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IMPROVING STUDENTS' PRACTICAL SKILLS IN BAKING AND PASTRY PRODUCTION THROUGH STATION ROTATION STRATEGY

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Abstract

Baking and Pastry Production requires hands-on practice across five core competencies. This study examined changes in the practical skills of 40 Grade 9 learners at Mactan National High School during School Year 2026–2027 before and after one week of instruction using the Station Rotation Strategy. The study used a quasi-experimental one-group pretest–posttest design and a performance-based assessment checklist covering mise en place and preparation, measurement and weighing of ingredients, mixing and baking techniques, product presentation and quality, and safety and sanitation practices. The analysis used weighted means, standard deviations, and paired-sample t tests at the .05 significance level. All five domains were rated Fairly Proficient at pretest, with a reported overall mean of 2.26. At posttest, the domain ratings were Proficient or Highly Proficient, with a reported overall mean of 4.19. Domain mean gains ranged from 1.80 to 1.97, and the reported paired comparisons yielded $p < .001$. The scores show improvement within the study group; the design cannot isolate the contribution of station rotation from other influences. The findings informed an instructional guide organized around five workstations for teaching Baking and Pastry Production.

Keywords: Baking and Pastry Production, Grade 9 learners, Mactan, Lapu-Lapu City, practical skills, Station Rotation Strategy

Introduction

Technology and Livelihood Education (TLE) is a core component of the basic education curriculum, designed to equip learners with practical skills and knowledge that support economic empowerment (Gaña, 2025). Baking and Pastry Production stands out as a vital specialization, opening pathways from professional kitchen employment to entrepreneurship while building strengths in precision, problem-solving, and innovation. Yet relying only on lectures and demonstrations often fails to foster deep, lasting learning (Gaña, 2025). True proficiency combines technical understanding with creativity; learners must go beyond following recipes to adjusting formulas, troubleshooting results, and sustaining consistent quality (CCA Manila, 2025). Competence in four key areas accurate measurement and weighing of ingredients, proper mixing and baking techniques, quality product presentation, and consistent safety and sanitation practices is essential not just for academic success but also for meeting industry standards and earning recognized certifications (Maryland State Department of Education, 2025).

Globally, Vocational Education and Training (VET) systems prioritize hands-on, experience-centered learning that links classroom work with real-world application, though alignment with industry needs remains a continuing priority across regions (OECD, 2025). Research shows that varied learning experiences and guided practice build competency more effectively than interest alone, confirming that thoughtful instructional design directly shapes skill mastery (Balendres & Diel, 2025). At the secondary level, practical activities like baking also strengthen skills across mathematics, science, communication, and motor control, highlighting the broad value of active learning (Texas A&M College of Education & Human Development, 2025). In the Philippines, TLE and Technical-Vocational-Livelihood (TVL) instruction faces challenges including congested curricula, delayed focus on TESDA National Certificate requirements, and misalignment with current industry expectations (Abapo, 2024). While Filipino teachers are professionally qualified, gaps in training for specialized and differentiated approaches can limit practice effectiveness (UNICEF, 2021).

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At Mactan National High School, Grade 9 Baking and Pastry Production learners experience these constraints directly: limited tools, equipment, and consumables force teachers to rely heavily on demonstration rather than active student practice. In a typical session, only one small group may measure ingredients or use the oven while others observe; learners rarely get repeated turns to weigh accurately, apply proper mixing methods, refine presentation, or reinforce sanitation habits. Consequently, many struggle to translate theory into usable skills, resulting in low confidence and performance below required standards. The Station Rotation Strategy addresses this need: learners are organized into small groups that move through dedicated workstations, each focused on one competency measurement and weighing, mixing and baking techniques, product presentation and quality, or safety and sanitation. This model optimizes limited resources, ensures equal participation, and gives every learner consistent, focused practice across all essential skill areas.

Existing studies have confirmed the value of learner-centered approaches such as project-based and problem-based learning in TLE, and have shown that targeted, context-appropriate interventions like the Contextualized Teacher's Instructional Plan (C TIP) significantly improve TVL outcomes compared to traditional methods (Abapo, 2024). However, a clear research gap remains: no published literature has yet examined the Station Rotation Strategy specifically as a way to strengthen practical skills in Baking and Pastry Production. No study has explored how this rotation model can address resource limitations and boost performance across the five identified competency areas. This research fills that gap by assessing the current level of practical skills among Grade 9 learners at Mactan National High School before the intervention. Establishing this baseline provides the necessary reference point to evaluate whether the Station Rotation Strategy effectively builds the hands-on competencies learners need for academic success, industry certification, and future livelihood opportunities.

Theoretical and Conceptual Framework and Legal Bases

This study assumed that examining the effectiveness of station rotation strategy could enhanced the practical skills of learners in baking and pastry production. Likewise, it is anchored on four key theories: Hierarchy of Learning / Conditions of Learning Theory (Gagné, 1965), Social Learning Theory (Bandura, 1977), Mastery Learning Theory (Bloom, 1968), and the Systems Approach to Vocational Education (Dewey, 1916, 1938; Babbitt, 1918).

To begin with Hierarchy of Learning / Conditions of Learning Theory (Gagné, 1965) posits that learning occurs in a cumulative, hierarchical sequence, from basic forms such as signal learning and stimulus-response associations up to higher-order capabilities like rule application and problem-solving. He emphasized that each type of learning requires specific internal and external conditions: learners must possess prerequisite skills before advancing, and instruction must be organized to match the nature of the competency being developed. Furthermore, he identified nine instructional events that support effective learning, ranging from gaining attention and presenting content to providing practice and reinforcing retention.

