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SKILL CHAIN MAPPING AS INSTRUCTIONAL STRATEGY IN SAUCE PREPARATION: CHANGES IN LEARNERS PERFORMANCE, PROCEDURAL CONSISTENCY, AND SAUCE QUALITY

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Abstract

This study examined changes in Grade 10 learners' sauce preparation performance following Skill-Chain Mapping at Mactan National High School during school year 2026–2027. The study used a quantitative one-group pretest–posttest design with 45 learners. A performance-based checklist and rubric assessed knowledge of ingredients and tools, application of procedures and techniques, quality and consistency of output, and compliance with standards and safety practices. Means and standard deviations summarized the ratings, and paired-sample t-tests compared pretest and posttest performance. The reported overall mean rose from 2.29 (Fairly Proficient) to 4.16 (Proficient). Domain means increased from 2.30 to 4.13, 2.35 to 4.19, 2.24 to 4.12, and 2.27 to 4.19, respectively. The reported paired comparisons yielded $p < .001$. The results show improvement within the study group but do not isolate the contribution of Skill-Chain Mapping from other influences. The findings informed an enhanced lesson plan that uses a visual sequence, guided practice, and checkpoints for sauce quality and safety.

Keywords: Skill-Chain Mapping, sauce preparation, learner proficiency, output quality, TLE–Cookery, one-group pretest–posttest design

Introduction

Complex culinary tasks such as sauce preparation demand precise sequencing, technical mastery, and consistent execution competencies that form the bedrock of Technology and Livelihood Education (TLE) Cookery yet remain difficult to master without clear, structured guidance. Proficiency in this area does not merely produce quality results; it also instills adherence to food safety standards and prepares learners for industry-recognized certification. Beyond technical ability, developing these skills nurtures discipline, keen attention to detail, and professional work values that extend well beyond the kitchen (Lumbo, 2025). UNESCO and the Research Consortium for School Health and Nutrition (2025) underscore that standardization and quality assurance in food-related education are essential to protect health and build lasting positive habits. Similarly, Panganiban (2022) asserts that effective TLE instruction must move beyond standalone demonstrations to foster integrated learning, connecting hands-on know-how with critical thinking and responsible practice.

Despite its importance, teaching and learning such multi-faceted competencies present distinct instructional challenges. Globally, vocational education serves as a key pathway to employment, yet evidence shows many students finish coursework without gaining coherent, job-ready proficiency. The National Center for Education Statistics (n.d.) notes that although nearly all secondary learners enroll in vocational subjects, only a small proportion complete logically sequenced training, leaving them unable to perform complex procedures dependably. Within local TLE Cookery classes, this gap appears as learners treat sauce preparation as disconnected steps rather than a unified process struggling with proper timing, heat control, ingredient balance, and predicting how early choices alter the final product. In the Philippines, Panganiban (2022) explains that learners often draw on superficial information instead of building structured, applied understanding, making multi-step tasks especially difficult. Lumbo (2025) further confirms that while students show strong aptitude in basic Cookery skills, integrated, sequential competencies remain an area in critical need of targeted support.

To address these gaps, Skill Chain Mapping is introduced as an instructional strategy designed to make implicit procedures explicit by breaking complex tasks into a clear, visually linked sequence of skills. This approach organizes

learning progressively from foundational steps to final quality checks, illustrating how each action influences the next and the overall outcome. Across Asia, education reforms increasingly adopt this principle: China Global Television Network (2022) describes how national life-skills curricula now structure learning in stages, advancing from basic preparation to full meal management. World Vision (n.d.) likewise reports that sequenced training in food production strengthens competence and livelihood impact throughout the region. By replacing fragmented instruction with a connected, replicable framework, Skill Chain Mapping helps learners anticipate consequences, self-correct mid-process, and consistently meet established standards aligning with UNESCO and the Research Consortium for School Health and Nutrition (2025) in advocating for consistent, quality-embedded learning systems.

These challenges are directly observed at Mactan National High School. During the previous school year, Grade 10 TLE–Cookery students showed enthusiasm for practical work but recurring difficulties in sauce preparation: outputs varied widely in texture, taste, and appearance; students frequently misordered procedures; and few could independently identify sources of error. This competency was formally identified as least mastered, prompting TLE teachers to review instructional approaches during Learning Action Cell (LAC) sessions. Skill Chain Mapping was introduced and discussed as a practical, evidence-aligned intervention one that could clarify procedural logic, reinforce stepwise mastery, and help learners produce consistent, standard-quality sauces. Implementing this approach responds directly to the school's need to strengthen instruction where current methods have not yet yielded reliable, work-ready proficiency.

While existing literature examines vocational curriculum design, skill acquisition, and industry alignment, a distinct research gap remains: no published studies have focused specifically on how organizing skills into a connected, visualized chain improves learner performance, output consistency, and product quality in complex sauce preparation within Philippine basic education. Although Cookery performance and vocational enrollment patterns have been assessed, there is no locale-specific evidence addressing whether Skill Chain Mapping addresses the variability observed among Grade 10 learners in this particular competency. Closing this gap will provide data-driven guidance for TLE instruction at Mactan National High School and beyond, ensuring teaching strategies are both effective and aligned with the dependable, industry-ready standards learners need.

Theoretical Framework and Legal Bases

This study assumed that skill chain mapping in sauce preparation can improve the performance of the Grade 10 learners in sauce preparation. Likewise, it is anchored on four key theories: Gagné's Hierarchy of Learning / Conditions of Learning Theory (Gagné, 1965), Social Learning Theory (Bandura (1977), Mastery Learning Theory by (Bloom, 1968), and the Systems Approach to Vocational Education (Dewey, 1916, 1938; Babbitt, 1918).

In this study, the theory provides the primary basis for Skill-Chain Mapping as an instructional strategy for complex sauce preparation. Sauce making involves multiple interconnected skills, identifying ingredients, measuring accurately, controlling heat, applying thickening techniques, adjusting consistency, and observing safety protocols, that must be mastered in a specific order. Gagné's hierarchy confirms that breaking these tasks into a linked sequence allows learners to build competence step by step, ensuring that no critical element is overlooked or underdeveloped. This directly supports the study's objectives of achieving consistent quality, standardized execution, and measurable improvement in learners' performance before and after the intervention.

Complementing this, Bandura's (1977) Social Learning Theory advances the idea that learning is acquired not only through direct experience but also through observation, modeling, and imitation. It states that individuals develop new behaviors and competencies by watching others, particularly credible, skilled models, and reproducing those actions, guided by verbal instruction, visual demonstration, and corrective feedback. The theory also highlights the role of self-efficacy: learners gain confidence and competence when they see clear examples of success and receive positive reinforcement as they practice. Unlike purely behavioral theories, it acknowledges the cognitive processes involved in retaining, organizing, and reproducing observed skills.

Applied to this study, the theory explains how Skill-Chain Mapping enhances learning by providing a clear, visible, and sequential model of correct practice. The mapped sequence serves as a concrete reference that learners can observe, follow, and replicate, reducing confusion and reliance on trial-and-error. It supports the development of

knowledge about ingredients and tools, proper application of techniques, and compliance with safety standards, as learners can see exactly how each step contributes to the final result. By following the mapped chain and receiving guided feedback at every stage, learners build both technical proficiency and the confidence needed to perform complex culinary tasks consistently.

