International Journal of Sustainable and Integrated Studies
Volume 1, Issue 4 | ISSN: 3155-6361
DOI: https://doi.org/10.65339/ijsis.V1.I4.288

Predictive Role of Measuring Skills, Teaching Quality and Attitudes Towards Culinary Learning on Procedural Skills in Bread and Pastry Production

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Publication history:

Received: October 13, 2026 Accepted: November 13, 2026
Revised: November 11, 2026 Published: November 14, 2026

International Journal of Sustainable and Integrated Studies, Vol. 1, No. 4, pp. 326–335, November 2026.

Abstract

The development of procedural skills is fundamental in culinary education, particularly in Bread and Pastry Production (BPP) under the Technology and Livelihood Education (TLE) curriculum. However, limited empirical evidence has examined how teaching quality, attitudes toward culinary learning, and measuring skills relate to procedural skills among junior high school learners. This quantitative descriptive-correlational study examined the relationships and predictive contributions of teaching quality, attitudes toward culinary learning, and measuring skills to the procedural skills. Procedural skills were assessed in terms of preparation, production, and presentation. The participants consisted of 90 Grade 9 and Grade 10 students enrolled in one of the public secondary schools in the district of Salay, Misamis Oriental, during the school year 2025–2026. Total enumeration sampling was used. Data were collected using a researcher-developed questionnaire and the TESDA Self-Assessment Guide for Bread and Pastry Production. Descriptive statistics, Pearson correlation, and multiple regression analyses were used. The findings showed that teaching quality was rated very high, while attitudes toward culinary learning were reported high. Measuring skills and overall procedural skills were also rated very high. Correlation analysis revealed significant positive relationships among all three predictor variables and procedural skills. However, regression analysis indicated that teaching quality and attitudes toward culinary learning were significant predictors, whereas measuring skills did not significantly contribute uniquely to procedural skills. These findings highlight the importance of effective instruction and positive learning attitudes in culinary education. Future studies may include diverse learners from multiple schools and use interviews, observations, or longitudinal designs.

Keywords: Attitudes Toward Culinary Learning, Bread and Pastry Production, Culinary Education, Measuring Skills, Procedural Skills, Teaching Quality.

1. Introduction

Bread and Pastry Production (BPP) develops learners' knowledge, skills, and attitudes related to baking and the food industry. As a component of livelihood education, BPP combines practical skills, scientific knowledge, and vocational training. Beyond providing knowledge of baking, the subject aims to develop learners' ability to perform tasks correctly, accurately, and consistently. These competencies are strengthened through hands-on learning and repeated practical activities (Rodil & Briones, 2022; Arida, 2023; Koerich et al., 2024).

Studies conducted in the Philippines have identified several factors associated with learners' BPP skills. Learners' perseverance and interest were found to be significantly related to their ability to prepare and produce baked products and to clean and maintain tools and equipment (Vallecera & Basal, 2022). Similarly, instructional quality, the laboratory learning environment, and student participation in food waste management were found to be related to learners' BPP skills (Pelpinosas & Saab, 2025). These findings suggest that learners' interest, teaching quality, and practical learning experiences are important factors associated with the development of procedural skills in baking.

Procedural skills refer to learners' ability to perform tasks correctly, accurately, and consistently. In BPP, these skills involve three essential areas: preparation, production, and presentation. Preparation involves organizing ingredients, measuring quantities, and preparing tools and equipment before baking. Production focuses on following procedures, applying appropriate baking techniques, and producing quality baked products. Presentation involves the proper handling, packaging, storage, and preservation of finished products to maintain their quality and safety. Accurate measurement and food safety practices are also essential components of cooking competency (Dean et al., 2021), while school-based cooking programs provide opportunities for practical learning and the development of food literacy (Vaughan et al., 2024). These competencies are reflected in the BPP curriculum (DepEd, 2016) and supported by research on food safety practices (Zanin et al., 2021).

Several factors may be associated with learners' procedural skills in BPP. Teaching quality may contribute to the development of these skills through clear demonstrations, guided practice, and appropriate feedback. Similarly, positive attitudes toward culinary learning may encourage learners to participate actively in practical activities and develop their skills. Measuring skills are also important because accurate measurement of ingredients contributes to consistency and quality in baking (Dean et al., 2021). Examining these factors may provide a better understanding of their relationship with learners' procedural skills in BPP.

