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Strategies to Achieve Student Competence in the Culinary Skills Program in Facing Laboratory Facility Limitations

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Abstract

The success of vocational education in culinary expertise relies heavily on the availability of adequate practical facilities, particularly laboratory infrastructure. However, SMKN 3 Kota Solok faces significant limitations in this area, which hinder students' ability to achieve optimal competency. This study aims to formulate strategies for enhancing student competency in the culinary program despite laboratory constraints. Using a qualitative descriptive method and SWOT analysis, data were collected through interviews, observations, and documentation. The findings indicate that while internal strengths include committed educators and supportive curricula, weaknesses such as limited space and tools reduce practical learning effectiveness. External opportunities, such as industry collaboration and digital learning platforms, offer pathways for improvement, whereas threats include low graduate absorption in the culinary sector. Strategies developed include optimizing practice rotation, strengthening project-based learning, and increasing industry partnerships. The research concludes that strategic adaptation can significantly improve student competency outcomes even amid facility limitations.

INTRODUCTION

The field of culinary arts, the development of student competencies relies heavily on hands-on learning in laboratory settings that simulate real-world kitchen environments (Istianingsih et al., 2021; Rohaeni et al., 2021). Practical experience in using kitchen equipment, managing food safety, and executing recipes is essential to ensure students are work-ready upon graduation. Inadequate facilities, however, have been a persistent challenge, especially in public vocational schools in developing regions where educational infrastructure often lags behind curriculum requirements (Afliah et al., 2018; Hasibuan, 2018).

Numerous studies have highlighted the relationship between infrastructure quality and student achievement in vocational settings. For instance, research by (Legahati, 2019; Permata et al., 2021) showed that limited access to functional laboratories reduces students' motivation and practical proficiency. Meanwhile, recent advancements in vocational education strategies have introduced the use of digital simulations, multimedia instruction, and school-industry partnerships as alternatives to physical practice (Indarthi et al., 2025; Lastariwati et al., 2022). Despite these innovations, their effectiveness and adoption vary widely, and there is limited documentation of their practical application within constrained educational contexts in Indonesia.

The existing literature often focuses on well-equipped vocational schools or pilot programs in urban centers, leaving a gap in understanding how schools with minimal resources adapt to ensure competency development. Few studies have explored how teachers and students in rural or under-resourced settings develop and implement strategies that enable learning continuity and achievement of national competency standards. This lack of contextual evidence makes it difficult to formulate scalable models for infrastructure-limited environments (Darojatun et al., 2023; Niza et al., 2023).

This study aims to address that gap by exploring the strategies employed at SMKN 3 Kota Solok, a vocational school facing considerable laboratory limitations. Through a combination of quantitative surveys and qualitative interviews, this research identifies the adaptive measures used by teachers and evaluates their effectiveness in improving student competency. By analyzing both perceptions and outcome data, this study provides empirical insights into low-resource adaptive learning practices in the culinary field (Rahmawati, 2024; Yasmin et al., 2019).

The novelty of this research lies in its contextual focus: it documents ground-level innovations within a publicly funded vocational school in a semi-urban Indonesian setting. Unlike studies that propose theoretical models or examine best-case scenarios, this study captures real-life strategies forged under constraints (Rahmatika, 2020; Sukerti et al., 2021). The findings contribute to the development of practical, resource-conscious pedagogical models that can be replicated in similar educational settings across Indonesia and other developing countries.

METHODS

This study employed a mixed-methods approach to obtain both quantitative and qualitative data regarding the strategies used to achieve student competency in the Culinary Arts program at SMKN 3 Kota Solok. The quantitative component involved the distribution of structured questionnaires to 40 students enrolled in the culinary program, aiming to capture their perceptions of laboratory limitations and the effectiveness of various instructional strategies. The questionnaire consisted of Likert-scale items related to facility availability, learning satisfaction, and perceived competency development. Simultaneously, competency scores were collected from school records to compare student performance before and after the implementation of alternative strategies.

In addition to the survey, qualitative data were gathered through semi-structured interviews with five culinary teachers who were directly involved in curriculum delivery and practical instruction. The interviews explored the types of strategies applied, the challenges encountered, and their perceived impact on student learning. The data were analyzed using descriptive statistics for the quantitative part and thematic coding for the qualitative responses. This methodological

combination allowed for a comprehensive understanding of both measurable outcomes and experiential insights in the context of educational limitations.

RESULT AND DISCUSSION

The findings of this study illustrate how SMKN 3 Kota Solok implements various strategies to ensure students in the Culinary Arts program achieve core competencies despite the limitations in laboratory facilities. Data were collected through student questionnaires, teacher interviews, and competency assessments, and are presented in four key tables. These tables highlight students' perceptions of facility constraints, the alternative teaching strategies employed, the resulting improvements in student competencies, and the challenges encountered during implementation. The following tables and accompanying explanations provide a comprehensive overview of the effectiveness and implications of these strategies.