In line with this, the Station Rotation Strategy Structures Baking and Pastry Production tasks in progressive order, starting with foundational competencies such as mise en place and measurement, then moving toward complex skills like mixing techniques and product presentation. This framework directly supports assessing the level of practical skills of the learners in Baking and Pastry Production before and after the implementation of the Station Rotation Strategy Moreover, the strategy's format incorporates clear instructions, guided practice, immediate feedback, and repeated application, fulfilling the external conditions needed for learners to build reliable, transferable practical skills across all five identified areas.

Several literature and studies affirm Gagné's Conditions of Learning Theory (1965) as a strong basis for structured skill building. McLeod (2026) notes that learning is cumulative, complex capabilities grow from simpler prerequisites, and that different outcomes require tailored methods, covering intellectual skills, knowledge, strategies, motor ability, and attitudes. Kurt (2021) adds that these categories span cognitive, psychomotor, and affective domains, confirming that tasks like baking demand sequenced, progressive mastery. Selvaraj et al. (2023) further show that applying Gagné's systematic framework yields better performance and motivation, supporting that station rotation strategy will help learners master complex baking and pastry tasks.

Complementing this, Social Learning Theory (Bandura, 1977) asserts that people acquire knowledge, skills, and behaviors not only through direct experience but also by observing, imitating, and modeling others. Central to this framework is the concept of reciprocal determinism, where personal factors, environmental influences, and behavior continuously interact, and the role of self-efficacy, or one's belief in their capacity to execute actions needed to achieve specific performance goals. Learning is further strengthened through social interaction, verbal persuasion, and successful performance experiences that reinforce confidence and competence.

Consistent with this perspective, the Station Rotation Strategy fosters a collaborative learning environment where learners observe peers and teacher demonstrators at each station, exchange techniques, and learn from both correct practices and constructive corrections. This setting allows for a clear comparison of the level of practical skills of the learners in Baking and Pastry Production before and after the implementation of the Station Rotation Strategy in Mise en place and preparation, Measurement and weighing of ingredients, Mixing and baking techniques, Product presentation and quality, and Safety and sanitation practices, as social modeling and shared practice directly shape how well learners perform each competency. Consequently, this social structure addresses the challenge of limited hands-on access by ensuring every student observes and actively participates, turning resource constraints into chances for shared learning and mutual support across all skill domains.

Several literature and studies affirm Bandura's Social Learning Theory as a vital basis for structured skill acquisition. Schunk and DiBenedetto (2023) note its enduring educational relevance: later expanded into Social Cognitive Theory, it establishes that learning happens through observation, modeling, and the interplay of personal, behavioral, and environmental factors, with core concepts like self-efficacy, self-regulation, and agency guiding effective instruction. Cleveland Clinic (2026) adds that this process follows four key stages, attention, retention, reproduction, and motivation, reinforced by clear demonstration and positive outcomes. Koutroubas and Galanakis (2022) further validate that self-efficacy, built through structured observation and guided practice, strongly drives skill development and performance. These findings confirm that station rotation strategy helps learners consistently and accurately perform complex culinary procedures such as in baking and pastry.

Next, Mastery Learning Theory (Bloom, 1968) which operates on the premise that nearly all learners can attain a high level of proficiency if instruction is appropriately organized, adequate time is provided, and learners receive the support and feedback they need. The approach breaks subject matter into discrete units with clear objectives; learners demonstrate mastery of one unit before moving to the next, using formative assessments to identify gaps and receiving corrective instruction or additional practice until proficiency is achieved. It rejects the assumption that only a small portion of learners can excel, emphasizing instead that success depends on quality of instruction and opportunity to practice.

Correspondingly, the Station Rotation Strategy divides Baking and Pastry Production competencies into separate workstations, each focused on one skill area such as sanitation, weighing, or baking techniques, allowing learners to focus on and repeatedly practice one competency at a time. This design is perfectly aligned with measuring the level of practical skills of the learners in Baking and Pastry Production before and after the implementation of the Station Rotation Strategy as targeted practice at each station ensures every learner progresses toward mastery. Thus, this approach directly addresses the gap where limited materials and demonstrations prevent full mastery, ensuring that learners attain satisfactory proficiency across all five practical skill areas before final assessments.

Several literature and studies affirm Mastery Learning Theory as a robust basis for building reliable, standardized proficiency. Aftab et al. (2022) found that structured mastery approaches significantly improved academic performance, confirming that step-by-step progression, where learners fully grasp each component before advancing, strengthens overall outcomes. Vlădescu (2023) further validates that mastery-oriented instruction yields better results independent of study time alone, emphasizing the value of sequenced learning. Leland (2025) links this to Carroll's School Learning Theory, explaining that achievement depends on aligned time, quality instruction, and perseverance rather than fixed ability, and that requiring full proficiency at each stage boosts success and retention. For this study, these findings confirm that station rotation strategy, by treating every segment of baking and pastry product as a mastery checkpoint, will help learners achieve consistent, high-quality, and standardized performance.

Finally, Systems Approach to Vocational Education (Dewey, 1916, 1938; Babbitt, 1918) provides emphasis on learning by doing and Babbitt's focus on purposeful, work-aligned instruction, views vocational education as an interconnected system that links classroom learning to real-life application, industry requirements, and holistic development. Dewey argued that education is not merely preparation for life but life itself, rooted in meaningful experience and problem-solving. Babbitt further stressed that vocational training should be organized around practical activities that mirror actual work processes, ensuring that skills are relevant, systematically built, and responsive to societal and economic needs.