The study may provide useful information for Technology and Livelihood Education (TLE) teachers in selecting appropriate teaching strategies and designing learning activities that support the development of learners' BPP competencies. It may also help identify areas where learners need additional guidance and practical training. Furthermore, the study supports Sustainable Development Goal (SDG) 4, particularly Target 4.4, which promotes the development of relevant technical and vocational skills, and SDG 8, particularly Target 8.5, which emphasizes productive employment and decent work (United Nations, 2015).

Although previous studies have examined BPP competencies and teaching and learning experiences, limited attention has been given to the combined predictive roles of measuring skills, teaching quality, and attitudes toward culinary learning in relation to learners' procedural skills. Rodil and Briones (2022) and Pelpinosas and Saab (2025) examined aspects of BPP competencies and teaching and learning experiences. However, further investigation is needed to determine how these variables, when considered together, predict the procedural skills of Grade 9 and Grade 10 learners in the Philippine context. This gap provides the basis for examining these factors among learners enrolled in BPP in the District of Salay, Misamis Oriental.

This study aims to determine whether measuring skills, teaching quality, and attitudes toward culinary learning significantly predict the procedural skills of Grade 9 and Grade 10 learners enrolled in BPP in the District of Salay, Misamis Oriental. Procedural skills are examined in terms of preparation, production, and presentation. Specifically, the study seeks to determine the combined predictive contribution of the three independent variables and identify which variable makes the strongest unique contribution to learners' overall procedural skills. The findings may provide a basis for improving instructional strategies, strengthening practical learning activities, and supporting the continuous development of learners' competencies in BPP.

2. Material and methods

2.1 Research Design

The study utilized a quantitative descriptive-correlational research design to assess teaching quality, attitudes toward culinary learning, measuring skills, and procedural skills in BPP. This design enabled the collection and analysis of numerical data to describe variables and examine their relationships without manipulation (Creswell & Creswell, 2018). A cross-sectional approach was employed, with data collected at a single point during School Year 2025–2026. Multiple regression analysis was used to determine the individual and combined predictive contributions of teaching quality, attitudes toward culinary learning, and measuring skills to procedural performance in preparation, production, and presentation.

2.2 Locale of the Study

The study was conducted in one public secondary school in the District of Salay, Misamis Oriental, Philippines, during School Year 2025–2026. The research focused on learners enrolled in BPP under the Technology and Livelihood Education (TLE) curriculum. The selected educational setting provided opportunities to examine learners' instructional experiences, measuring competencies, attitudes toward culinary learning, and practical performance in bread and pastry production.

2.3 Respondents of the Study

The respondents consisted of 90 junior high school learners, comprising 30 Grade 9 and 60 Grade 10 students officially enrolled in BPP during School Year 2025–2026. These learners participated in practical culinary activities involving ingredient preparation, measurement, equipment utilization, baking procedures, and product presentation. Their direct involvement in these activities made them appropriate participants for evaluating teaching quality, attitudes toward culinary learning, measuring skills, and procedural competencies.

2.4 Sample and Sampling Procedure

Total enumeration sampling was employed, involving all 90 eligible Grade 9 and Grade 10 learners within the identified population. This approach was appropriate because the population was manageable and all participants met the established inclusion criteria. Including the entire eligible population eliminated the need for selecting a smaller sample and provided comprehensive data from the participating learners. However, the findings were limited to the selected educational setting and could not automatically be generalized to other schools or districts.