Next, Bloom's (1968) Mastery Learning Theory asserts that nearly all learners can achieve high levels of proficiency if instruction is appropriately structured, sufficient time is provided, and learners are assessed and given remediation on each component before moving forward. The core premise is that differences in achievement often stem from variations in learning pace, prior preparation, and instructional quality rather than inherent ability. The approach requires defining clear learning objectives, breaking content into manageable units, providing formative assessments after each unit, and allowing learners to progress only once they have demonstrated mastery of the current segment.
In the context of this study, this theory reinforces the value of Skill-Chain Mapping in ensuring that every learner fully understands and executes each part of sauce preparation, from basic preparation to final presentation, before combining all steps into a complete procedure. It directly underpins the pre-test and post-test design, as well as the goal of minimizing gaps in performance. By treating each link in the skill chain as a discrete mastery objective, the strategy helps standardize learning outcomes, ensuring that learners achieve uniform quality and consistency regardless of differences in their background or pace of learning.

Finally, the Systems Approach to Vocational Education, rooted in Dewey's (1916, 1938) principles of experiential learning and Babbitt's (1918) scientific analysis of work, views vocational skills as an interconnected system rather than isolated tasks. It emphasizes that every action, tool, material, and procedure influences the final outcome, and that effective instruction must organize learning into logical sequences aligned with industry requirements and real-world practice. The framework stresses that learners should not only know how to perform tasks but also understand why each step matters, how elements relate to one another, and how to maintain standards that meet professional expectations.

For this study, the systems perspective validates the use of Skill-Chain Mapping to present complex sauce preparation as a cohesive process rather than disconnected activities. It explains how knowledge of ingredients, proper technique, quality control, and safety practices function together to produce a standardized, high-quality result. This supports the study's focus on compliance with industry standards and its aim to develop an enhanced lesson plan that systematically connects all competencies. Ultimately, this approach ensures that learners gain not just technical know-how, but a holistic understanding of how structured, sequenced practice leads to reliable, professional-grade performance.

On the other hand, there are several legal bases that also help strengthen the study. These include Republic Act No. 10533 – Enhanced Basic Education Act of 2013, DepEd Order No. 003, s. 2024 – The MATATAG Curriculum: Basic Education Curriculum Framework, DepEd Order No. 42, s. 2016 – Policy Guidelines on Home Economics and Livelihood Education / Technology and Livelihood Education, and DepEd Order No. 8, s. 2019 – Policy on the Adoption of Innovative Instructional Practices and Resources in Basic Education.

To begin with, Republic Act No. 10533 – Enhanced Basic Education Act of 2013 mandates the K to 12 Basic Education Program to equip learners with sufficient time for mastery of concepts and skills, develop lifelong learners, and prepare graduates for tertiary education, middle-level skills development, employment, and entrepreneurship. It explicitly includes Technology and Livelihood Education (TLE) as a core learning area, emphasizing practical, work-oriented competencies aligned with industry standards such as those set by TESDA. The law aims to decongest the curriculum and ensure every learner acquires relevant, usable skills through adequate instruction and hands-on application.

Next, DepEd Order No. 003, s. 2024 – The MATATAG Curriculum: Basic Education Curriculum Framework revises the basic education curriculum to focus on foundational literacy and numeracy, streamline competencies, and strengthen values and life skills. It reaffirms the importance of TLE and TVL tracks in building practical livelihood skills, with greater emphasis on logical skill progression, real-world application, and alignment with national qualification standards. The framework encourages instructional approaches that help learners connect concepts to practice and develop dependable, transferable competencies.

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Furthermore, DepEd Order No. 42, s. 2016 – Policy Guidelines on Home Economics and Livelihood Education / Technology and Livelihood Education sets the official direction for TLE and Home Economics, outlining its objectives to develop learners' knowledge, skills, and attitudes necessary for productive work and responsible family and community life. It specifies that instruction should be competency-based, aligned with TESDA Training Regulations, and delivered through appropriate methods that balance theory and practice. The order emphasizes that TLE must equip learners with skills leading to certification, employment, or further specialization.

Finally, DepEd Order No. 8, s. 2019 – Policy on the Adoption of Innovative Instructional Practices and Resources in Basic Education encourages teachers to design, adopt, and use innovative, context-appropriate instructional strategies, materials, and assessment tools that enhance learning outcomes. It recognizes that diverse learners and practical subjects may require alternative approaches beyond traditional methods, provided these are evidence-based, aligned with curriculum goals, and approved through proper channels. The policy promotes creativity and continuous improvement in teaching to address gaps and raise achievement.