In keeping with this framework, the Station Rotation Strategy organizes instruction around actual baking workflows, from preparation and measurement to execution, presentation, and safety, mirroring the sequence and discipline required in professional kitchens. This alignment enables a comprehensive evaluation of the level of practical skills of the learners in Baking and Pastry Production before and after the implementation of the Station Rotation Strategy as each component reflects how skills are applied in authentic settings. Ultimately, aligning instruction with how tasks are performed in real settings helps learners build not just technical proficiency but also the work habits and readiness needed for TESDA assessments and future employment.

Several literature and studies affirm the Systems Approach to Vocational Education as essential for building competent, industry-ready proficiency. Barliana et al. (2020) note that poor alignment and fragmented practice often limit graduate readiness, while integrated, adaptive models that treat skills as interconnected systems improve expertise, character, and employment potential. Mende et al. (2025) further confirm that effective vocational education depends on coordinated, cohesive systems, covering alignment, collaboration, and quality assurance, rather than isolated components. OECD (2025) reinforces this, showing that successful vocational training unites curriculum, instruction, standards, and industry links in a unified framework. For this study, these findings validate that station rotation strategy, by presenting complex sauce preparation as a connected, standardized process, will foster consistent, professional-grade performance aligned with industry expectations.

All the four theories and supporting literature provide a cohesive, multi-dimensional foundation affirming that the Station Rotation Strategy is a well-grounded approach to enhance the practical skills of Grade 9 learners in Baking and Pastry Production. Aligning with Gagné's Hierarchy of Learning, the strategy organizes instruction in a progressive sequence, starting with foundational abilities such as mise en place and accurate measurement before advancing to complex techniques, ensuring learners build prerequisite competencies in line with how skills are naturally acquired, while also enabling clear assessment of performance across all five identified areas before and after implementation. Complementing this structure, Bandura's Social Learning Theory reinforces that rotating through shared workstations fosters observation, peer modeling, and active participation, boosting confidence and self-efficacy even when resources are limited, and directly shaping how well learners master each practical competency. Bloom's Mastery Learning Theory further strengthens this framework by validating that dedicating each station to a specific skill area allows for focused practice, targeted feedback, and repeated attempts until proficiency is achieved, ensuring no learner is left behind and all five skill domains are thoroughly developed. Finally, anchored in the Systems Approach to Vocational Education, the strategy mirrors authentic baking workflows and industry-standard processes, linking classroom practice to real-world requirements and supporting holistic development that prepares learners for certification and future employment. Together, these perspectives confirm that the Station Rotation Strategy systematically addresses the challenges of traditional instruction, providing a structured, collaborative, mastery-centered, and work-aligned method to measure and improve student performance in mise en place and preparation, measurement and weighing of ingredients, mixing and baking techniques, product presentation and quality, and safety and sanitation practices.

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.

First is the Republic Act No. 10533 – Enhanced Basic Education Act of 2013. This law establishes the K to 12 Basic Education Program, aiming to enhance the Philippine education system by ensuring learners acquire 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 mandates that the curriculum be relevant, responsive, and aligned with national development goals, while emphasizing the use of pedagogies that actively engage learners and build competencies across cognitive, psychomotor, and affective domains. It also upholds the provision of quality instruction that is accessible, inclusive, and attuned to the needs of diverse learners and emerging industry demands.
In support of this mandate, the study directly responds to the law's goal of ensuring learners develop practical skills ready for work or further training by assessing the level of practical skills of the learners in Baking and Pastry Production before and after the implementation of the Station Rotation Strategy. Furthermore, the Station Rotation Strategy's learner-centered, hands-on design fulfills the requirement to move beyond passive teaching methods, ensuring Grade 9 learners gain the proficiency, confidence, and readiness the law intends for all basic education graduates.

Moreover, DepEd Order No. 003, s. 2024 – The MATATAG Curriculum: Basic Education Curriculum Framework order sets the updated framework that simplifies and decongests the curriculum, focusing on foundational skills, core competencies, and values formation to ensure mastery of essential learning standards. It prioritizes "less is more," giving learners adequate time to deepen understanding and practice skills, while aligning content with learners' developmental stages and real-life applications. It also strengthens TLE and TVL components by clarifying core competencies, linking learning to livelihood opportunities, and promoting instructional approaches that maximize meaningful engagement and skill acquisition.

Consistent with this framework, the study's focus on targeted skill areas aligns perfectly with the MATATAG principle of concentrating on essential competencies rather than overloaded content, as it evaluates performance across mise en place and preparation, measurement and weighing of ingredients, mixing and baking techniques, product presentation and quality, and safety and sanitation practices before and after using the Station Rotation Strategy. Additionally, the rotation approach gives learners ample, focused time to practice each competency, directly supporting the curriculum's goal of mastery, while addressing the challenge of limited resources by ensuring every learner participates actively within the restructured and streamlined curriculum requirements.

Furthermore, DepEd Order No. 42, s. 2016 – Policy Guidelines on Home Economics and Livelihood Education / Technology and Livelihood Education outlines the standards, scope, and implementation guidelines for TLE, emphasizing its role in equipping learners with technical-vocational skills aligned with industry standards and TESDA National Certifications. It mandates that instruction prioritize the development of practical competencies, proper work habits, safety protocols, and entrepreneurial mindsets, while requiring that teaching strategies provide sufficient hands-on experience and exposure to actual work processes. It also specifies that assessment should focus on performance-based outcomes to verify learners' ability to apply skills in real settings.

In line with these guidelines, the study directly measures performance in the core practical domains required for Baking and Pastry Production, assessing the level of practical skills of the learners in Baking and Pastry Production before and after the implementation of the Station Rotation Strategy. Moreover, the Station Rotation Strategy ensures that even with limited equipment and materials, learners gain repeated, structured practice in all required competencies, upholding the policy's requirement for meaningful, performance-centered instruction that prepares learners for industry standards and certification.

