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Poultry Ingredient Knowledge and Cooking Techniques as Predictors of Main Course Preparation Skills in Culinary Vocational Students

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ABSTRACT

This study aimed to analyze the predictive role of students' knowledge of poultry ingredients and cooking techniques on their main course preparation skills in the context of continental cuisine. A quantitative ex post facto design was employed with 35 eleventh-grade students from the Culinary Arts program at SMKN 3 Kediri, Indonesia, selected via purposive sampling from a population of 152 students. Data were collected using validated multiple-choice tests measuring poultry ingredient knowledge (X_1) and cooking technique knowledge (X_2), alongside a performance assessment rubric for main course preparation skills (Y). Instrument reliability was confirmed by Cronbach's alpha values of 0.938 and 0.702, respectively. Data were analyzed through descriptive statistics and multiple linear regression using SPSS version 25.0. Both independent variables demonstrated statistically significant partial effects on main course preparation skills (X_1: $t = 6.308$, $p < 0.001$; X_2: $t = 5.732$, $p < 0.001$). Simultaneously, the two predictors explained 62.2% of the variance in skill outcomes (Adjusted $R^2 = 0.622$; $F = 7.548$, $p < 0.001$). Poultry ingredient knowledge ($\beta = 0.426$) showed a slightly stronger predictive contribution than cooking technique knowledge ($\beta = 0.386$). Poultry ingredient knowledge and cooking technique knowledge are significant predictors of main course preparation skills in culinary vocational students. These findings highlight the critical role of theoretical content mastery in supporting psychomotor skill development and underscore the need for integrated theory-practice curricula in vocational culinary education.

Keywords
Cooking techniques; Culinary vocational education; Ingredient knowledge; Main course preparation; Poultry; Psychomotor skills.

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INTRODUCTION

Vocational education plays a strategic role in preparing a competent and industry-ready workforce. In Indonesia, Vocational High Schools (Sekolah Menengah Kejuruan/SMK) are designed to equip graduates with occupational competencies through structured theoretical instruction and applied practical training (Ariansyah et al., 2024; Sutarna et al., 2020). The Culinary Arts program—one of the most prominent vocational tracks—emphasizes the mastery of food ingredients, culinary processing techniques, and dish presentation standards aligned with professional hospitality and foodservice industries (Masyitha et al., 2024; Xie et al., 2021).

Within the Culinary Arts curriculum, main course preparation constitutes a central and complex competency benchmark. A main course (plat principal) represents the most nutritionally complete and volumetrically substantial component of a full-service menu, typically incorporating a protein source, starch accompaniment, and vegetable garnish (Labensky et al., 2020). The preparation of poultry-based main courses—such as chicken cordon bleu and seasoned chicken wings—demands proficiency in multiple culinary skills, including ingredient handling, precise knife cuts (e.g., julienne: 3 mm × 3 mm × 4–5 cm; jardinière: 4–5 mm × 4–5 mm × 4–5 cm), and the application of appropriate cooking techniques such as sautéing and deep frying(Berghout et al., 2018)

The curriculum structure at SMKN 3 Kediri follows a sequential prerequisite model: students complete Food Ingredient Knowledge (Pengetahuan Bahan Makanan/PBM) and Basic Culinary (Boga Dasar) courses before advancing to Continental Food Processing and Presentation (Pengolahan dan Penyajian Makanan Kontinental/PPMK). This hierarchical design reflects the pedagogical assumption that theoretical knowledge in prior courses serves as a cognitive scaffold for the development of applied skills in subsequent practical courses.

This type of research uses quantitative methods with surveys and quasi-research approaches. Experimental (Quasi Experimental) with Nonrandomized Control Group Pretest-Posttest Design. Research This involves two different groups, namely the intervention group and the control group which will measured attitudes, knowledge and actions in Mosquito Nest Eradication (PSN) in the environment their residence. The Intervention Group consisted of eighth grade students at SMPN 49 Makassar City and SMPN21 Makassar City as the control group. The sample selection in this study used the Purposive Sampling technique, where

sample selection using several considerations according to the desired criteria (Sugiyono, 2018). The inclusion criteria in selecting this sample include the respondent's house. have a container, live in Minasa Upa Subdistrict for the Intervention Group and Subdistrict Gunung Sari for the Control Group. Meanwhile, the inclusion criteria were the cadre's house. health. The number of respondents was 60 respondents, 30 respondents each for each group.