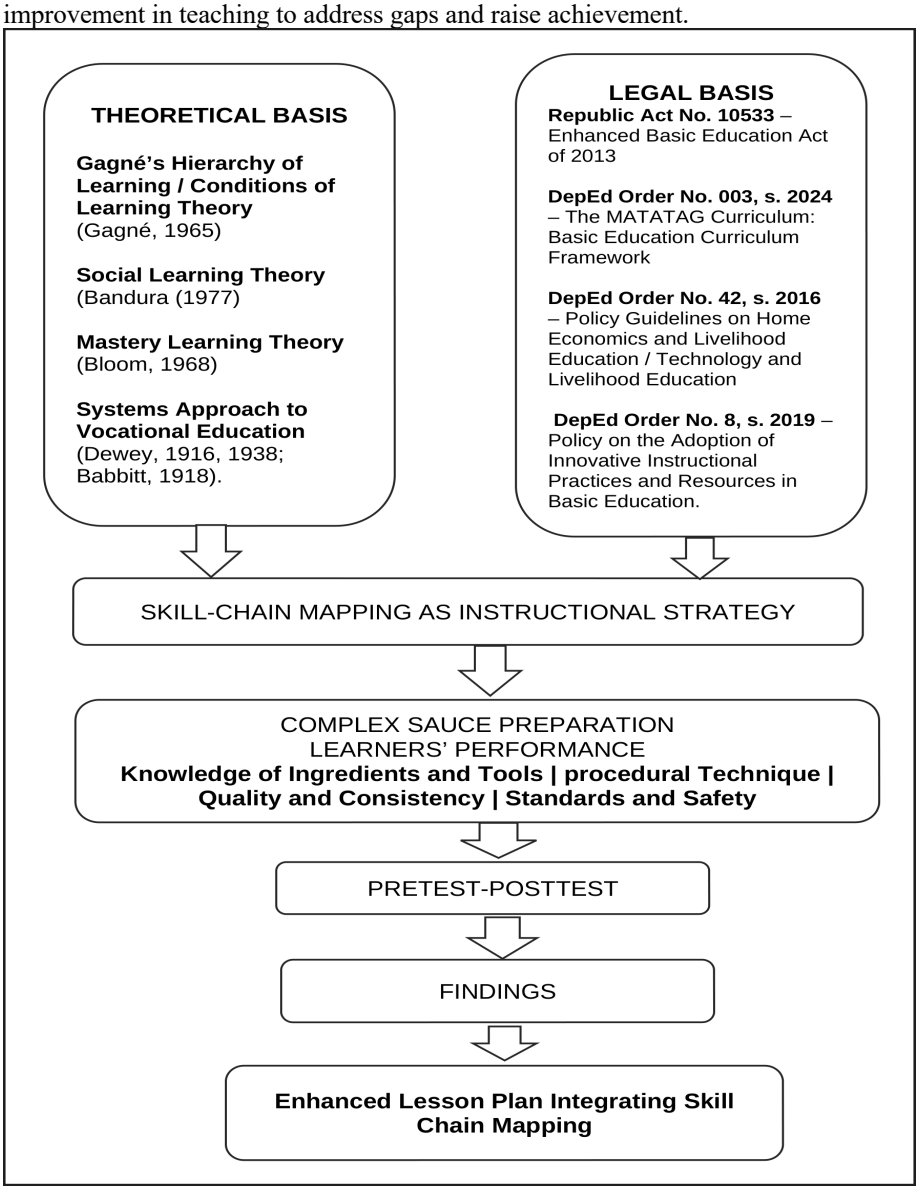


Figure 1
Theoretical and Conceptual Framework

Related Literature

Dioquino and Abellana (2022) found that while TLE teachers effectively applied planning and assessment strategies limited access to materials and training affected overall competence; this highlights that providing structured tools such as Skill Chain Mapping alongside adequate support strengthens both teaching and learning outcomes. In parallel Imama et al. (2025) observed that effective vocational education requires integrated design and strong industry links rather than disconnected instruction showing that context aligned systematic approaches like Skill Chain Mapping help bridge gaps between classroom practice and workplace needs. Both studies emphasize that success depends not only on method but also on proper resources and alignment.

Likewise Phionah (2024) and Meghana Sainath and Thavva (2025) converge on the importance of identifying and addressing skill gaps through intentional sequencing and competency mapping; where Phionah focuses on closing gaps through targeted training Meghana et al. explain how mapping current versus required skills enables precise progressive development both confirming that organizing skills in logical order ensures complete mastery. Extending this Tripathi (2026) notes that skill mapping combined with role-based training boosts productivity and reduces errors while Vu (2021) underscores that consistent standardized processes are essential for quality outcomes and satisfaction. Though their contexts differ manufacturing and service quality respectively both affirm that structured sequencing yields reliable professional grade results.

Complementing these Diapana et al. (2026) found that TVL Cookery students performed well against TESDA standards but often underestimated their ability; industry stakeholders stressed that workplace readiness demands systematic mastery of technical and soft skills through aligned step by step instruction. Collectively these studies share a common thread that breaking complex tasks into connected progressive segments just as Skill Chain Mapping does enhances proficiency builds confidence aligns learning with industry expectations and ensures consistent high-quality performance in practical skill-based work.

Synthesis. these studies converge on a unified conclusion: structured, sequenced, and competency-aligned instruction is essential for building reliable, industry-ready proficiency. Dioquino and Abellana (2022) and Imama et al. (2025) confirm that success requires not only sound methods but also adequate resources, integrated curriculum design, and strong links between learning and work. Phionah (2024), Meghana et al. (2025), and Tripathi (2026) further demonstrate that systematically identifying, mapping, and ordering skills directly closes performance gaps, minimizes errors, and boosts consistency and productivity. Vu (2021) reinforces that standardized, well-organized processes are key to dependable quality and satisfaction, while Diapana et al. (2026) validate that TESDA-aligned, step-by-step practice strengthens both technical mastery and learner confidence. Together, these findings affirm that Skill Chain Mapping builds the consistent, high-quality performance expected of skilled Cookery grade ten students.

Methods

Design and Study Flow

This study employed a Quasi-Experimental Research Design, specifically the One-Group Pretest-Posttest Design. This design was appropriate for determining the effectiveness of an intervention by comparing the same group's performance before and after exposure to the treatment, particularly when forming separate control groups was neither feasible nor ethical. Using intact classes was necessary to avoid disrupting regular class grouping and schedules; therefore, learners served as their own control group, eliminating the need for an independent comparison group (Fraenkel, Wallen, & Hyun, 2019).

In this study, Grade 10 learners from Mactan National High School functioned as their own baseline for comparison. A pretest was administered to measure their initial performance in complex sauce preparation across the specified indicators. Following the implementation of Skill Chain Mapping as the instructional intervention, a posttest using identical assessment tools was conducted. Statistical analysis determined whether a significant difference existed between pretest and posttest results, and an enhanced lesson plan was proposed based on the findings. This design was widely recommended for educational intervention studies because it effectively isolated the effect of the strategy while accounting for initial differences in learner ability (Creswell, 2021).

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This study was guided by the Input-Process-Output (IPO) model, a structured framework that clearly outlined the components, procedures, and expected results of the research. It systematically organized what was gathered, how the study was conducted, and what was produced at the end, ensuring that the investigation followed a logical and coherent flow aligned with the stated objectives.

Input. In the input phase, the study focused on the data and variables relevant to the use of Skill Chain Mapping in teaching complex sauce preparation. These included: the level of performance of learners in complex sauce preparation before using Skill Chain Mapping in terms of knowledge of ingredients and tools, application of procedures and techniques, quality and consistency of output, and compliance with standards and safety practices; the level of performance of learners in complex sauce preparation after using Skill Chain Mapping in terms of the same indicators; and the challenges encountered by the students in using the said instructional strategy.

Process. For the process phase, the study utilized the Quasi-Experimental Research Design, specifically the One-Group Pretest-Posttest Design. It followed a systematic data gathering procedure that consisted of: securing approval from the concerned authorities; seeking informed consent from the respondents; administering the assessment tools; retrieving the completed outputs; and

Output. Lastly, the output phase presented the tangible product and main contribution of the study: an Enhanced Lesson Plan Using Skill Chain Mapping, which was developed based on the findings to improve the teaching and learning of complex sauce preparation among Grade 10 TLE Cookery learners.