Lastly, DepEd Order No. 8, s. 2019 – Policy on the Adoption of Innovative Instructional Practices and Resources in Basic Education encourages schools and teachers to adopt, adapt, and develop evidence-based, creative, and context-responsive instructional practices and resources that address gaps in learning, optimize available facilities, and improve student outcomes. It recognizes that traditional methods may not always suit varied learning needs or resource limitations, and supports interventions that maximize the use of available tools, promote active participation, and ensure equitable access to quality learning experiences. It also mandates that such innovations be evaluated for effectiveness to establish their contribution to improved academic and practical performance.

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Accordingly, the Station Rotation Strategy qualifies as a responsive, innovative practice designed specifically to address the constraint of limited baking materials and equipment at Mactan National High School, while the study's pre- and post-implementation assessment determines its actual impact on the level of practical skills of the learners in Baking and Pastry Production before and after the implementation of the Station Rotation Strategy. Ultimately, this research fulfills the policy's directive to validate new approaches, providing evidence that will guide wider adoption of strategies that optimize resources and boost learner competence in TLE.

Synthesis. All these legal provisions form a unified, authoritative foundation that validates the relevance, compliance, and purpose of this study. Republic Act No. 10533 establishes the core mandate to equip learners with practical, industry-ready skills for employment and further education, which this study addresses by evaluating how the Station Rotation Strategy builds proficiency across the five key competency areas. DepEd Order No. 003, s. 2024 (MATATAG Curriculum) reinforces this by prioritizing focused, in-depth mastery of essential standards, aligning directly with the study's targeted assessment of mise en place and preparation, measurement and weighing of ingredients, mixing and baking techniques, product presentation and quality, and safety and sanitation practices before and after the intervention. DepEd Order No. 42, s. 2016 further anchors the work in official TLE requirements that demand hands-on, performance-based learning aligned with industry and TESDA standards, ensuring the study's focus matches prescribed curriculum goals. Finally, DepEd Order No. 8, s. 2019 explicitly supports the adoption and evaluation of innovative, context-responsive strategies that address resource limitations and improve outcomes, endorsing the Station Rotation Strategy as a valid intervention and the study's pre-post assessment design as a necessary step to establish its effectiveness. Together, these laws and orders confirm that the research is not only legally compliant but also directly responsive to national education policies aimed at strengthening TLE instruction, optimizing limited resources, and ensuring Grade 9 learners gain the practical competence required for future opportunities.

Taken together, these theories and legal bases provide a solid framework that deepens understanding of why structured sequenced instruction is vital for mastering complex tasks like baking and pastry and further elaborates how station rotation strategy can effectively address gaps in consistency quality and standardization. Beyond these foundational principles and policy mandates related studies and literature further validate contextualize and expand these findings offering additional new knowledge into how similar strategies have been applied tested and proven effective across different learning settings and skill-based disciplines.

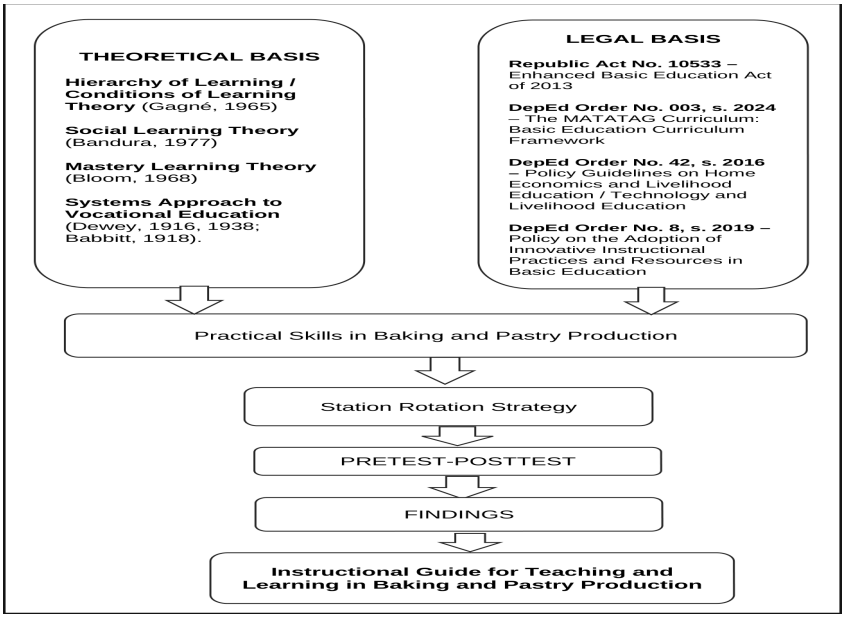


Figure 1
Theoretical and Conceptual Framework of the Study

On the other hand, Republic Act No. 10533- Enhanced Basic Education Act of 2013, and Republic Act No. 7796- Technical Education and Skills Development Act of 1994 (TESDA Act) legal bases that provides support on the nature of the study.

Republic Act No. 10533 establishes the policy framework that the State shall create a functional basic education system that will develop productive and responsible citizens equipped with the essential competencies, skills, and values for both life-long learning and employment. The law institutionalizes the Technical-Vocational-Livelihood (TVL) Track within the K to 12 curriculum, mandating that instruction align with industry standards and provide learners with meaningful, practical skills leading to national certification and gainful livelihood. Specifically, it directs the Department of Education (DepEd) to coordinate closely with the Technical Education and Skills Development Authority (TESDA) so that TLE/TVL specializations such as Bread and Pastry Production NC II are taught and assessed according to national competency standards.