2.5 Research Instrument

The study utilized researcher-developed, expert-validated instruments comprising questionnaires, a multiple-choice test, and a teacher-rated performance assessment adapted from the Technical Education and Skills Development Authority (TESDA) Self-Assessment Guide (SAG) for BPP. The instruments measured teaching quality, attitudes toward culinary learning, measuring skills, and procedural performance. Teaching quality was assessed using a five-point Likert-scale questionnaire covering instructional clarity, teaching strategies, demonstrations, assessment, feedback, classroom management, and teacher support. The indicators were developed from relevant instructional literature (Darling-Hammond et al., 2017; OECD, 2021). Attitudes toward culinary learning were measured through a five-point Likert-scale questionnaire examining interest, motivation, self-confidence, enjoyment, and perceived relevance of culinary activities (Santucci de Oliveira et al., 2023; Wei et al., 2023; Yiğit, 2025). Measuring skills were evaluated using a researcher-developed 10-item multiple-choice test covering ingredient measurement, measuring tools, recipe interpretation, and proportional reasoning (Lins et al., 2024; Teixeira et al., 2021). Each correct response received one point, while incorrect responses received zero. Procedural skills were assessed by the designated teacher using an adapted TESDA competency-based instrument covering preparation, production, and presentation (TESDA, n.d.). Performance was rated on a five-point scale ranging from poor to excellent. Content validity was established through evaluation by three experts who assessed the instruments' clarity, relevance, appropriateness, and alignment with the study objectives. Following revisions, the instruments were pilot-tested among 30 senior high school Technical-Vocational-Livelihood learners from a public school in Salay District. Reliability was examined using Cronbach's alpha, with 0.70 identified as an acceptable threshold based on George and Mallery (2016, p. 189). The reported coefficients were 0.741 for teaching quality, 0.792 for attitudes toward culinary learning, and 0.729, 0.854, and 0.825 for procedural skills in preparation, production, and presentation, respectively. These results indicated acceptable to good internal consistency, consistent with the interpretation of George and Mallery (2016). Confirmatory Factor Analysis (CFA) was also conducted to examine the measurement structure and construct validity of the instruments. The teaching quality indicators demonstrated significant loadings on a single latent factor, with generally satisfactory model fit. Similarly, the attitudes toward culinary learning indicators supported a single-factor structure with acceptable fit indices. These findings supported the suitability of the instruments for subsequent statistical analysis.

2.6 Data Gathering Procedure

Data collection commenced after obtaining ethical clearance from the Lourdes College Research Ethics Committee and securing authorization from the Schools Division Superintendent of Misamis Oriental and the participating school principal. The researcher incorporated expert recommendations into the instruments and coordinated with school authorities regarding appropriate schedules for administration. During School Year 2025–2026, printed questionnaires and the measuring skills test were personally administered to the 90 participants. Learners received clear instructions and sufficient time to complete the instruments. Teaching quality and attitudes toward culinary learning were assessed through questionnaires, while measuring skills were evaluated through the multiple-choice test. The designated teacher assessed procedural skills using the adapted TESDA Self-Assessment Guide, applying standardized criteria for preparation, production, and presentation. After administration, the researcher checked the completed instruments for completeness, assigned participant codes, and matched questionnaire responses, test scores, and teacher-rated performance assessments. The collected information was organized, encoded, and prepared for statistical analysis while maintaining respondent confidentiality.

2.7 Data Analysis Techniques

Descriptive and inferential statistical techniques were employed to analyze the collected data. Frequency counts, percentages, means, weighted means, and standard deviations were used to describe teaching quality, attitudes toward culinary learning, measuring skills, and procedural competencies in preparation, production, and presentation. Responses to the teaching quality and attitude questionnaires were interpreted using a five-point agreement scale, while procedural performance was evaluated using a five-point competency scale. Measuring

skills scores were interpreted according to the percentage of correct responses. Pearson's Product–Moment Correlation Coefficient (Pearson's r) was employed to determine the strength, direction, and significance of relationships between the independent variables and procedural skills. Multiple regression analysis was subsequently used to determine the individual and collective predictive contributions of teaching quality, attitudes toward culinary learning, and measuring skills. The coefficient of determination (R^2) indicated the proportion of variance explained by the predictors, while regression coefficients and corresponding p-values identified significant individual predictors. Statistical analyses were performed using appropriate statistical software at a 0.05 significance level, with p-values below 0.05 considered statistically significant. Regression assumptions were also examined.

2.8 Ethical Considerations

The study adhered to the ethical principles of respect for persons, beneficence, and justice outlined in the Belmont Report (Amdur & Bankert, 2011). Ethical clearance and institutional permissions were obtained before data collection. Because participants were minors, parental or guardian consent and student assent were secured. Participation was voluntary, and respondents were informed of their right to withdraw without consequences for their grades, academic standing, or relationships with teachers. Confidentiality and privacy were maintained in accordance with the Data Privacy Act of 2012 (Republic Act No. 10173). Participant codes replaced identifying information, printed records were securely stored, and electronic files were password-protected with access restricted to the researcher. Data were used exclusively for research purposes, and findings were reported without identifying individual learners. Research records were retained for one year after study completion, subject to institutional requirements, after which printed materials were securely shredded and electronic records permanently deleted. These safeguards protected participants' rights, privacy, and welfare throughout the research process.