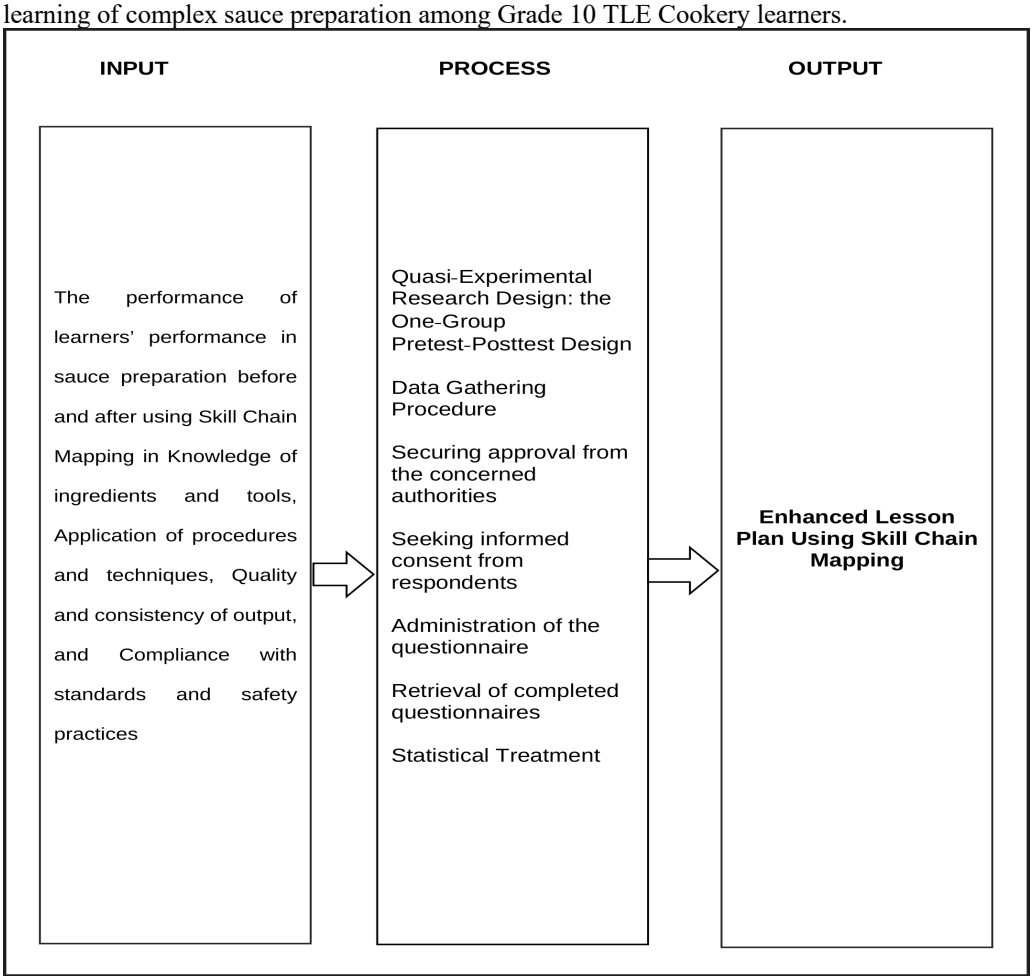


Figure 2
Flow of the Study

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Research Environment and Participants

The study was conducted at Mactan National High School, located in Mactan, Lapu-Lapu City, Cebu. It was classified as a very large public secondary school, headed by Principal IV Rowena Sagarino, and was also the institution where the researcher was employed as a TLE Grade 10 teacher. This setting was highly appropriate for the study for several key reasons. First, the school offered the Technology and Livelihood Education program with Cookery as one of its major competencies, providing direct access to the target respondents who were enrolled in the subject. Second, the school followed the DepEd K to 12 and MATATAG curricula, ensuring that the intervention aligned with existing national standards and requirements. Third, as a large public school, it represented a diverse learner population with varying levels of prior knowledge and practical skills, making the findings more applicable and generalizable to similar educational settings. Finally, the researcher's assignment at the institution facilitated smooth coordination, easier implementation of the instructional strategy, and more efficient monitoring of the learners' progress throughout the conduct of the study.

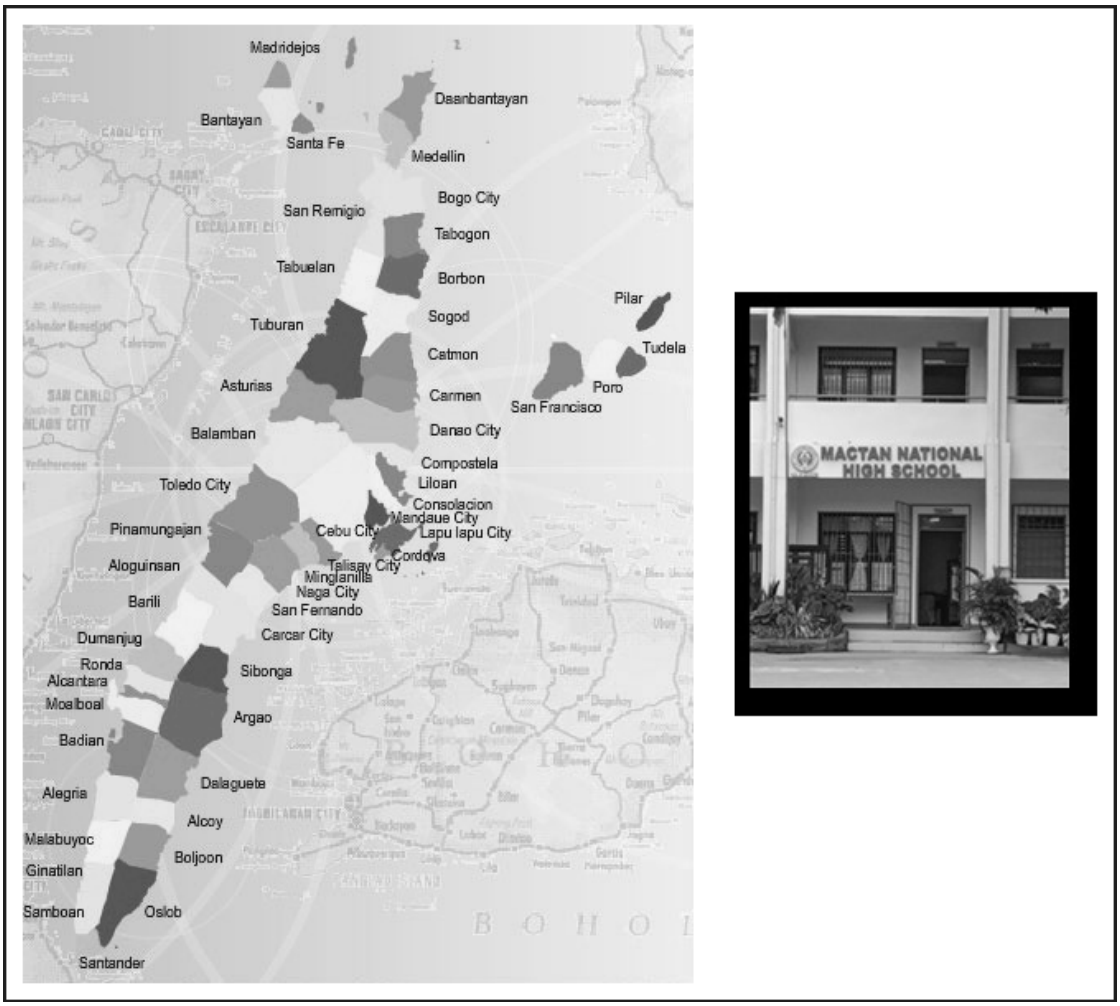


Figure 3
Location Map and School Photograph

The respondents of the study were the forty-five (45) Grade 10 students enrolled at Mactan National High School for the School Year 2026-2027. They were selected using purposive sampling, a non-probability sampling technique where participants were chosen based on specific characteristics relevant to the study's objectives (Creswell, 2021; Fraenkel et al., 2019). Specifically, these learners were part of the school's remediation program for Technology and

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Livelihood Education Cookery. This group was purposefully selected because they had demonstrated difficulties in mastering practical competencies, particularly in performing multi-step culinary procedures such as complex sauce preparation. Their inclusion allowed the researcher to clearly measure the intervention's effectiveness in addressing existing learning gaps, improving proficiency, and helping learners achieve the required standards. Selecting this specific group ensured that the findings directly reflected how Skill Chain Mapping could support learners who needed structured, progressive guidance to master essential skills.