This research was conducted in March-June 2023, where training was provided at the school. each group and a mosquito larvae examination was carried out at each respondent's residence.The research was conducted by measuring the values of knowledge, attitudes, actions and the presence of mosquito larvae. before and after the intervention. The instruments used were research questionnaires, DBD booklet, PSN-Kit, mosquito larvae monitoring checklist, observation sheets and so on.

Critical Examination of Existing Literature

The relationship between declarative knowledge and psychomotor skill development has been extensively theorized within educational psychology. Bloom's revised taxonomy conceptualizes cognitive learning as a hierarchy from remembering and understanding to applying, analyzing, evaluating, and creating (Anderson & Krathwohl, 2001; Grebin et al., 2020). In vocational contexts, this framework implies that students who possess superior conceptual knowledge of ingredients and techniques are better positioned to execute practical tasks competently.

Empirical evidence supports this theoretical linkage. (Harun et al., 2018) reported that higher levels of theoretical knowledge significantly predict practical skill outcomes among culinary vocational students. Similarly, (Lumbo et al., 2025) demonstrated a positive correlation between foundational culinary course comprehension and the quality of continental cuisine preparation. (Bauer et al., 2023) further corroborated that students' readiness to perform culinary tasks is substantially mediated by their prior knowledge quality. In the domain of cooking techniques specifically, (Iomaire et al., 2020) established that a comprehensive understanding of food preparation methods—including moist heat (boiling, steaming, poaching), dry heat (grilling, roasting, frying), and fat-based techniques (braising, stewing)—is prerequisite to achieving consistent and high-quality culinary outcomes.

Regarding poultry as a culinary ingredient, its distinct physical characteristics—tender myofibrillar structure relative to red meat, high protein content, and moisture sensitivity to heat—necessitate specific handling and processing knowledge (Setyaningsih et al., 2024). The quality of poultry is assessed through freshness, color, odor, texture, and appropriate storage conditions, all of which directly influence the final product quality when applied in practical settings. Accurate knowledge of these properties enables students to make informed decisions during ingredient selection, preparation, and cooking—ultimately shaping the quality of the prepared dish (Chandradewi et al., 2025).

Identification of Research Gaps

Despite the growing body of literature affirming the knowledge-skill relationship in vocational education, several critical gaps remain. First, most prior studies have examined general food knowledge or broad cooking competencies, without isolating poultry ingredient knowledge as a distinct predictor variable. Second, few studies have simultaneously investigated both ingredient knowledge and cooking technique knowledge as co-predictors of a specific practical skill outcome within a unified regression framework. Third, the Indonesian vocational culinary context remains underrepresented in the peer-reviewed international literature, limiting the transferability and contextualization of global findings to local educational settings. Finally, preliminary observation at SMKN 3 Kediri revealed that over 20% of students failed to achieve the Minimum Competency Criteria (KKM = 75) in poultry main course preparation across two consecutive academic years, yet the specific cognitive predictors of this underperformance had not been empirically examined.

Rationale for the Research

The identification of knowledge-based predictors of practical skill outcomes holds significant practical value for culinary vocational educators, curriculum designers, and school administrators. If poultry ingredient knowledge and cooking technique knowledge are confirmed as significant predictors of main course preparation performance, this provides an evidence-based rationale for reinforcing these theoretical domains within the instructional sequence. Moreover, understanding the relative weight of each predictor enables more targeted pedagogical interventions for at-risk students.

Research Objectives

The present study pursued three specific objectives: (1) to describe the levels of poultry ingredient knowledge, cooking technique knowledge, and main course preparation skills among eleventh-grade Culinary Arts students at SMKN 3 Kediri; (2) to examine the partial effect of each knowledge variable on main course preparation skills; and (3) to determine the simultaneous effect of both knowledge variables on main course preparation skills. The following hypotheses were tested: H1: poultry ingredient knowledge has a significant partial effect on main course preparation skills; H2: cooking technique knowledge has a significant partial effect on main course preparation skills; and H3: both knowledge variables simultaneously have a significant effect on main course preparation skills.

MATERIALS AND METHODS

Study Design

This study employed a quantitative research approach using an ex post facto design—a non-experimental design in which the researcher examines the causal relationships between pre-existing variables without any active manipulation or intervention (Creswell & Creswell, 2018). The independent variables were students' knowledge of poultry ingredients (X_1) and cooking techniques (X_2), while the dependent variable was their main course preparation skills (Y). The study was conducted from September 2025 to January 2026, encompassing the phases of preliminary observation, instrument development and validation, data collection, data analysis, and manuscript preparation.