3. Results and Discussion

3.1 Assessment of Teaching Quality, Culinary Learning Attitudes, and Measuring Skills

3.1.1 Teaching Quality in Bread and Pastry Production

Teaching quality obtained an overall mean of 4.59 (SD = 0.42), interpreted as Very High. Most participants rated teaching quality as Very High (53.33%) or High (45.56%). The highest-rated indicator was the explanation of safety rules before practical activities (M = 4.70, SD = 0.53), followed by checking learners' understanding before proceeding (M = 4.68, SD = 0.60) and demonstrating practical skills (M = 4.66, SD = 0.52). Encouraging questions during practical sessions received the lowest rating (M = 4.41, SD = 0.70), although it remained High. These findings indicate that learners perceived their teacher as effective in maintaining safety, explaining procedures, and demonstrating practical competencies. However, the comparatively lower assessment of opportunities to ask questions suggest a need to strengthen learner participation. Providing more opportunities for clarification, constructive feedback, and discussion during practical activities may further improve instructional effectiveness and support procedural skills development.

3.1.2 Attitudes Toward Culinary Learning

Attitudes toward culinary learning obtained an overall mean of 4.36 (SD = 0.50), interpreted as High. Most participants demonstrated High (54.44%) or Very High (38.89%) attitudes. Feeling proud after successfully completing a recipe received the highest rating (M = 4.72, SD = 0.47), followed by enjoyment of bread and pastry activities (M = 4.54, SD = 0.75) and collaboration with classmates (M = 4.48, SD = 0.62). Perceived importance of culinary skills for future employment received the lowest mean (M = 4.04, SD = 0.86). The results suggest that successful task completion, enjoyment, and collaboration are important aspects of learners' positive attitudes toward culinary education. However, learners appeared less strongly convinced of the occupational relevance of culinary competencies. Integrating career-related discussions, collaborative activities, and achievable practical challenges may help sustain motivation while strengthening learners' understanding of the long-term value of BPP skills.

3.1.3 Measuring Skills

Measuring skills obtained an overall score of 9.32 (SD = 1.42), interpreted as Very High. Of the 90 participants, 77 (85.56%) demonstrated Very High measuring skills, seven (7.78%) obtained High scores, five (5.56%) demonstrated Moderate proficiency, and one (1.11%) was classified as Low. No participant belonged to the Very Low category. These findings indicate generally strong performance in ingredient measurement, recipe interpretation, and measurement-related procedures. The findings highlight the importance of accurate measurement in maintaining ingredient proportions and product consistency. Arida (2023) identified mensuration and calculation as important components of baking skills performance, while Teixeira et al. (2021) emphasized the assessment of practical competencies in skills-based learning. Despite the generally high scores, learners with lower proficiency may benefit from additional exercises involving measuring tools, recipe adjustments, and proportional calculations. Integrating measurement activities into actual baking procedures may also strengthen the application of these competencies.

3.2 Procedural Skills in Bread and Pastry Production

3.2.1 Procedural Skills in Preparation

Preparation skills obtained an overall mean of 4.62 (SD = 0.50), interpreted as Very High. Most participants were classified as Very High (71.11%) or High (24.44%). Ensuring equipment cleanliness and safety received the highest rating (M = 4.81, SD = 0.42), followed by selecting appropriate tools and equipment (M = 4.69, SD = 0.55) and measuring ingredients according to recipe requirements (M = 4.66, SD = 0.54). Identifying and substituting equivalent ingredients received the lowest rating (M = 4.39, SD = 0.67). The results indicate strong preparation competencies, particularly in sanitation, equipment selection, and ingredient measurement. These practices are consistent with the competencies emphasized in the TESDA Bread and Pastry Production NC II Training Regulations (TESDA, 2009). Koerich et al. (2024) also highlighted the importance of hands-on activities in developing practical culinary competencies. However, the lower rating for ingredient substitution suggests that learners require additional opportunities to apply technical judgment. Godefroidt et al. (2023) discussed how ingredient properties and substitutions influence product characteristics, while Dapčević-Hadnađev et al. (2022) emphasized the effects of processing conditions on food quality. Guided activities involving ingredient comparisons and recipe modifications may therefore strengthen preparation skills.