This legal mandate directly supports the present study. RA 10533 requires schools to deliver instruction that prepares learners for TESDA National Certificate assessments across core competencies: mise en place and preparation, accurate measurement and weighing, mixing and baking techniques, product presentation and quality, and safety and sanitation practices. The Station Rotation Strategy responds to this legal obligation by ensuring that even with limited resources, every learner receives repeated, hands-on practice in each competency area moving beyond mere demonstration to the actual skill acquisition that the law demands. The study addresses the gap between statutory expectation and classroom reality, providing evidence on whether an optimized instructional approach can help schools meet the standards set by the legislation.

Republic Act No. 7796 charges TESDA with establishing national trade and skill standards and ensuring that training delivery matches workplace requirements. Section 22 explicitly mandates the formulation of competency standards that define what a person must demonstrate to be certified in a qualification including Bread and Pastry Production NC II, which specifies performance criteria for preparation, measurement, baking methods, presentation, and strict compliance with occupational safety and sanitation protocols. The law further emphasizes that training must be accessible and that standards must be applied consistently across all learning institutions, whether formal or technical-vocational.

This legal provision strengthens the study by anchoring its five competency areas directly in officially recognized standards. TESDA's Training Regulations require not just theoretical knowledge but demonstrated proficiency something that cannot be achieved through observation alone. The Station Rotation Strategy is a practical response to this requirement: by structuring learning into dedicated workstations, it enables schools with limited equipment to still provide the repeated practice, skill application, and performance checks that TESDA standards demand. The pre-intervention assessment of learners' practical skills provides a baseline against which alignment with national standards can be measured, ensuring that the study contributes to fulfilling the legal intent of producing competent, industry-ready graduates.

Republic Act No. 10533 and Republic Act No. 7796 together form a complementary legal foundation for this study, where RA 10533 institutionalizes the Technical-Vocational-Livelihood Track and mandates DepEd-TESDA coordination to deliver industry-aligned, certification-ready skills in Baking and Pastry Production NC II, while RA 7796 defines the specific national competency standards covering mise en place and preparation, measurement and weighing of ingredients, mixing and baking techniques, product presentation and quality, and safety and sanitation practices that learners must actually demonstrate rather than simply observe. Both laws converge on the requirement for meaningful, hands-on proficiency rather than theoretical familiarity alone, yet schools such as Mactan National High School face persistent resource limitations that restrict repeated student practice, creating a clear gap between statutory expectation and classroom reality; this study directly responds to that gap by assessing learners' pre-intervention practical skills to establish a baseline, while the Station Rotation Strategy offers a legally aligned solution that optimizes available tools and materials through focused workstations, ensuring every learner gains the consistent, active practice needed to meet national standards and fulfill the state's mandate to produce competent, industry-ready graduates.

Related Literature

The Station Rotation Model (SRM) is widely recognized as a flexible, student-centered instructional approach that organizes learning into distinct activity stations where small groups rotate at scheduled intervals. Tucker (2021) explains that it typically combines teacher-led guidance, independent tasks, and hands-on or digital practice, prioritizing student agency, differentiated instruction, and the development of 21st-century skills such as critical thinking, communication, collaboration, and creativity. Similarly, Fulbeck et al. (2020) describe it as a feasible, low-disruption strategy that fits within existing school schedules and infrastructure, allowing teachers to adjust materials according to learner pace and needs even in resource-limited settings. In line with this, Anagnostopoulou et al. (2023) note that SRM can be systematically designed using frameworks such as the ADDIE model and aligned with Universal Design for Learning principles to ensure inclusive, accessible experiences for all learners. Further expanding on this, Anagnostopoulou et al. (2025) confirm through a systematic review of 30 studies that consistent implementation yields positive outcomes across different contexts, including increased motivation, autonomy, and higher-order thinking, while remaining adaptable to various formats such as virtual or blended arrangements. Likewise, the Department of Defense Education Activity [DoDEA] (2025) highlights that structured rotation cycles enable targeted support, reinforce prior learning, and foster sustained skill growth across grade levels and subject areas.

Empirical evidence consistently shows that SRM improves both participation and performance. For instance, Draayer (2021) found that learners taught through station rotation demonstrated significantly greater skill mastery and comprehension compared to those in traditional settings, as the format allows repeated, focused practice and efficient use of available tools. Corroborating this, Oledan (2025) reports that Grade 9 Filipino learners rated SRM's effectiveness and their own engagement, motivation, and satisfaction at moderately high levels; perceived effectiveness significantly predicted stronger participation, while sequenced activities fostered better work strategies, peer support, and independent problem-solving. In terms of higher-order skills, Oktarianto et al. (2025) established through a posttest-only control group design that learners exposed to SRM exhibited substantially stronger critical thinking abilities than those taught conventionally, confirming the model's capacity to deepen analytical reasoning across disciplines. Collectively, these studies demonstrate that SRM not only boosts interest and involvement but also systematically builds the competencies required for practical, performance-based subjects.

In the specific context of vocational education, particularly Baking and Pastry Production, structured, hands-on instruction is critical for developing industry-ready skills. Cunanan (2026) found that while learners generally perform well in measurement and procedural execution, they often lag in product presentation and decorative skills; performance is most strongly influenced by quality of instruction, feedback, supervision, and availability of materials. Similarly, Dulnuan-Boligon and Castro (2026) observed that Grade 11 TVL learners are only moderately competent overall, with clear gaps in accurate measurement, dough handling, decorating, and equipment use, gaps further widened by limited facilities and insufficient practice opportunities. Aligning with these findings, Santos and Aquino (2023) confirmed that strong proficiency across core competencies, including preparation, measurement, techniques, presentation, and safety, directly correlates with higher employability, underscoring the importance of consistent, well-structured training aligned with industry standards. Taken together, these studies reveal a recurring challenge: while learners are capable of mastering the required skills, uneven access to practice and inadequate use of effective instructional methods often hinder full proficiency across all five key areas, mise en place and preparation, measurement and weighing of ingredients, mixing and baking techniques, product presentation and quality, and safety and sanitation practices.