Study Participants

The target population comprised 152 students enrolled in the Culinary Arts program at SMKN 3 Kediri (Jl. Hasanudin No. 10, Dandangan, Kediri City, East Java, Indonesia). Purposive sampling was employed, yielding a sample of 35 eleventh-grade students from Class XI Culinary 2 who met the following eligibility criteria: (a) enrollment in the Culinary Arts program at the time of the study; (b) completion of Food Ingredient Knowledge (PBM) and Basic Culinary (Boga Dasar) courses; and (c) active participation in the Continental Food Processing and Presentation (PPMK) course. This class was selected because it had satisfied all prerequisite course requirements, ensuring that the students possessed the minimum prior knowledge necessary to engage with the measured practical tasks.

Pilot testing for instrument validation was conducted with 30 students from Class XII Culinary 3, who were not included in the main sample. This separation ensured the independence of the validation sample from the research sample.

Research Instruments

Two instruments were developed for data collection:

Written Knowledge Tests: Two multiple-choice tests were developed—one for poultry ingredient knowledge (X1) and one for cooking technique knowledge (X2). Each test consisted of 15 validated items covering definitional, procedural, and applied knowledge domains. The poultry test addressed: the definition and classification of poultry, ingredient characteristics, quality indicators, nutritional composition, and storage and handling procedures. The cooking technique test covered: the definition and classification of culinary processing methods, technical characteristics of each method, considerations during the cooking process, and the appropriate matching of technique to ingredient type and dish category.

Performance Assessment Sheet: A structured performance rubric assessed five practical domains during the main course preparation session: preparation (12 items × weight 2 = max 24 points), processing/cooking (2 items × weight 12 = max 24 points), presentation/plating (3 items × weight 4 = max 12 points), time management (2 items × weight 5 = max 10 points), and product quality (3 items × weight 10 = max 30 points). The maximum aggregate score was 100. Criterion weights were determined following the Multi-Criteria Decision Analysis (MCDA) framework, which assigns differential importance weights based on the relative contribution of each criterion to the overall decision outcome (Danielson & Ekenberg, 2016). The resulting weight distribution is presented in Table 1.

Table 1. Performance Assessment Weight Distribution for Main Course Preparation

No.	Assessment Criterion	Number of Items	Weight	Maximum Score
1	Preparation	12	2	24
2	Cooking Process	2	12	24
3	Plating & Presentation	3	4	12
4	Time Management	2	5	10
5	Product Quality	3	10	30
	Total			100

Instrument Validation and Reliability

Content validity was established through expert judgment involving three subject matter specialists: Dr. Hj. Sri Handajani, S.Pd., M.Kes.; Annisa Nur'aini, S.Pd., M.Pd. (both Culinary Arts lecturers at Universitas Negeri Surabaya); and Eni Retnaningsari, S.Pd. (Culinary Arts teacher, SMKN 3 Kediri). Each expert assessed the items for clarity, relevance, and alignment with the curriculum objectives, subsequently certifying the instruments as content-valid.

Empirical validity was determined through item-level analysis using SPSS 25.0, with a critical r value of 0.361 ($n = 30$, $\alpha = 0.05$, two-tailed). All 30 items (15 per test) demonstrated item-total correlation coefficients exceeding this threshold, confirming their individual validity. Reliability was assessed using Cronbach's alpha: the poultry knowledge test yielded $\alpha = 0.938$ and the cooking technique test yielded $\alpha = 0.702$, both exceeding the minimum acceptable threshold of 0.60 (George & Mallery, 1998), confirming the internal consistency of both instruments.

Data Collection Procedure

Written tests were administered to all 35 sampled students under standardized conditions during regularly scheduled class hours. Student scores were computed using the following formula: Score = (Σ correct items / maximum items) × 100.

Practical assessment was conducted by the lead researcher, assisted by three trained co-assessors—Atika A., Dwi Apriliani, and Rahadatul Asmahda—all of whom had prior experience as student-teachers (PLP supervisors) at vocational schools in East Java. Prior to the assessment session, a calibration meeting was held to align assessors' understanding of the rubric criteria, scoring procedures, and inter-rater consistency. Students were assessed during a supervised practical examination session in which they prepared one of two assigned menus: (a) chicken cordon bleu with château potatoes and bouquetière of vegetables, or (b) chicken wings with baked jacket potatoes and mixed vegetables.