3.2.2 Procedural Skills in Production

Production skills obtained an overall mean of 4.49 (SD = 0.47), interpreted as High. Most participants assessed their production skills as Very High (54.44%) or High (42.22%), while 3.33% reported Moderate proficiency. Following proper mixing techniques received the highest rating (M = 4.66, SD = 0.58), followed by baking products at appropriate times and temperatures (M = 4.60, SD = 0.61) and applying plating techniques (M = 4.59, SD = 0.60). Identifying and correcting common mixing faults received the lowest rating (M = 4.37, SD = 0.66), followed by documenting baking results (M = 4.39, SD = 0.71). These findings suggest that learners were more confident in following established procedures than in identifying errors, documenting outcomes, and making technical adjustments. Pelpinosas and Saab (2025) discussed the importance of the teaching-learning process in developing bread and pastry skills, while Koerich et al. (2024) highlighted the contribution of practical learning experiences. Arida (2023) also emphasized practical baking competencies, and the discussions of Koerich et al. (2024) and Santucci de Oliveira et al. (2023) reinforce the importance of applying acquired skills during actual performance. Guided troubleshooting, process monitoring, baking logs, and structured product evaluation may strengthen learners' technical judgment and production accuracy.

3.2.3 Procedural Skills in Presentation

Presentation skills obtained an overall mean of 4.63 (SD = 0.39), interpreted as Very High. Most participants reported Very High (66.67%) or High (32.22%) presentation skills. Cleaning and sanitizing work areas received the highest rating (M = 4.82, SD = 0.41), followed by proper handwashing and personal hygiene (M = 4.81, SD = 0.42) and safe food waste disposal (M = 4.76, SD = 0.50). Product labeling received the lowest rating (M = 4.48, SD = 0.57), followed by appropriate storage conditions (M = 4.51, SD = 0.64). The findings indicate that learners demonstrated particularly favorable competencies in sanitation, hygiene, and waste management. Limon (2022) emphasized the importance of developing food safety knowledge and practical skills among learners. However, the comparatively lower ratings for labeling and storage suggest a need to strengthen post-production management. Imran Hossain et al. (2025) found that although university students in Bangladesh demonstrated adequate knowledge of food labeling, they had limited understanding of batch numbers and packaging symbols and frequently neglected to check expiry dates and other essential labeling information. Practical activities involving product packaging, labeling, appropriate storage, and inventory procedures may help learners maintain product quality and safety.

3.2.4 Overall Procedural Skills

Overall procedural skills obtained a mean of 4.58 (SD = 0.41), interpreted as Very High. Presentation received the highest rating (M = 4.63, SD = 0.39), followed by Preparation (M = 4.62, SD = 0.50), both interpreted as Very High. Production obtained the lowest rating (M = 4.49, SD = 0.47), although it remained High. These findings indicate favorable procedural competencies across the three stages of Bread and Pastry Production, with comparatively greater development needed in production. The higher ratings for presentation and preparation suggest stronger familiarity with sanitation, equipment handling, and routine procedures. In contrast, production requires learners to integrate technical knowledge, monitor baking conditions, recognize errors, and make adjustments. Pelpinosas and Saab (2025) emphasized the importance of instructional quality and laboratory learning conditions, while Koerich et al. (2024) highlighted practical experiences in developing culinary competencies. Strengthening production-focused exercises, guided troubleshooting, and performance-based assessment may help develop more balanced procedural competence.

3.3 Relationships Between Teaching Quality, Attitudes Toward Culinary Learning, Measuring Skills, and Procedural Skills

3.3.1 Relationship Between Teaching Quality and Procedural Skills

Teaching quality demonstrated a statistically significant positive relationship with procedural skills ($r = .654$, $p < .001$). It had the strongest correlation with procedural skills among the three independent variables. The result indicates that participants who reported higher teaching quality also tended to demonstrate higher procedural skills. Consequently, the null hypothesis of no significant association was rejected. This finding is supported by Pelpinosas and Saab (2025), who identified a significant positive relationship between instructional quality and Bread and Pastry Production skills. Similarly, Koerich et al. (2024) emphasized the importance of practical learning experiences and effective teacher–learner interactions in culinary education. The result highlights the relevance of clear demonstrations, guided practice, and instructional support in developing learners' practical competencies.