Synthesis. Overall, the reviewed sources converge on the view that the Station Rotation Model is a well-supported, adaptable strategy that addresses many of the limitations of traditional instruction. Across different grade levels and subjects, SRM has been shown to optimize limited resources, enable differentiated guidance, boost engagement and collaboration, and systematically build both foundational and higher-order skills. In the domain of Baking and Pastry Production specifically, existing research confirms that gaps in competency, especially in presentation, accuracy, and technique, are often tied to insufficient practice and uneven supervision rather than learner ability. Consequently, there is strong theoretical and empirical support for implementing SRM as an intervention that organizes instruction into manageable, repeated practice stations, ensuring that every learner gets adequate hands-on experience across all five competency areas.

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Significance of the Study

The findings will show how the Station Rotation Strategy strengthens Grade 9 learners' practical skills in Baking and Pastry Production across mise en place and preparation, measurement and weighing, mixing and baking techniques, product presentation and quality, and safety and sanitation practices. Results will benefit the following:

Curriculum Planners and DepEd Officials. Findings provide local evidence to refine TLE/TVL implementation guidelines, especially for schools with limited resources.

Grade 9 Learners. Gain equal, repeated hands-on practice at workstations instead of only observing; build confidence, master core competencies, and become better prepared for TESDA assessments, further studies, and food-industry careers or entrepreneurship.

TLE Teachers. Acquire a proven, resource-efficient approach to structure lessons, give targeted feedback, differentiate instruction, and maximize available facilities to raise student proficiency.

School Administrators. Receive data to guide policy, resource allocation, and staff development; support investments and programs that strengthen TLE instruction and practical performance.

The Researcher. Deepen expertise in baking education and research methods; grow professionally by linking classroom practice with evidence-based solutions.

Future Researchers. Serve as reference and baseline data; fill the gap in local literature on Station Rotation in Baking and Pastry Production, offering direction for expanded or long-term studies.

Methods

Design and Flow of the Study

This study employed a Quasi-Experimental Research Design, specifically the one-group pretest-posttest design, to determine how the Station Rotation Strategy improved grade 9 learners'' practical skills in Baking and Pastry Production. Notably, this study did not include a separate control group; instead, the same group of learners served as their own reference by being assessed before and after the intervention. As Creswell (2014) explained, this design was appropriate when measuring change directly attributable to a specific intervention without requiring a parallel comparison group.

Fraenkel and Wallen (2019) further clarified that omitting a control group was justified in educational settings where forming equivalent or comparable groups was difficult, impractical, or would create unequal learning opportunities. In the context of this study at Mactan National High School, all Grade 9 learners enrolled in Baking and Pastry Production shared the same learning environment and faced identical challenges including limited tools, equipment, and materials making it neither feasible nor fair to withhold the improved instructional approach from some learners while providing it to others. By using the One-Group Pretest-Posttest Design, the researcher ensured that every student received the Station Rotation Strategy, addressing shared learning needs while still enabling valid comparison between pre-intervention baseline performance and post-intervention proficiency.

Consistent with the study's objectives, this design allowed measurement of improvement in practical skills across five core competency areas: mise en place and preparation; measurement and weighing of ingredients; mixing and baking techniques; product presentation and quality; and safety and sanitation practices. According to Campbell and Stanley (1963), while this design did not fully rule out all external influences, it provided a clear and meaningful measure of change when pre-existing conditions were consistent and the intervention was applied systematically conditions that applied directly here, as all participants followed the same curriculum, schedule, and instructional approach.

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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 the Station Rotation Strategy in Baking and Pastry Production. These included: the level of practical skills of the learners before and after the implementation of the Station Rotation Strategy in terms of: Mise en place and preparation; Measurement and weighing of ingredients; Mixing and baking techniques; Product presentation and quality; and Safety and sanitation practices.

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 applying appropriate statistical treatment to analyze the gathered data and determine the significant difference between pretest and posttest results.

Output. Lastly, the output was an instructional guide integrating the Station Rotation Strategy.