Statistical Analysis

All statistical analyses were performed using SPSS Version 25.0 (IBM Corp., Armonk, NY, USA) with a significance level of $\alpha = 0.05$. The following analytical procedures were applied:

Descriptive Statistics: Mean (M), median (Mdn), mode (Mo), standard deviation (SD), and score range were computed for each variable. Theoretical categorization was based on ideal mean (Mi) and ideal standard deviation (SDi), calculated as: Mi = ½(maximum + minimum score); SDi = ⅙(maximum − minimum score). Students were classified into four performance categories (Very Good, Good, Adequate, Poor) following the four-category classification formula of Azwar (2022).

Classical Assumption Tests: Prior to regression analysis, three diagnostic tests were conducted: (a) normality of residuals was evaluated using the one-sample Kolmogorov–Smirnov test (normal distribution assumption: Asymp. Sig. > 0.05); (b) multicollinearity was assessed via Tolerance and Variance Inflation Factor (VIF) indices (acceptable thresholds: Tolerance > 0.10, VIF < 10.0); and (c) heteroscedasticity was examined using the Glejser test (no heteroscedasticity: $p > 0.05$ for all predictors).

Multiple Linear Regression: The predictive relationship was modeled as: $Y = a + b_1X_1 + b_2X_2 + \varepsilon$, where Y = main course preparation skills, X_1 = poultry ingredient knowledge, X_2 = cooking technique knowledge, a = constant, b_1 and b_2 = regression coefficients, and ε = error term. Partial effects were evaluated using the t-test (df = n − k = 35 − 3 = 32; t-table = 2.037); simultaneous effects were evaluated using the F-test (df1 = 2, df2 = 31; F-table = 3.305). The coefficient of determination (Adjusted R^2) quantified the proportion of variance in the dependent variable explained by the predictors.

Ethical Considerations

This study received ethical endorsement from the appropriate institutional authority at Universitas Negeri Surabaya, validated by the institutional ethics committee in accordance with national research ethics guidelines. All participants were fully informed of the study's purpose, voluntary nature, and confidentiality protocols prior to data collection. Written informed consent was obtained from all student participants, and for participants under 18 years of age, parental or guardian consent was additionally secured. Participant anonymity was maintained throughout all stages of data analysis and reporting. No personal identifying information was disclosed in any published materials, and all data were stored securely with restricted access.

RESULTS

Descriptive Analysis of Poultry Ingredient Knowledge (X_1)

Table 2 presents the descriptive statistics for the poultry ingredient knowledge variable. The sample mean (M = 77.90) exceeded both the theoretical midpoint (Mi = 63.30) and the minimum competency criterion (KKM = 75), suggesting an overall tendency toward favorable knowledge attainment.

Table 2. Descriptive Statistics for Poultry Ingredient Knowledge (X1)

Statistical Parameter	Value
N	35
Mean (M)	77.90
Median (Mdn)	80.00
Mode (Mo)	86.70
Standard Deviation (SD)	15.46
Maximum Score	93.30
Minimum Score	33.30
Ideal Mean (Mi)	63.30
Ideal SD (SDi)	10.00

Categorization of individual scores using the four-category framework (Azwar, 2022) is displayed in Table 3. A substantial majority of students (65.71%, n = 23) achieved scores in the 'Very Good' category (≥ 78.3), with a combined 82.85% of students performing at or above the 'Good' level. Only 8.57% of students (n = 3) were classified in the 'Poor' category.

Table 3. Categorization of Poultry Ingredient Knowledge Scores

Category	Score Interval	Frequency (n)	Percentage (%)
Very Good	≥ 78.3	23	65.71
Good	63.3 – < 78.3	6	17.14
Adequate	48.3 – < 63.3	3	8.57
Poor	< 48.3	3	8.57
Total		35	100.00

Descriptive Analysis of Cooking Technique Knowledge (X_2)

Descriptive statistics for cooking technique knowledge are summarized in Table 4. The sample mean (M = 74.80) was positioned near the theoretical midpoint (Mi = 66.65), indicating an overall performance at the transition between 'Good' and 'Very Good' categories.

Table 4. Descriptive Statistics for Cooking Technique Knowledge (X2)

Statistical Parameter	Value
N	35
Mean (M)	74.80
Median (Mdn)	80.00
Mode (Mo)	80.00
Standard Deviation (SD)	12.52
Maximum Score	93.30
Minimum Score	40.00
Ideal Mean (Mi)	66.65
Ideal SD (SDi)	8.88

Table 5 shows the distribution of students across the four categorical levels of cooking technique knowledge. More than half of the sample (51.43%, n = 18) performed at the 'Very Good' level, and approximately 80.00% of students achieved either 'Very Good' or 'Good' classifications. Only 5.71% (n = 2) were categorized as 'Poor.'