3.3.2 Relationship Between Attitudes Toward Culinary Learning and Procedural Skills

Attitudes toward culinary learning showed a statistically significant positive relationship with procedural skills ($r = .637$, $p < .001$). This was the second strongest correlation among the independent variables. Learners who reported more positive attitudes toward culinary activities generally demonstrated higher procedural skills. The finding contributed to the rejection of the null hypothesis of no significant association. The result is consistent with Lee and Lee (2023), who reported positive relationships among learning motivation, learning immersion, and performance in culinary education. Likewise, Chen and Wang (2023) emphasized the contribution of interactive learning approaches to learning interest, engagement, and practical skills development. These findings suggest that encouraging interest, enjoyment, and active participation may support learners' procedural competence in BPP.

3.3.3 Relationship Between Measuring Skills and Procedural Skills

Measuring skills demonstrated a statistically significant moderate positive relationship with procedural skills ($r = .430$, $p < .001$). Although this was the weakest correlation among the three independent variables, the relationship remained statistically significant. Learners with higher measuring skills scores generally demonstrated higher procedural skills. This finding further supported the rejection of the null hypothesis of no significant association. The result is consistent with Arida (2023), who identified mensuration and calculation as relevant components of baking performance. Similarly, Rodil and Briones (2022) reported a significant relationship between analytical skills and BPP competencies. The finding indicates that measurement proficiency is associated with practical performance, although other competencies, including sequencing, equipment handling, and baking techniques, remain necessary for successful procedural execution.

3.4 Predictive Contributions of Teaching Quality, Attitudes Toward Culinary Learning, and Measuring Skills

3.4.1 Combined Predictive Contribution of the Independent Variables

Multiple regression analysis revealed that teaching quality, attitudes toward culinary learning, and measuring skills collectively predicted procedural skills significantly ($R = .704$, $R^2 = .496$, $F = 28.165$, $p < .001$). The model explained 49.60% of the variance in procedural skills, while the remaining 50.40% was unexplained by the included variables. Since the regression model was statistically significant, the null hypothesis that the three variables did not collectively predict procedural skills was rejected. These findings indicate that instructional quality, learner attitudes, and measurement proficiency collectively provide meaningful information about procedural performance. However, the unexplained variance suggests that other factors may also be associated with learners' competencies. The results support the importance of examining both instructional and learner-related characteristics when developing strategies to strengthen practical skills in Bread and Pastry Production.

3.4.2 Teaching Quality as a Predictor of Procedural Skills

Teaching quality emerged as the strongest significant positive predictor of procedural skills ($B = .377$, $\beta = .385$, $t = 3.485$, $p = .001$). Holding the other predictors constant, a one-unit increase in teaching quality was associated with a .377-unit increase in predicted procedural skills. The corresponding null hypothesis was rejected. This finding emphasizes the importance of effective instruction in practical culinary learning. Clear demonstrations, constructive feedback, appropriate explanations, and consistent guidance may help learners understand technical procedures and perform baking activities more effectively. Pelpinosas and Saab (2025) and Engida et al. (2024) discussed the contribution of instructional quality to students' learning and performance. Strengthening teacher guidance and practical demonstrations may therefore support procedural competence.

3.4.3 Attitudes Toward Culinary Learning as a Predictor of Procedural Skills

Attitudes toward culinary learning also significantly and positively predicted procedural skills ($B = .266$, $\beta = .328$, $t = 2.988$, $p = .004$). Holding teaching quality and measuring skills constant, a one-unit increase in attitudes toward culinary learning was associated with a .266-unit increase in predicted procedural skills. The corresponding null hypothesis was rejected. This result suggests that learners' interest, enjoyment, and appreciation of culinary activities contribute meaningful predictive information about procedural competence. Positive attitudes may encourage active participation, repeated practice, and persistence when performing unfamiliar tasks. Lee and Lee (2023) discussed the relationship between motivation, engagement, and learning performance in culinary

education. Creating meaningful, engaging, and supportive practical activities may therefore strengthen learners' motivation and procedural skills.

