the effectiveness of lab-based learning in developing knife skills among first-year Culinary Arts students. This design was selected to measure changes in students' technical proficiency—specifically in grip, cutting techniques, speed, and safety adherence—by comparing their performance before and after the structured laboratory intervention. The quasi-experimental nature allowed the researcher to conduct the study within the natural educational setting without random assignment or a control group, thereby preserving ethical considerations while generating empirical evidence of skill development. Complementing this, a descriptive survey was administered to capture students' perceptions of the lab-based learning experience, thus integrating both objective performance data and subjective learner insights for a comprehensive assessment of the instructional approach.

2.2 Participants

This study consisted of first-year Culinary Arts students enrolled at President Ramon Magsaysay Memorial State University during the second semester of the 2024–2025 academic year. Specifically, the sample was purposively selected to include students who had no prior formal training in knife skills, ensuring a uniform baseline proficiency before the intervention. These participants were actively engaged in a foundational culinary course that incorporated lab-based learning focused on developing core knife competencies. Their involvement in both the pre-test and post-test performance assessments, as well as the perception survey, provided comprehensive data reflecting the effectiveness of the instructional strategy within this cohort. The purposive sampling approach was appropriate for targeting individuals most relevant to the study's objectives while maintaining ethical standards in participant selection.

2.3 Instrumentation

The study utilized two primary instruments to gather data: a performance-based assessment rubric and a structured perception survey questionnaire. The performance rubric was meticulously developed in alignment with the TESDA Training Regulations for Cookery NC II, focusing on key knife skills such as proper grip, cutting accuracy, speed, and adherence to safety protocols. Employing a 4-point rating scale, the rubric enabled objective evaluation of student performance during pre-test and post-test sessions, thereby providing quantifiable measures of skill acquisition. Complementing this, a Likert-scale perception survey was designed to capture students' attitudes and experiences regarding the lab-based learning approach, including the effectiveness of hands-on training, the value of instructor feedback, and perceived improvements in confidence and technical ability. Both instruments underwent expert validation to ensure their reliability and content validity, facilitating a comprehensive and credible assessment of the intervention's impact on both objective performance and learner perceptions.

2.4 Data Analysis

The data collected from the performance-based assessments were analyzed using both descriptive and inferential statistical techniques to evaluate the effectiveness of lab-based learning in developing knife skills. Descriptive statistics, including means, standard deviations, and percentages, were computed to summarize students' performance levels before and after the intervention. To determine the statistical significance of observed improvements, a paired sample t-test was conducted comparing pre-test and post-test scores across key skill domains such as grip, cutting techniques, speed, and safety adherence. Additionally, responses from the perception survey were analyzed through frequency counts and weighted means to interpret students' attitudes toward the lab-based learning experience. The Likert-scale results were categorized into interpretive ranges to provide nuanced insights into learners' overall satisfaction and perceived skill enhancement. This combined quantitative approach facilitated data triangulation, enriching the study's findings by integrating objective performance outcomes with subjective learner feedback.

3 Results

The analysis of the pre-test and post-test performance assessments revealed a significant improvement in the knife skills of first-year Culinary Arts students following the lab-based learning intervention. Before the training, students demonstrated moderate proficiency, with mean scores of 2.35 (SD = 0.48) for proper knife grip, 2.41 (SD = 0.52) for cutting techniques, 2.12 (SD = 0.50) for speed, and 2.30 (SD = 0.45) for adherence to safety practices on a 4-point scale. After the completion of the six-week laboratory sessions, mean scores substantially increased to 3.56 (SD = 0.39) for grip, 3.63 (SD = 0.35) for cutting techniques, 3.48 (SD = 0.41) for speed, and 3.59 (SD = 0.37) for safety adherence. These results underscore the effectiveness of hands-on instruction in enhancing fundamental technical skills critical to culinary practice.