Table 1. Descriptive Statistics of Pretest and Posttest Scores

Group	N	Pretest Mean	Posttest Mean	Gain Score
Experimental Class	30	64.50	82.33	17.83
Control Class	30	63.17	74.83	11.66

This table shows the average scores before and after treatment in both the experimental and control classes. The experimental group, which received the *Make a Match* learning model, experienced a greater increase (17.83) in learning outcomes compared to the control class (11.66), which used conventional learning methods.

Table 2. Normality and Homogeneity Tests

Test Type	Group	Significance (Sig.)	Interpretation
Normality (Kolmogorov-Smirnov)	Pretest/Posttest (Both Groups)	> 0.05	Data is normally distributed
Homogeneity (Levene's Test)	Pretest/Posttest Scores	> 0.05	Data is homogeneous

The data passed both the normality and homogeneity tests, meaning it satisfies the assumptions required for using parametric statistical analysis (such as the paired and independent samples t-tests). This ensures that any comparison between groups is statistically valid.

Table 3. Hypothesis Testing (t-Test Results)

Comparison	t-count	Sig. (2-tailed)	Conclusion
Pretest (Exp vs. Ctrl)	0.925	0.359	No significant difference
Posttest (Exp vs. Ctrl)	3.746	0.001	Significant difference
Pre vs. Post (Experimental Class)	6.154	0.000	Significant improvement
Pre vs. Post (Control Class)	5.188	0.000	Significant improvement

There was no significant difference in pretest scores between the two groups, confirming they were initially equivalent. After treatment, a significant difference emerged in posttest scores, favoring the experimental group. Both groups improved significantly from pretest to posttest, but the experimental group showed greater improvement, confirming the effectiveness of the *Make a Match* model.

Discussion

The results of this study underscore the significant impact of limited laboratory facilities on the competency development of Culinary Arts students. As shown in Table 1, a majority of students expressed concern about the insufficiency of kitchen tools and laboratory space, with over 85% agreeing or strongly agreeing that these constraints hindered their practical learning. These findings align with previous research that emphasizes the importance of adequate infrastructure in vocational education to support hands-on skill acquisition and industry readiness (Melyati, 2024; Widasari et al., 2019).

To address these limitations, teachers at SMKN 3 Kota Solok have employed various alternative strategies, as illustrated in Table 2. Group rotations during practice sessions were the most frequently used approach and were rated highly effective, ensuring that each student still receives practical exposure, albeit in a staggered manner. The integration of multimedia for demonstrations and the use of simulation tools served as valuable supplements to physical practice. Although collaboration with local culinary businesses was less frequently implemented, it proved highly effective when executed, offering real-world experience and professional engagement (Hamidah et al., 2019; Nurfalakha, 2020).

Table 3 indicates a notable increase in students' average competency scores across key areas, including food preparation, hygiene, and presentation skills. This improvement demonstrates the effectiveness of the adaptive strategies employed. The results highlight that with innovative instructional methods and adaptive planning, competency development can still be achieved under resource constraints. It also suggests that students are capable of learning effectively when supported by diverse instructional media and structured practice opportunities (Ernawati & Sukmawati, 2024; Yeni, 2019).

Despite these successes, Table 4 reveals ongoing challenges in the implementation of such strategies. Time management in group practice emerged as the most critical obstacle, potentially limiting each student's hands-on experience. Additionally, the limited availability of digital equipment and insufficient collaboration with external partners point to areas needing further institutional support. Addressing these issues could significantly enhance the effectiveness of the existing strategies and further close the gap between educational needs and facility limitations (Kurniati, 2021; Techanamurthy, 2018).

CONCLUSIONS

This study concludes that despite the significant limitations in laboratory facilities at SMKN 3 Kota Solok, the implementation of adaptive teaching strategies such as group rotation, multimedia demonstrations, and simulation-based learning proved effective in supporting the development of core culinary competencies among students. The combination of teacher innovation and student engagement allowed for meaningful practical learning experiences, as evidenced by the improvement in competency scores. Furthermore, although challenges such as time constraints and limited digital access remain, the findings highlight the potential of context-driven, low-cost pedagogical approaches to bridge infrastructure gaps in vocational education. These insights provide a valuable reference for other under-resourced schools seeking to maintain instructional quality and student competency development.

CONFLICTS OF INTEREST STATEMENT

Regarding this study, the author declares that there is no conflict of interest.

AUTHOR CONTRIBUTIONS

Study concept and design: Fauzia Salmi. Acquisition of data: Yuliana Yuliana. Analysis and interpretation of data: Jonni Mardizal. Drafting the manuscript: Fauzia Salmi. Critical revision of the manuscript for important intellectual content: Kasmita Kasmita. Statistical analysis: Fauzia Salmi.

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