Table 5. Categorization of Cooking Technique Knowledge Scores

Category	Score Interval	Frequency (n)	Percentage (%)
Very Good	≥ 80.00	18	51.43
Good	66.65 – < 80.00	10	28.57
Adequate	53.30 – < 66.65	5	14.29
Poor	< 53.30	2	5.71
Total		35	100.00

Descriptive Analysis of Main Course Preparation Skills (Y)

The descriptive profile of the dependent variable—main course preparation skills—is presented in Table 6. The mean skill score (M = 85.70) substantially exceeded both the ideal theoretical mean (Mi = 80.00) and the KKM threshold, indicating that the majority of students demonstrated competent performance in practical assessment.

Table 6. Descriptive Statistics for Main Course Preparation Skills (Y)

Statistical Parameter	Value
N	35
Mean (M)	85.70
Median (Mdn)	86.00
Mode (Mo)	82.00
Standard Deviation (SD)	10.09
Maximum Score	100.00
Minimum Score	60.00
Ideal Mean (Mi)	80.00
Ideal SD (SDi)	6.67

Table 7 presents the categorical distribution of main course preparation skill scores. The largest proportion of students (51.43%, n = 18) was classified in the 'Good' category, with 37.14% (n = 13) achieving 'Very Good' status. Cumulatively, 88.57% of students demonstrated performance at or above the 'Good' level. A small minority of 8.57% (n = 3) were classified as 'Poor.'

Table 7. Categorization of Main Course Preparation Skill Scores

Category	Score Interval	Frequency (n)	Percentage (%)
Very Good	≥ 90.00	13	37.14
Good	80.00 – < 90.00	18	51.43
Adequate	70.00 – < 80.00	1	2.86
Poor	< 70.00	3	8.57
Total		35	100.00

Classical Assumption Tests

Prior to conducting the regression analysis, three classical assumption tests were performed to verify that the data fulfilled the required statistical preconditions.

Normality Test: The one-sample Kolmogorov–Smirnov test on unstandardized residuals yielded a test statistic of 0.077 with Asymp. Sig. (2-tailed) = 0.113 (Table 8). As this value exceeds the α = 0.05 threshold, the residuals were confirmed to follow a normal distribution, satisfying the normality assumption for linear regression.

Table 8. Results of One-Sample Kolmogorov–Smirnov Normality Test

Parameter	Value
N	35
Mean of residuals	0.0000000
Std. Deviation of residuals	0.47934365
Kolmogorov–Smirnov Statistic	0.077
Asymp. Sig. (2-tailed)	0.113
Decision	Normal distribution (p > 0.05)

Multicollinearity Test: Both predictors exhibited Tolerance values of 0.951 and VIF values of 1.056 (Table 9), well within acceptable thresholds (Tolerance > 0.10; VIF < 10.0). These results confirmed the absence of problematic multicollinearity between the two independent variables.

Table 9. Multicollinearity Diagnostics

Variable	Tolerance	VIF	Tolerance Threshold	VIF Threshold	Conclusion
Poultry Ingredient Knowledge (X1)	0.951	1.056	> 0.10	< 10.0	No multicollinearity
Cooking Technique Knowledge (X2)	0.951	1.056	> 0.10	< 10.0	No multicollinearity

Heteroscedasticity Test: The Glejser test produced significance values of 0.320 for X1 and 0.126 for X2 (Table 10), both exceeding α = 0.05. This confirms the absence of heteroscedasticity, validating the homoscedasticity assumption of the regression model.

Table 10. Glejser Test for Heteroscedasticity

Variable	Significance Value	Threshold	Conclusion
Poultry Ingredient Knowledge (X1)	0.320	0.05	No heteroscedasticity
Cooking Technique Knowledge (X2)	0.126	0.05	No heteroscedasticity

Multiple Linear Regression Analysis

Having satisfied all classical assumptions, multiple linear regression analysis was conducted to model the predictive relationships. The regression coefficients are presented in Table 11.

Table 11. Multiple Linear Regression Coefficients

Model	Unstandardized B	Std. Error	Standardized Beta (β)	t-value	p-value
Constant	0.593	2.027	—	0.584	0.000
Poultry Ingredient Knowledge (X1)	0.512	0.081	0.426	6.308	0.000
Cooking Technique Knowledge (X2)	0.571	0.100	0.386	5.732	0.000

The resulting regression equation is:

$$\mathbf{Y = 0.593 + 0.512X_1 + 0.571X_2 + \varepsilon}$$

This equation indicates that both X_1 and X_2 exert positive directional effects on Y. For each one-unit increase in poultry ingredient knowledge score (X_1), main course preparation skills (Y) are predicted to increase by 0.512 units, holding X_2 constant.