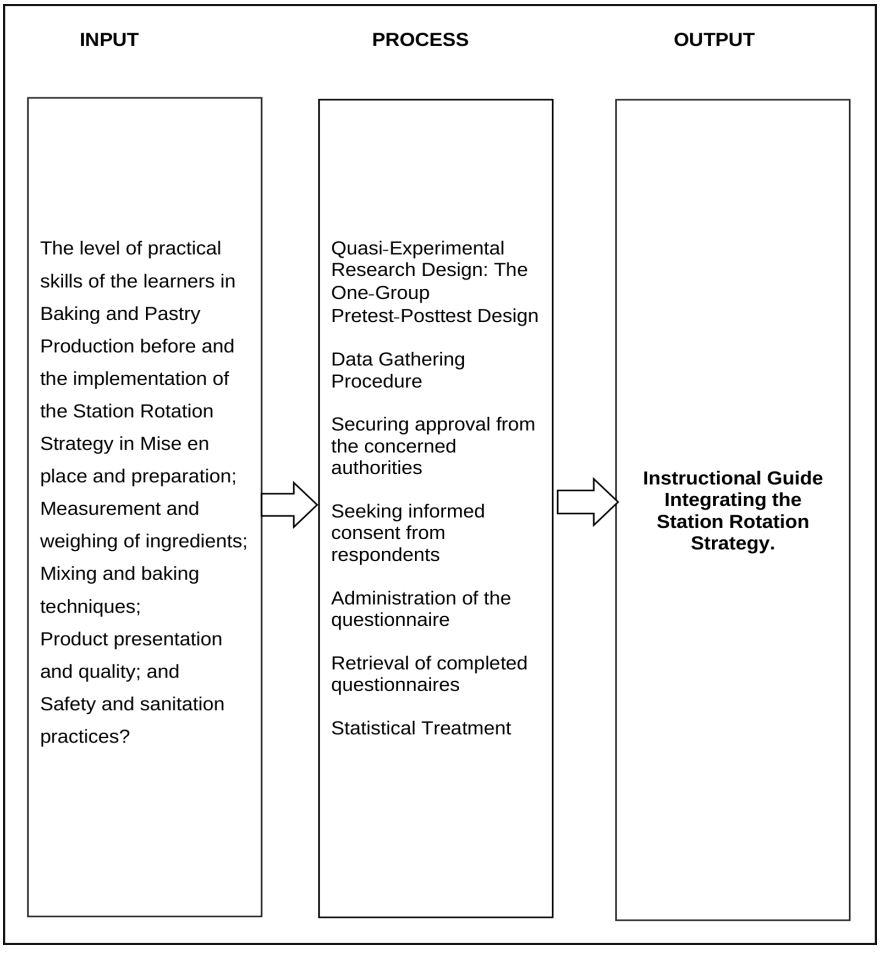


Figure 2
Flow of the Study

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Research Environment and Respondents

The study was conducted at Mactan National High School, situated in Mactan, Lapu-Lapu City, Cebu. Classified as a very large public secondary institution under the leadership of Principal IV Rowena Sagarino, the school served a diverse student population and implemented the full range of basic education programs. This setting was highly appropriate for the investigation for several compelling reasons. First, the school offered the Technology and Livelihood Education (TLE) curriculum, with Baking and Pastry Production included as one of its specialized competency areas, thereby providing direct access to the Grade 9 learners who comprised the study's target respondents. Second, the institution adhered strictly to the DepEd K to 12 Basic Education Program and the MATATAG Curriculum Framework, ensuring that the proposed Station Rotation Strategy aligned fully with national standards, learning competencies, and assessment requirements. Third, as a very large public school, it reflected the varied conditions, learner profiles, and resource challenges commonly observed in comparable secondary schools across the country, which strengthened the applicability and relevance of the findings.



Figure 3
Location Map of the Research Environment

The respondents of this study were the forty (40) Grade 9 learners enrolled in the Technology and Livelihood Education program 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 directly relevant to the study's objectives (Creswell, 2021; Fraenkel et al., 2019). The inclusion criteria required that the learners were officially enrolled Grade 9 learners taking Baking and Pastry Production and had obtained low-performance ratings in their previous TLE practical examinations. This selection ensured that the participants represented the group most affected by limited hands-on opportunities and instructional gaps, making them the most appropriate respondents to measure whether the Station Rotation Strategy effectively improved proficiency across the five target areas: mise en place and preparation, measurement and weighing of ingredients, mixing and baking techniques, product presentation and quality, and safety and sanitation practices.

Table 1
Distribution of Respondents of the Study in Mactan National High School

Environment	**Frequency (f)**	**Percentage (%)**
Mactan National High School	40	100
Total	40	100

Instrument and Scoring

The primary data-gathering tool for this study was a validated assessment instrument adapted from the work of Cunanan (2026) and Dulnuan-Boligon and Castro (2026). This instrument was specifically designed to measure the level of practical skills of the learners in Baking and Pastry Production before and after the implementation of the Station Rotation Strategy in terms of: mise en place and preparation; measurement and weighing of ingredients; mixing and baking techniques; product presentation and quality; and safety and sanitation practices. To align the tool fully with this study's objectives, several modifications were made: items were revised to focus explicitly on the five targeted competency areas, assessment criteria were matched to TESDA Bread and Pastry Production NC II standards, and rating scales were adjusted to capture observable improvement resulting from the Station Rotation Strategy.

To ensure the instrument's appropriateness, accuracy, and alignment with the study's objectives, it underwent content validation by three qualified experts, each holding a Master's degree in TLE: a Master Teacher in TLE, a senior TLE specialist, and the researcher's statistical consultant. Their feedback and recommendations were incorporated to refine the tool before it was pilot-tested at Mactan Air Base High School. The pilot implementation was conducted to verify clarity, suitability, and feasibility in a comparable school setting, and the results guided further adjustments to the instrument. For reliability, the internal consistency of the final tool yielded a Cronbach's alpha result of 0.92 confirming that the assessment items were consistent and dependable for measuring the intended skills. Following these validation and reliability procedures, the refined instrument was administered for the pretest and posttest assessments.

To provide a clear, consistent, and context-relevant assessment of the learners' practical skills in Baking and Pastry Production, the following 5-point rating scale was used for both pre-test and post-test evaluations across all five competency areas: mise en place and preparation, measurement and weighing of ingredients, mixing and baking techniques, product presentation and quality, and safety and sanitation practices.