Table 1
Distribution of Respondents

Environment	Frequency (f)	Percentage (%)
Mactan National High School	45	100
Total	45	100

Instrument and Scoring

The main instrument that was used in this study was a performance-based assessment checklist and rating scale, adapted and modified from the TESDA Cookery NC II Training Regulations and the DepEd TLE Cookery Curriculum Guide of 2016. It covered four specific areas: knowledge of ingredients and tools, application of procedures and techniques, quality and consistency of output, and compliance with standards and safety practices, with each section containing detailed criteria aligned with the study's objectives. A five-point Likert scale was utilized to rate performance, where 5 meant Highly Proficient (performed all tasks correctly and independently, exceeding standards), 4 meant Proficient (performed all tasks correctly and consistently meeting standards), 3 meant Moderately Proficient (performed most tasks correctly with minimal guidance), 2 meant Fairly Proficient (performed some tasks correctly but required frequent guidance), and 1 meant Not Proficient (failed to perform tasks correctly even with assistance). Since the tool was adapted from established and standardized references, it underwent content validation by a panel of three experts: those who had already completed a master's degree in teaching TLE, who evaluated its clarity, relevance, completeness, and alignment with the required competencies and research objectives. Necessary revisions were incorporated based on their comments and suggestions to ensure the instrument was appropriate for the target respondents and the specific context of the study. Once validated and finalized, the same instrument-checklist was administered for both pretest and posttest assessments to ensure uniform and accurate measurement of learner performance.

This section presented the scoring procedure used to interpret performance before and after the use of Skill Chain Mapping, specifically in terms of knowledge of ingredients and tools, application of procedures and techniques, quality and consistency of output, and compliance with standards and safety practices.

Table 2
Performance Scoring Procedure

Scale	Numerical Range	Descriptive Rating	Qualitative Description
5	4.21 – 5.00	Highly Proficient	Performs all tasks correctly, independently, and exceeds standards
4	3.41 – 4.20	Proficient	Performs all tasks correctly and meets standards consistently
3	2.61 – 3.40	Moderately Proficient	Performs most tasks correctly with minimal guidance
2	1.81 – 2.60	Fairly Proficient	Performs some tasks correctly but needs frequent guidance
1	1.00 – 1.80	Not Proficient	Fails to perform tasks correctly even with guidance

Data Gathering Procedure

Preliminary Stage. The researcher first secured formal approval from the School Head of Mactan National High School to obtain permission to conduct the study within the institution. After receiving positive confirmation from all authorities, the researcher met with the selected respondents during their free time to explain the study's purpose, scope, and procedures in detail. For those who expressed willingness to participate, the researcher distributed informed consent forms that clearly outlined the study's objectives, the nature of their involvement, and their rights including voluntary participation and the freedom to withdraw at any time without penalty or prejudice to their academic standing.

Data Gathering Stage. Once all administrative and ethical preparations were finalized, the researcher administered the pre-test to the respondents through a standardized, hands-on performance task in complex sauce preparation. The pre-test required each learner to prepare Béchamel Sauce individually, following standard procedures without the aid of Skill Chain Mapping. Outputs were assessed across the defined indicators: knowledge of ingredients and tools, application of procedures and techniques, quality and consistency of the finished product, and adherence to safety and sanitation standards. Immediately following the pre-test, the Skill Chain Mapping intervention was implemented over one instructional week, integrated directly into the regular TLE–Cookery schedule. The intervention unfolded as follows:

Day 1- Introduction and Chain Construction: The researcher presented the Skill Chain Map specifically designed for Béchamel Sauce, breaking the task into ten visually linked steps: selecting and measuring ingredients; melting butter gently; forming a smooth white roux; cooking the roux briefly without browning; warming the milk; adding milk gradually while whisking continuously; simmering over low heat with constant stirring; checking consistency using the nappé test; seasoning appropriately; and finishing and holding the sauce at the correct temperature. Learners discussed how each step depended on the previous one and identified the critical links where errors most commonly occurred.

Day 2- Guided Practice with the Map: Working individually, learners used printed copies of the map as their primary reference while preparing Béchamel Sauce. They self-assessed at every stage before proceeding to the next, marking each link as "completed" or "needs improvement" and identifying exactly where difficulties arose. The researcher provided targeted feedback by referring to specific links rather than general comments, reinforcing the connection between technique and outcome.

Day 3- Independent Practice and Troubleshooting: Learners prepared the sauce again using the map but with progressively less guidance. They practiced diagnosing common problems such as lumps, thin consistency, or discoloration by tracing the issue back to the corresponding link in the chain. This session emphasized not only following the sequence but understanding the cause-and-effect relationship between each action and the final quality.
Day 4- Reinforcement and Consistency Check: Learners produced two separate batches of Béchamel Sauce to practice replicating uniform results. They compared outputs across batches and used the map to verify that the same standards were applied consistently every time. The session concluded with a group reflection on how the structured approach changed their confidence, clarity, and reliability in performing the task.

On the fifth day following the full implementation of the intervention, the researcher administered the post-test using the same performance task and assessment instrument as the pre-test. Learners prepared Béchamel Sauce individually, and outputs were evaluated using identical criteria to measure changes in performance, consistency, and quality after exposure to Skill Chain Mapping.

Post-Data Gathering Stage. Upon completion of all assessments, the quantitative data from pre-test and post-test results were compiled, tallied, and subjected to appropriate statistical treatment. The findings served as the empirical basis for developing an Enhanced Lesson Plan in TLE–Cookery that integrated Skill Chain Mapping as a core instructional strategy, designed to address learning gaps and strengthen the teaching of complex multi-step culinary procedures.

Ethical Considerations

This study strictly adhered to established ethical standards in educational research to ensure the protection, rights, and welfare of all participants.

First, informed consent was secured from the school authorities, the participating learners, and their parents or legal guardians through a written consent form that clearly explained the purpose of the study, the procedures followed, the nature of participation, potential benefits, and any possible risks involved. Participation was entirely voluntary, and respondents were informed that they had the right to withdraw from the study at any time without penalty or prejudice. Confidentiality and anonymity were strictly observed; all gathered data were treated with utmost privacy, and personal information was not disclosed or shared in any form that could identify the respondents. All assessment results and records were kept secure and were used solely for academic and research purposes.

Regarding artificial intelligence (AI) use, any AI tools employed were utilized only for organizational, formatting, and language-refinement purposes, and were not used to generate or fabricate data, falsify findings, or replace the researcher's own analysis and interpretation. All uses of AI were properly acknowledged, and the researcher retained full responsibility for the accuracy, integrity, and originality of the entire work. Furthermore, the study ensured no harm came to the participants; no physical, emotional, or psychological discomfort was caused, and all activities were conducted within approved school guidelines and safety protocols. Finally, the researcher properly cited and acknowledged all sources of information and related literature used in the study to uphold intellectual honesty and research integrity.