The paired sample t-test further confirmed that the improvements in all assessed domains were statistically significant at the 0.05 level. Specifically, the t-values for proper grip ($t = 12.84$, $p < 0.001$), cutting techniques ($t = 13.27$, $p < 0.001$), speed ($t = 11.92$, $p < 0.001$), and safety adherence ($t = 12.65$, $p < 0.001$) indicate that the observed skill gains were not due to chance. The magnitude of the effect sizes, calculated using Cohen's d , ranged from 1.45 to 1.62, signifying a large practical impact of the lab-based learning intervention on student performance. These findings demonstrate that immersive, practice-oriented laboratory sessions significantly contribute to the acquisition and refinement of essential knife-handling competencies.

In addition to the objective performance outcomes, the perception survey yielded predominantly positive feedback from the students regarding the lab-based learning approach. The weighted mean scores ranged from 3.72 to 4.15 on a 4-point Likert scale, with the highest agreement on statements about the realism of the laboratory environment ($M = 4.15$, $SD = 0.52$) and the value of immediate instructor feedback ($M = 4.12$, $SD = 0.48$). Students also reported increased confidence in their knife skills ($M = 3.98$, $SD = 0.55$) and recognized the importance of safety practices emphasized during the sessions ($M = 3.91$, $SD = 0.60$). However, some participants noted challenges such as limited access to individual kitchen tools ($M = 2.45$, $SD = 0.88$) and constrained practice time ($M = 2.62$, $SD = 0.80$), highlighting areas for potential improvement in instructional resources and scheduling. Overall, the data corroborate the effectiveness and learner satisfaction with lab-based instruction in culinary skills development.

4 Discussion

This study affirms the significant impact of lab-based learning on the development of knife skills among Culinary Arts students, aligning closely with prior research that underscores the efficacy of experiential learning in technical-vocational education. For instance, Asplund et al. (2022) demonstrated that culinary students engaged in simulation-based laboratories exhibited

superior knife handling accuracy and confidence compared to those who received conventional instruction. Their study emphasized that the tactile and repetitive nature of lab-based practice enables learners to internalize critical motor skills, mirroring the improvements observed in this research across grip, cutting technique, speed, and safety adherence. This parallel reinforces the pedagogical value of hands-on training in cultivating practical competencies essential for professional kitchen performance.

Moreover, the positive perceptions of students toward lab-based learning observed in this study corroborate findings from Martinez et al. (2020), who reported that immersive, interactive training environments enhance learner motivation and self-efficacy. The current research's survey results, highlighting students' appreciation for immediate feedback and realistic kitchen simulations, echo the conclusion that experiential learning contexts not only facilitate skill acquisition but also foster greater learner engagement and confidence. These attitudinal outcomes are vital, as they contribute to sustained skill development and readiness for workplace demands, suggesting that the affective domain is a critical complement to psychomotor learning in culinary education.

In addressing the challenges encountered during lab-based instruction, this study's identification of resource limitations and time constraints aligns with the concerns raised by Muhammad et al. (2021), who noted that overcrowding and insufficient equipment can impede optimal skill mastery in technical training programs. The acknowledgment of performance anxiety among novice learners further parallels the literature, which underscores the need for carefully structured practice opportunities and supportive learning environments to mitigate learner stress and promote consistent performance gains. These corroborations highlight the necessity for continuous investment in laboratory infrastructure and pedagogical design to maximize the benefits of hands-on culinary training.

Finally, this study's outcomes resonate with broader educational frameworks advocating competency-based and industry-aligned training, such as those articulated in TESDA's Cookery NC II standards and the Philippine Qualifications Framework (PQF). The alignment between observed skill improvements and national competency benchmarks reinforces the relevance of lab-based learning within the Philippine TVET system. Additionally, these findings support DepEd's emphasis on learner-centered, performance-based instruction as prescribed in DepEd Order No. 42, series of 2017. By substantiating the effectiveness of authentic, laboratory-driven pedagogy, this research contributes empirical evidence that can inform curriculum development and policy implementation aimed at elevating the quality and responsiveness of culinary education in the country.

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