Similarly, a one-unit increase in cooking technique knowledge (X_2) corresponds to a predicted increase of 0.571 units in Y, controlling for X_1.

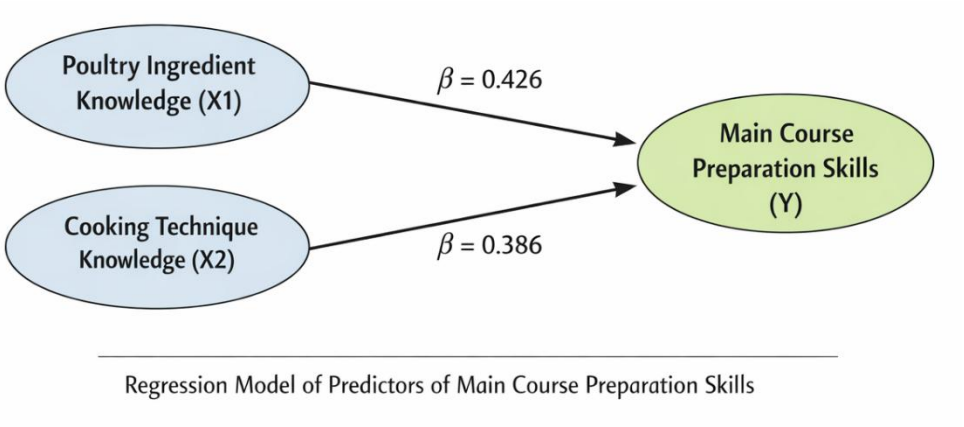

Figure 1. Regression Model of Predictors of Main Course Preparation Skills

Figure 1 illustrates the regression model showing the predictive relationships between poultry ingredient knowledge and cooking technique knowledge on students' main course preparation skills. Poultry ingredient knowledge (β = 0.426) demonstrated a slightly stronger contribution compared to cooking technique knowledge (β = 0.386), indicating its more dominant role in predicting students' performance.

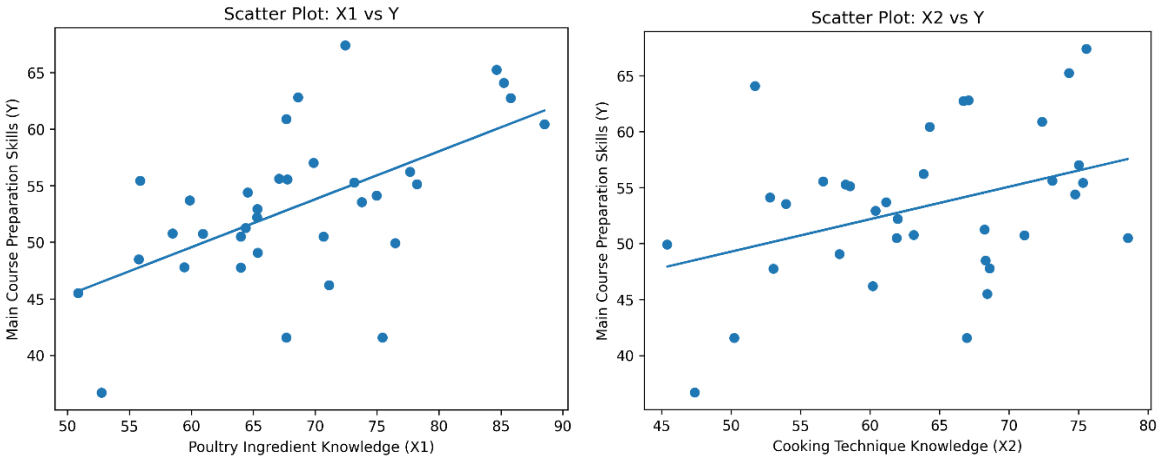

Figure 2. Scatter Plot of Variable Relationships

Figure X presents the scatter plots illustrating the relationships between poultry ingredient knowledge and cooking technique knowledge with main course preparation skills. The plots indicate a positive linear trend, supporting the regression findings that both predictors significantly contribute to students' performance.

Coefficient of Determination

Table 12 presents the coefficient of determination for the regression model. The Adjusted R^2 value of 0.622 indicates that the two predictor variables jointly explain 62.2% of the total variance in main course preparation skills. The remaining 37.8% of variance is attributable to factors not included in the present model.