Statistical Analysis

Weighted Mean was computed to determine the general level of performance of the learners in complex sauce preparation before and after the use of Skill Chain Mapping, specifically in terms of knowledge of ingredients and tools, application of procedures and techniques, quality and consistency of output, and compliance with standards and safety practices. It summarized the ratings obtained from the assessment checklist to describe the overall proficiency of the respondents.

Standard Deviation was calculated to measure the spread or consistency of the learners' scores. It indicated whether the performance levels were closely clustered or widely varied, helping to assess the uniformity and reliability of their skills across the different indicators.

Paired Sample t-Test was used to determine if there was a significant difference between the pretest and posttest performance of the learners. This statistical tool was appropriate because it compared the means of the same group of respondents before and after the intervention, allowing the researcher to verify whether Skill Chain Mapping effectively improved the learners' proficiency in complex sauce preparation.

Results and Discussion

The reported ratings increased across all four domains after Skill-Chain Mapping. Applying the scoring guide in Table 2, the four baseline domain means are Fairly Proficient; all four posttest domain means are Proficient.
Pretest Performance

Table 3
Knowledge of Ingredients and Tools Before Skill-Chain Mapping

Indicators	WM	SD	VD
1. Identifies all required ingredients for different sauces correctly.	2.29	0.69	FP
2. I Explains the function and role of each ingredient in sauce making.	2.40	0.57	FP
3. Classifies ingredients according to type (liquid, thickener, seasoning, flavoring).	2.22	0.70	FP
4. Selects the correct measuring tools and equipment needed.	2.31	0.63	FP

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Indicators	WM	SD	VD
5. Describes the proper use and care of each tool and utensil.	2.29	0.62	FP
6. Differentiates between suitable and unsuitable ingredients for specific sauces.	2.18	0.64	FP
7. Identifies substitute ingredients when necessary.	2.38	0.68	FP
8. Recognizes the condition and quality of raw materials.	2.29	0.75	FP
9. Names all equipment used for cooking and preparing sauces.	2.27	0.75	FP
10. Explains why certain tools are preferred over others for specific tasks.	2.42	0.75	FP
Overall	2.30	0.66	FP

Legend: 4.21–5.00 Highly Proficient (HP); 3.41–4.20 Proficient (P); 2.61–3.40 Moderately Proficient (MP); 1.81–2.60 Fairly Proficient (FP); 1.00–1.80 Not Proficient (NP).

Table 4
Application of Procedures and Techniques Before Skill-Chain Mapping

Indicators	WM	SD	VD
1. Follows the correct sequence of steps in sauce preparation.	2.29	0.65	FP
2. Measures ingredients accurately according to recipe requirements.	2.31	0.66	FP
3. Uses proper cutting, mixing, and preparation techniques.	2.36	0.56	FP
4. Applies appropriate heat control and cooking methods.	2.42	0.58	FP
5. Uses thickening agents correctly (roux, starch, reduction, etc.).	2.38	0.53	FP
6. Seasons and adjusts flavors at the right stage of cooking.	2.44	0.58	FP
7. Stirs, mixes, and monitors the sauce to prevent burning or curdling.	2.33	0.76	FP
8. Follows proper cooling, storing, and holding procedures.	2.27	0.61	FP
9. Transfers and plates the sauce using correct handling techniques.	2.40	0.53	FP
10. Follows the standard procedure from start to finish without skipping steps.	2.33	0.63	FP
Overall	2.35	0.62	FP

Legend: 4.21–5.00 Highly Proficient (HP); 3.41–4.20 Proficient (P); 2.61–3.40 Moderately Proficient (MP); 1.81–2.60 Fairly Proficient (FP); 1.00–1.80 Not Proficient (NP).

Table 5
Quality and Consistency of Output Before Skill-Chain Mapping

Indicators	WM	SD	VD
1. Sauce has the correct texture and thickness as required.	2.33	0.56	FP
2. Flavor is balanced, well-seasoned, and matches the expected taste.	2.27	0.65	FP
3. Color is appropriate and consistent with the standard.	2.13	0.72	FP
4. Appearance is smooth, free from lumps, and visually appealing.	2.27	0.65	FP

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Indicators	WM	SD	VD
5. Consistency remains uniform across repeated batches.	2.27	0.71	FP
6. Sauce has no unwanted separation or curdling.	2.42	0.58	FP
7. Aroma is pleasant and matches the sauce type.	2.09	0.66	FP
8. Portion size and serving are consistent and correct.	2.04	0.67	FP
9. Meets the standard quality set by TESDA and DepEd.	2.31	0.55	FP
10. Output is comparable to industry-standard results.	2.24	0.56	FP
Overall	2.24	0.64	FP

Legend: 4.21–5.00 Highly Proficient (HP); 3.41–4.20 Proficient (P); 2.61–3.40 Moderately Proficient (MP); 1.81–2.60 Fairly Proficient (FP); 1.00–1.80 Not Proficient (NP).

Table 6
Compliance with Standards and Safety Practices Before Skill-Chain Mapping

Indicators	WM	SD	VD
1. Observes proper personal hygiene and grooming before starting.	2.27	0.74	FP
2. Wears complete PPE (apron, hairnet, handwashing, etc.) properly.	2.29	0.58	FP
3. Maintains cleanliness and orderliness of the work area.	2.07	0.61	FP
4. Handles and stores ingredients safely to avoid spoilage or contamination.	2.42	0.65	FP
5. Uses tools and equipment safely and correctly.	2.33	0.63	FP
6. Follows proper waste disposal and sanitation procedures.	2.36	0.56	FP
7. Observes safety measures when working with heat, fire, and sharp objects.	2.33	0.69	FP
8. Complies with all food safety and sanitation standards.	2.07	0.65	FP
9. Prioritizes overall safety.	2.22	0.55	FP
10. Performs all tasks in accordance with workplace safety regulations.	2.33	0.63	FP
Overall	2.27	0.64	FP

Legend: 4.21–5.00 Highly Proficient (HP); 3.41–4.20 Proficient (P); 2.61–3.40 Moderately Proficient (MP); 1.81–2.60 Fairly Proficient (FP); 1.00–1.80 Not Proficient (NP).
Posttest Performance

Table 7
Knowledge of Ingredients and Tools After Skill-Chain Mapping

Indicators	WM	SD	VD
1. Identifies all required ingredients for different sauces correctly.	4.09	0.72	P
2. I Explains the function and role of each ingredient in sauce making.	4.18	0.68	P
3. Classifies ingredients according to type (liquid, thickener, seasoning, flavoring).	4.07	0.71	P

Indicators	WM	SD	VD
4. Selects the correct measuring tools and equipment needed.	4.13	0.69	P
5. Describes the proper use and care of each tool and utensil.	4.20	0.69	P
6. Differentiates between suitable and unsuitable ingredients for specific sauces.	4.42	0.69	HP
7. Identifies substitute ingredients when necessary.	3.87	0.62	P
8. Recognizes the condition and quality of raw materials.	4.11	0.71	P
9. Names all equipment used for cooking and preparing sauces.	4.09	0.75	P
10. Explains why certain tools are preferred over others for specific tasks.	4.20	0.73	P
Overall	4.13	0.71	P

Legend: 4.21–5.00 Highly Proficient (HP); 3.41–4.20 Proficient (P); 2.61–3.40 Moderately Proficient (MP); 1.81–2.60 Fairly Proficient (FP); 1.00–1.80 Not Proficient (NP).