3.4.4 Measuring Skills as a Predictor of Procedural Skills

Measuring skills did not significantly predict procedural skills after controlling for teaching quality and attitudes toward culinary learning (B = .232, β = .081, t = .895, p = .373). Although the regression coefficient was positive, it did not reach statistical significance at the 0.05 level. Consequently, the null hypothesis concerning the unique predictive contribution of measuring skills was not rejected. This finding does not imply that measuring skills are unimportant in Bread and Pastry Production. Accurate measurement remains necessary for maintaining ingredient proportions and product consistency. However, measuring skills did not explain significant additional variation in procedural performance after accounting for the other predictors. Measurement instruction should therefore remain integrated with practical activities involving mixing, baking, troubleshooting, and product evaluation rather than being treated as an isolated competency.

3.5 Overall Discussion and Instructional Implications

The findings revealed very high teaching quality, measuring skills, and overall procedural skills, alongside high attitudes toward culinary learning. Among the procedural dimensions, presentation and preparation obtained higher ratings than production. All three independent variables were significantly and positively associated with procedural skills. However, only teaching quality and attitudes toward culinary learning demonstrated significant unique predictive contributions, with teaching quality emerging as the strongest predictor. These results emphasize that procedural competence in Bread and Pastry Production is associated not only with technical knowledge but also with instructional support and learners' attitudes toward practical learning. Teaching strategies should prioritize clear demonstrations, guided practice, constructive feedback, and engaging activities while strengthening production-related competencies such as troubleshooting, monitoring baking conditions, and evaluating finished products. Although measuring skills remain essential, their development should be integrated into complete baking procedures. Bessette et al. (2026) found that short-term immersive cooking programs showed promising improvements in cooking skills and self-efficacy among children and adolescents.

The findings provide a basis for improving instructional practices and supporting more balanced competency development among junior high school learners in Bread and Pastry Production.

4. Conclusion & Recommendations

The study concludes that teaching quality and attitudes toward culinary learning are significant predictors of procedural skills among 90 Grade 9 and Grade 10 Bread and Pastry Production learners in the District of Salay, Misamis Oriental. Learners demonstrated very high levels of perceived teaching quality, measuring skills, and overall procedural skills, while their attitudes toward culinary learning were high. Presentation received the highest procedural skills rating, followed by preparation and production. Although all three independent variables showed significant positive relationships with procedural skills, only teaching quality and attitudes toward culinary learning made significant unique contributions to the regression model. Measuring skills remained positively associated with procedural performance but did not independently predict it after accounting for the other variables. Collectively, the predictors explained 49.60% of the variance in procedural skills. These findings underscore the importance of effective instructional practices, positive learning attitudes, and meaningful practical experiences in understanding learners' procedural competencies.

Technology and Livelihood Education teachers should maintain clear demonstrations, structured practical activities, constructive feedback, and consistent safety instruction while strengthening learners' production competencies. Greater emphasis should be placed on identifying and correcting mixing and baking faults, monitoring dough consistency, documenting baking outcomes, and evaluating finished products. Teachers should also provide opportunities for questioning, collaborative learning, and independent problem-solving to sustain positive attitudes toward culinary learning. Students should actively participate in practical exercises, apply feedback, and consistently observe accurate measurement, sanitation, labeling, and storage procedures. School administrators should support these efforts by providing appropriate baking equipment, ingredients, laboratory facilities, and professional development opportunities for teachers. Future researchers may examine additional predictors, including laboratory resources, frequency of practical activities, prior baking experience, and learner confidence. Similar investigations across different schools may further clarify the relationships between instructional factors, learner characteristics, and procedural performance in Bread and Pastry Production.

The study employed a quantitative descriptive-correlational design involving 90 Grade 9 and Grade 10 learners from one public secondary school in the District of Salay, Misamis Oriental, during School Year 2025–2026. Its geographic and institutional scope limits the generalizability of the findings. Data collection involved self-report instruments, while procedural skills were assessed by a single teacher, potentially introducing response and evaluator bias. Furthermore, the correlational design does not establish causal relationships, and the regression

model left 50.40% of procedural skills variance unexplained. Future studies may include multiple schools, independent performance assessments, additional predictors, and longitudinal or mixed-methods approaches.

5. Compliance with ethical standards

The study adhered to established research ethics through institutional ethical clearance, informed consent and parental consent or assent for minor participants, voluntary participation, confidentiality, anonymity, and compliance with the Data Privacy Act of 2012, ensuring the protection of participants' rights, privacy, and welfare throughout the research process.

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