Table 12. Coefficient of Determination (Adjusted R^2)

Predictors	Adjusted R^2	Explained Variance (%)
X_1 (Poultry Ingredient Knowledge) + X_2 (Cooking Technique Knowledge)	0.622	62.2%

Partial Effects: t-Test Results (H1 & H2)

Table 13 summarizes the partial t-test results. With t-table = 2.037 (df = 32, α = 0.05, two-tailed), both predictors demonstrated t-values substantially exceeding this critical value.

Table 13. Partial t-Test Results for Independent Variables

Variable	$t_{Calculated}$	t_{Table}	Sig.	α	Decision
Poultry Ingredient Knowledge (X_1)	6.308	2.037	0.000	0.05	H1 Accepted
Cooking Technique Knowledge (X_2)	5.732	2.037	0.000	0.05	H2 Accepted

These results confirm that: (H_1) poultry ingredient knowledge (X_1) exerts a significant partial effect on main course preparation skills (t = 6.308, p < 0.001); and (H_2) cooking technique knowledge (X_2) exerts a significant partial effect on main course preparation skills (t = 5.732, p < 0.001).

Simultaneous Effect: F-Test Results (H_3)

The ANOVA results for the simultaneous (joint) effect of both predictors are displayed in Table 14.

Table 14. ANOVA Results for Simultaneous Regression Effect

Source	Sum of Squares	df	Mean Square	F-Calculated	F-Table	Sig.
Regression	2.934	5	0.587	7.548	3.305	0.000
Residual	22.747	94	0.242			
Total	25.682	99				

With F-calculated (7.548) substantially exceeding F-table (3.305) and $p < 0.001$, the null hypothesis (H0) is rejected in favor of H3: poultry ingredient knowledge and cooking technique knowledge jointly and significantly predict main course preparation skills. This confirms the overall adequacy and statistical significance of the regression model.

DISCUSSION

Predictive Role of Poultry Ingredient Knowledge

The finding that poultry ingredient knowledge significantly and positively predicted main course preparation skills ($\beta = 0.426$, $p < 0.001$) is consistent with foundational learning theories and corroborates prior empirical evidence. From a cognitive science perspective, declarative knowledge about ingredients—encompassing their physical properties, quality indicators, nutritional characteristics, and handling requirements—provides an essential cognitive schema that guides practical decision-making during food preparation (Anderson & Krathwohl, 2001; Laporte et al., 2023). Students who possess a robust mental representation of poultry characteristics are better equipped to anticipate and mitigate preparation errors, such as uneven filleting, inappropriate coating techniques in chicken cordon bleu, or incorrect assessment of doneness during deep frying.

These results align with (Lagrada & Arroyo, 2025), who reported that theoretical knowledge proficiency significantly predicted practical skill outcomes in vocational culinary students, and with (Pieniak et al., 2023), who established that food ingredient knowledge mastery significantly influences the quality of culinary practical performance. The present study extends these findings by specifically isolating poultry ingredient knowledge as the strongest individual predictor ($\beta = 0.426$ vs. $\beta = 0.386$ for cooking technique knowledge), suggesting that a nuanced understanding of the protein source—rather than technique alone—is the primary cognitive determinant of successful main course preparation.

Within the practical context of this study, students who demonstrated superior poultry knowledge were observably more deliberate in the preparation stage: selecting appropriately fresh cuts, handling raw poultry according to hygiene and sanitation standards, and performing proportional tenderization for chicken cordon bleu preparation. These behaviors reflect the applied dimension of factual and conceptual knowledge articulated in Bloom's revised taxonomy (Anderson & Krathwohl, 2001).

Predictive Role of Cooking Technique Knowledge

Cooking technique knowledge also demonstrated a strong and significant partial effect on main course preparation skills ($\beta = 0.386$, $p < 0.001$). This finding is consistent with Simpson's psychomotor domain taxonomy (as cited in Nugrahani, 2021), which posits that comprehension of procedural information constitutes the initial phase enabling students to progress from guided practice to autonomous skill execution. Students with a thorough understanding of dry heat cooking methods—particularly deep frying—were better able to regulate oil temperature, determine appropriate immersion duration, and achieve uniform internal doneness in the prepared poultry dishes.

This outcome corroborates the assertion by (Okon et al., 2024) that knowledge of food preparation methods is a fundamental prerequisite for achieving consistent, high-quality culinary results. It also extends the findings of Santos et al. (2023), who documented a positive relationship between cooking technique comprehension and procedural accuracy in vocational culinary practical work. The practical menus evaluated in this study—requiring concurrent application of deep frying, vegetable preparation, and timed plating—represented a moderate-to-high difficulty level for eleventh-grade students, underscoring the critical role of procedural knowledge in managing the cognitive and psychomotor demands of multi-component meal preparation (Labensky et al., 2020).