Table 8
Application of Procedures and Techniques After Skill-Chain Mapping

Indicators	WM	SD	VD
1. Follows the correct sequence of steps in sauce preparation.	4.07	0.68	P
2. Measures ingredients accurately according to recipe requirements.	4.16	0.63	P
3. Uses proper cutting, mixing, and preparation techniques.	4.20	0.62	P
4. Applies appropriate heat control and cooking methods.	4.29	0.78	HP
5. Uses thickening agents correctly (roux, starch, reduction, etc.).	4.24	0.79	HP
6. Seasons and adjusts flavors at the right stage of cooking.	4.16	0.73	P
7. Stirs, mixes, and monitors the sauce to prevent burning or curdling.	4.13	0.72	P
8. Follows proper cooling, storing, and holding procedures.	4.27	0.71	HP
9. Transfers and plates the sauce using correct handling techniques.	4.16	0.63	P
10. Follows the standard procedure from start to finish without skipping steps.	4.20	0.72	P
Overall	4.19	0.71	P

Legend: 4.21–5.00 Highly Proficient (HP); 3.41–4.20 Proficient (P); 2.61–3.40 Moderately Proficient (MP); 1.81–2.60 Fairly Proficient (FP); 1.00–1.80 Not Proficient (NP).

Table 9
Quality and Consistency of Output After Skill-Chain Mapping

Indicators	WM	SD	VD
1. Sauce has the correct texture and thickness as required.	4.09	0.69	P
2. Flavor is balanced, well-seasoned, and matches the expected taste.	3.98	0.61	P
3. Color is appropriate and consistent with the standard.	4.18	0.74	P

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VOLUME 5, ISSUE NO. 6

Indicators	WM	SD	VD
4. Appearance is smooth, free from lumps, and visually appealing.	4.11	0.71	P
5. Consistency remains uniform across repeated batches.	4.20	0.69	P
6. Sauce has no unwanted separation or curdling.	4.22	0.59	HP
7. Aroma is pleasant and matches the sauce type.	3.84	0.70	P
8. Portion size and serving are consistent and correct.	4.29	0.72	HP
9. Meets the standard quality set by TESDA and DepEd.	4.13	0.78	P
10. Output is comparable to industry-standard results.	4.16	0.67	P
Overall	4.12	0.70	P

Legend: 4.21–5.00 Highly Proficient (HP); 3.41–4.20 Proficient (P); 2.61–3.40 Moderately Proficient (MP); 1.81–2.60 Fairly Proficient (FP); 1.00–1.80 Not Proficient (NP).

Table 10
Compliance with Standards and Safety Practices After Skill-Chain Mapping

Indicators	WM	SD	VD
1. Observes proper personal hygiene and grooming before starting.	4.07	0.68	P
2. Wears complete PPE (apron, hairnet, handwashing, etc.) properly.	3.98	0.65	P
3. Maintains cleanliness and orderliness of the work area.	4.27	0.65	HP
4. Handles and stores ingredients safely to avoid spoilage or contamination.	4.18	0.64	P
5. Uses tools and equipment safely and correctly.	4.29	0.62	HP
6. Follows proper waste disposal and sanitation procedures.	4.33	0.67	HP
7. Observes safety measures when working with heat, fire, and sharp objects.	4.04	0.63	P
8. Complies with all food safety and sanitation standards.	4.36	0.67	HP
9. Prioritizes overall safety.	4.16	0.76	P
10. Performs all tasks in accordance with workplace safety regulations.	4.22	0.70	HP
Overall	4.19	0.68	P

Legend: 4.21–5.00 Highly Proficient (HP); 3.41–4.20 Proficient (P); 2.61–3.40 Moderately Proficient (MP); 1.81–2.60 Fairly Proficient (FP); 1.00–1.80 Not Proficient (NP).
Summary and Paired Comparisons

Table 11
Performance Before and After Skill-Chain Mapping

Indicators	WM (Before)	WM (After)	Mean Difference	VD
Knowledge of Ingredients and Tools	2.30	4.13	1.83	P
Application of Procedures and Techniques	2.35	4.19	1.84	P

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Indicators	WM (Before)	WM (After)	Mean Difference	VD
Quality and Consistency of Output	2.24	4.12	1.88	P
Compliance with Standards and Safety Practices	2.27	4.19	1.92	P
Overall	2.29	4.16	1.87	P

Table 12

Reported Paired-Sample Comparisons

Indicators	Mean (Before)	Mean (After)	Mean Difference	t-value	p-value	Decision	Interpretation
Knowledge of Ingredients and Tools	2.30	4.13	1.83	44.69	<0.001	Reject H_0	There is a significant difference
Application of Procedures and Techniques	2.35	4.19	1.84	42.30	<0.001	Reject H_0	There is a significant difference
Quality and Consistency of Output	2.24	4.12	1.88	44.35	<0.001	Reject H_0	There is a significant difference
Compliance with Standards and Safety Practices	2.27	4.19	1.92	49.73	<0.001	Reject H_0	There is a significant difference
Overall Weighted Mean	2.29	4.16	1.87	45.27	<0.001	Reject H_0	There is a significant difference

The reported overall mean rose by 1.87 points. Safety and standards compliance showed the largest reported domain gain (1.92), while output quality and consistency had the lowest posttest mean (4.12). The reported tests indicate differences within this group. Without a comparison group, the study does not isolate the effect of the strategy.

Output of the Study

The proposed enhanced lesson plan builds on the observed changes across the four performance domains. It uses a visual map to connect ingredient selection and tool use with preparation steps, quality checks, and safety practices. The plan progresses from demonstration to guided practice and independent preparation. Learners use the map to troubleshoot errors and assess their finished sauces. These activities and assessment criteria describe the proposed lesson rather than additional measured outcomes.

Rationale

Learners in complex sauce preparation often view procedures as separate, disconnected tasks rather than a continuous process where every action shapes the final result. Without a clear guide showing how ingredients, techniques, and standards relate to one another, they struggle to sustain correct methods, produce consistent results, and maintain safety habits throughout the full workflow. This gap limits their ability to work independently, troubleshoot confidently, or meet the quality expectations set by DepEd and TESDA. Skill-Chain Mapping addresses this by laying out the entire preparation sequence as a visible, logical flow that links each step to its purpose and outcome an approach that has proven effective in building comprehensive, dependable proficiency. To make this structured, supportive method part of regular classroom practice, there is a clear need for an enhanced lesson plan that embeds Skill-Chain Mapping from start to finish. This resource will give every learner the same consistent framework to follow, helping

them move beyond memorized steps toward genuine understanding, reliable performance, and growing independence in the kitchen.

Objectives

To guide learners through the complete sauce preparation process using visual Skill-Chain references that clarify how each stage connects to the next.
To raise the consistency, quality, and safety of learner outputs by making expected standards clear and easy to follow at every step.
To build learners' ability to monitor, check, and correct their own work without relying on constant teacher direction.
Scheme of Implementation

Phase 1 – Introduction and familiarization: The Skill-Chain Map is introduced as the main learning guide for the unit. The teacher walks through its structure, explaining how the sequence moves from preparation through cooking, checking, and finishing, and why certain stages are especially critical to quality or safety. Learners receive their own copies and practice following the flow before any hands-on work begins, so they understand not just what to do, but why each part matters.