Furthermore, (Amelia et al., 2023) demonstrated that students with stronger culinary knowledge were more confident and systematic during practical tasks—an observation that aligns with the structured, efficient workflow observed among high-scoring students in the present study. The positive regression coefficient for cooking technique knowledge ($b = 0.571$) further implies that interventions targeting this knowledge domain may produce measurable gains in practical skill outcomes.

Simultaneous Effect and Combined Explained Variance

The simultaneous regression model, accounting for 62.2% of the variance in main course preparation skills (Adjusted $R^2 = 0.622$, $F = 7.548$, $p < 0.001$), provides compelling evidence that ingredient knowledge and cooking technique knowledge together constitute a substantial portion of the cognitive architecture underpinning culinary skill performance. This proportion of explained variance is consistent with, and slightly higher than, the ranges reported in comparable studies examining knowledge-skill relationships in vocational education contexts (Bauer et al., 2023; Zhang & Koshmanova, 2021).

The remaining unexplained variance (37.8%) suggests that other factors—including motivational orientation, learning strategy, family socioeconomic background, facility quality, prior cooking experience, and cooperative group dynamics during practical work—also contribute meaningfully to skill outcomes. This is consistent with the broader vocational competency literature, which positions skill development as a multidimensional construct integrating cognitive, affective, and contextual elements (Fraser et al., 2019; Iliescu et al., 2025).

Limitations of the Study

Several limitations must be acknowledged in interpreting these findings. First, the relatively small sample size ($n = 35$) from a single class in a single school limits the generalizability of the results to broader culinary vocational populations in Indonesia or internationally. Second, the ex post facto design, while appropriate for examining pre-existing causal relationships, precludes causal inference with the same rigor as experimental designs. Third, the performance assessment relied partly on subjective evaluator judgment, and although calibration procedures were implemented, residual inter-rater variability cannot be fully eliminated. Fourth, the study did not account for potentially confounding variables such as motivational factors, family culinary background, or prior practical experience. Future research should address these limitations through larger, multi-school, longitudinal designs incorporating a broader array of predictor variables and objectively measured outcome indicators.

CONCLUSION

This study provides robust empirical evidence that poultry ingredient knowledge and cooking technique knowledge are significant and practically meaningful predictors of main course preparation skills among eleventh-grade Culinary Arts vocational students at SMKN 3 Kediri, Indonesia. Both variables demonstrated statistically significant partial effects: poultry ingredient knowledge ($t = 6.308$, $\beta = 0.426$, $p < 0.001$) and cooking technique knowledge ($t = 5.732$, $\beta = 0.386$, $p < 0.001$). Together, these predictors explained 62.2% of the variance in practical skill outcomes (Adjusted $R^2 = 0.622$; $F = 7.548$, $p < 0.001$), confirming all three study hypotheses.

The slightly stronger predictive contribution of poultry ingredient knowledge ($\beta = 0.426$) compared to cooking technique knowledge ($\beta = 0.386$) underscores the primacy of ingredient-level understanding as the foundational cognitive basis for subsequent technique application. This pattern reinforces the sequential curriculum logic already embedded in the SMKN 3 Kediri program, in which ingredient knowledge courses precede applied culinary practice.

These findings carry important implications for culinary vocational education theory and practice. Theoretically, they affirm the applicability of Bloom's revised taxonomy and Simpson's psychomotor hierarchy in the vocational cooking context, demonstrating that declarative and procedural knowledge domains together serve as meaningful predictors of psychomotor performance. Practically, the results advocate for a pedagogically integrated theory-practice instructional model in which ingredient knowledge and cooking technique concepts are explicitly connected to corresponding practical skill tasks, rather than taught as independent modules.

The authors recommend that culinary educators implement contextually embedded theoretical instruction—for instance, incorporating ingredient quality assessment and technique decision-making directly into pre-practical briefings—to strengthen the knowledge-to-skill transfer pathway. School administrators are encouraged to expand industry partnership programs (PKL/work-based learning) to provide students with authentic, real-world culinary experiences that consolidate classroom knowledge into professional competencies. Future research should investigate additional cognitive, motivational, and environmental predictors of culinary practical skills; explore gender-based or cohort differences; and apply experimental or quasi-experimental designs to test the causal efficacy of targeted instructional interventions on skill outcomes..

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