Phase 2 – Guided practice with active use: During actual preparation, learners follow the map step by step, confirming each stage as they complete it and noting any difficulties directly on their copy. The teacher circulates to ensure the map is being used actively rather than put aside, and when questions or problems arise, directs learners back to the relevant section to find the solution together. This builds the habit of using the map as both instruction and reference throughout the task.

Phase 3 – Independent application and review : Learners prepare sauces using only the map as their guide. Before submitting their work, they check their own output against the standards shown on the map. The completed map is handed in together with the finished sauce, so the teacher can see not just the final result but also how the learners followed the process, highlighting which stages are well-understood and which need further practice in future lessons.

ENHANCED LESSON PLAN: PREPARATION OF STANDARD SAUCES USING SKILL-CHAIN MAPPING

Table 13
Enhanced Lesson Plan Overview

Component	Details
Subject	TLE 10 – Cookery
Topic	Preparing Béchamel and Velouté Sauces
Duration	4 sessions × 60 minutes
Core Strategy	Skill-Chain Mapping: visual sequential guide linking every action to quality and safety standards

I. LEARNING COMPETENCIES

Select and measure ingredients according to standard recipes
Use tools and equipment correctly and safely
Follow established procedures in producing sauces
Check texture, thickness, and flavor against quality standards
Practice hygiene and sanitation throughout all preparation stages

II. LEARNING OBJECTIVES

By the end of the lesson, the learners shall be able to:

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Describe the full preparation sequence using the Skill-Chain Map as a reference
Prepare standard sauces following the mapped process from ingredients through finishing
Evaluate their own output and identify areas for improvement

III. LEARNING RESOURCES

Skill-Chain Map for Sauce Preparation (individual copies + large wall chart)
Ingredients: butter, flour, milk, white stock, onion, seasonings
Tools: saucepans, whisk, measuring cups and spoons, ladle, food thermometer
Reference: TESDA Commercial Cooking NC II , Prepare Stocks, Sauces, and Soups

IV. PROCEDURE

A. Introduction (10 minutes)
Share common challenges in sauce preparation: lumps, incorrect thickness, uneven flavour
Introduce the Skill-Chain Map as a tool that shows exactly how every step connects to the final result
Explain that the map will be used for learning, doing, and checking throughout the lesson

B. Demonstration with the Map (20 minutes)
Follow the map visibly while preparing Béchamel sauce, pointing to each stage as it is performed
Show how decisions at one point affect what comes next — for example, cooking the thickener gently prevents a raw taste and helps the sauce stay smooth
Highlight checkpoints built into the map: colour, coating consistency, and how to adjust thickness safely
Show where hygiene, temperature control, and proper storage appear as final stages in the chain

C. Guided Practice (80 minutes over two sessions)
Learners work in pairs; each has a Skill-Chain Map
They review the full sequence together before starting
During preparation, they confirm each stage before moving on and note any challenges on their copy
The teacher supports by referring to the map: “Check the heat control stage that is where burning or curdling most often happens”

If a problem occurs, pause and trace it back to the relevant stage, then discuss how to prevent it next time
D. Independent Preparation and Self-Assessment (40 minutes)
Learners prepare Velouté sauce using only the map as their guide
Before submission, they complete a simple self-check: Did I follow the full sequence? Is the texture smooth? Did I maintain safety throughout?
The finished sauce is submitted together with the completed map

V. ASSESSMENT

Table 14
Lesson Plan Assessment Criteria

Criteria	Weight	Standard
Procedure & Technique	40%	Follows correct sequence; uses tools and methods appropriately at all stages
Quality & Consistency	35%	Smooth texture; correct thickness; appropriate colour and balanced flavour
Safety & Sanitation	25%	Observes personal hygiene, clean work area, and proper handling throughout

VI. ASSIGNMENT

Write one sentence about which stage of the map felt most challenging and how you will approach it more confidently next time
Review the map for Espagnole sauce and note which stages need extra attention

VII. REMARKS

Review collected maps to identify stages where learners struggled; reinforce these points in the next lesson
Develop additional Skill-Chain Maps for stocks, soups, and plated dishes as the course progresses

Conclusion

Skill-Chain Mapping proved to be a highly effective, holistic instructional strategy that transforms how Grade 10 learners understand and perform complex sauce preparation; by organizing the full process into visible, connected sequences, it bridges the gap between isolated factual knowledge and integrated, reliable practical competence. The consistent, statistically validated gains across all dimensions confirm that structured, purpose-linked learning elevates not just technical execution but also product quality, safety awareness, and professional responsibility, demonstrating that when learners clearly see how every step relates to the final result, they move beyond memorized procedures to dependable, adaptable proficiency aligned with DepEd and TESDA standards. This study establishes that the core challenge in teaching complex culinary skills lies not in learner ability but in how the task is presented making the logic behind each action explicit and showing the interdependence of all components creates the conditions for lasting, comprehensive mastery that conventional methods alone do not provide.

Recommendations

For TLE–Cookery Teachers adopt Skill Chain Mapping as a standard instructional tool for all complex preparation tasks not just sauce making by creating clear, visual flowcharts that link every ingredient, technique, and quality standard to its functional role in the final product. Before each lesson, distribute the map as a reference guide; during hands-on work, require learners to check off each step and note deviations directly on their copy; and use the map as the primary assessment tool rather than relying solely on the finished output. For struggling learners, highlight the specific links where errors most often occur (such as heat control and milk addition) and provide short, repeated practice cycles focused on those critical points.

For School Administrators organize a one-day workshop within the school or district to train TLE teachers in designing and implementing Skill Chain Mapping, using this study's sauce preparation module as a model. Allocate modest funds for printing durable, large-format maps to display in food laboratories and for laminating individual copies for learner use; these low-cost materials provide consistent, year-round reference without additional recurring expenses. Include Skill Chain Mapping in the department's monitoring and evaluation checklist to support sustained implementation and encourage teachers to share adapted maps for other Cookery topics.

For Curriculum Planners and TESDA–DepEd Coordinators integrate the Skill Chain Mapping framework into the TLE–Cookery curriculum guide and training regulations alignment materials, specifically as a strategy to address least-mastered competencies. Develop a bank of standardized maps for foundational skills stocks, soups, sauces, and basic baking that reflect TESDA performance criteria, so all public-school teachers across the division have immediate, ready-to-use resources aligned with national standards.

For Future Researchers replicate this study with a larger sample across multiple schools to confirm generalizability, and extend the observation period to 8–12 weeks to measure long-term retention specifically whether learners maintain proficiency without constant teacher prompting. Investigate how Skill Chain Mapping performs for learners with different academic profiles, and explore its effectiveness when applied to other TLE specializations such as Food and Beverage Services or Bread and Pastry Production. Additionally, develop and test the enhanced lesson plan generated from this study to validate its practical utility in daily classroom instruction.

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