Table 2
Performance Scoring Procedure

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Scale	Numerical Range	Descriptive Rating	Qualitative Description (Contextualized for Baking and Pastry Production)
5	4.21 – 5.00	Highly Proficient	Completes all baking tasks accurately and independently; organizes work systematically, measures ingredients precisely, applies correct techniques consistently, produces high-quality output with excellent presentation, and follows all safety and sanitation standards without supervision—often exceeding expected requirements.
4	3.41 – 4.20	Proficient	Performs all required baking tasks correctly and consistently; follows proper procedures for preparation, weighing, mixing, baking, and finishing; meets all set quality and safety standards reliably, and requires no corrective intervention.
3	2.61 – 3.40	Moderately Proficient	Accomplishes most baking tasks correctly; handles basic preparation, measurement, and routine techniques adequately, but may need minimal guidance or occasional reminders to ensure consistency in mixing, baking time, presentation, or strict adherence to hygiene rules.
2	1.81 – 2.60	Fairly Proficient	Successfully performs only some parts of the baking process; frequently needs prompting or assistance with accurate weighing, proper mixing methods, controlling baking conditions, neat finishing, or observing safety protocols, and cannot complete the full task sequence on their own.
1	1.00 – 1.80	Not Proficient	Unable to carry out essential baking tasks correctly even with step-by-step guidance; struggles with basic preparation, accurate measurement, following recipe procedures, maintaining sanitation, or producing acceptable output.

Data Gathering Procedure

The data gathering for this study was conducted in three major stages: Preliminary Stage, Data Gathering Stage, and Post-Data Gathering Stage. Each stage outlined systematic steps to ensure the credibility, validity, and rigor of the research process.

Preliminary Stage. The researcher first secured formal approval from the Office of the Schools Division Superintendent (SDS) to conduct the study. Upon approval, an endorsement letter signed by the SDS was submitted to the Office of the Public Schools District Supervisor (PSDS) for further clearance. Once endorsed, the researcher presented the SDS approval and PSDS confirmation to the School Head of Mactan National High School to secure final permission to carry out the investigation with the target Grade 9 learners. After receiving positive confirmation from all authorities, the researcher met with the selected respondents during their free time to briefly explain the study's purpose, scope, and procedures. When they expressed willingness to participate, the researcher distributed the informed consent forms, which clearly outlined the study details, as well as the participants' rights including voluntary involvement and the freedom to withdraw at any time without penalty.

Data Gathering Stage. Once all necessary approvals had been secured and informed consent obtained, the actual data gathering proceeded in three key phases: pre-assessment, intervention, and post-assessment.

First, the pre-test was administered to determine the practical skills of the learners in Baking and Pastry Production before the implementation of the Station Rotation Strategy in terms of: mise en place and preparation, measurement and weighing of ingredients, mixing and baking techniques, product presentation and quality, and safety and sanitation practices. This baseline assessment was carried out without using the Station Rotation Strategy; instead, learners

prepared and baked crinkles in the conventional, basic manner, following the recipe as a single continuous task, working individually without designated stations, and completing all steps from gathering ingredients to presenting the final product while relying on standard instruction and memory, with baking duration maintained at 12 to 15 minutes at 180°C. Using the validated performance-based assessment checklist and rating scale, the researcher evaluated the learners' proficiency across the five competency areas and recorded all ratings systematically to establish their initial levels.

Next, the Station Rotation Strategy was implemented over a one-week period. During this phase, the researcher organized the instructional area into five dedicated workstations, each corresponding to one of the five competency areas. The class was divided into small groups of four learners each, and groups rotated to a new station every 5 minutes, completing two full cycles per session while crinkles production remained the consistent focus and baking duration stayed at 12 to 15 minutes at 180°C. At the station on mise en place and preparation, learners identified, gathered, and organized all ingredients and tools while the researcher inspected arrangements and provided feedback; at the station on measurement and weighing of ingredients, learners practiced accurate weighing and measuring techniques as the researcher verified precision and corrected errors; at the station on mixing and baking techniques, learners followed proper procedures and monitored baking time while the researcher demonstrated methods and supervised safe oven use; at the station on product presentation and quality, learners assessed and arranged their outputs attractively as the researcher shared quality benchmarks; and at the station on safety and sanitation practices, learners observed hygiene and safety protocols throughout preparation and cleanup while the researcher modeled, inspected, and reinforced consistent standards. This structured rotation maximized limited resources, ensured equal hands-on participation, and systematically built proficiency across all five skill areas.

Immediately following the one-week intervention, the post-test was conducted. The learners performed the identical crinkles baking task using the same basic format as the pre-assessment and without stations, so that any observed change in performance could be directly attributed to the Station Rotation Strategy rather than variations in procedure. They were assessed individually using the same validated performance-based instrument, focusing again on mise en place and preparation, measurement and weighing of ingredients, mixing and baking techniques, product presentation and quality, and safety and sanitation practices. All results were recorded systematically for statistical analysis and interpretation.

Post-Data Gathering Stage. Once all tests were completed, the quantitative data was compiled, tallied, and subjected to appropriate statistical analysis, and served as the basis for developing the Contextualized Instructional Guide in Teaching Baking and Pastry Production Using the Station Rotation Strategy.

Ethical Considerations

Informed consent was secured from all selected Grade 9 learners and their parents or guardians prior to data collection; participants were fully informed of the study's purpose, procedures, benefits, and their rights, including voluntary participation and the freedom to withdraw at any time without penalty or effect on their academic standing.

Confidentiality was maintained at all times: all gathered data, assessment results, and personal information were kept strictly private, assigned with codes instead of real names, and accessible only to the researcher and authorized validators. Records were stored securely and destroyed after the study was completed and the research requirements were fulfilled.

Objectivity and integrity were observed by ensuring that assessments were based solely on actual performance using the validated instrument, free from bias or favoritism. All sources of information, ideas, and related studies used in this research were properly cited and acknowledged to uphold academic honesty. The safety and welfare of the learners were prioritized during all practical activities; proper supervision, safety protocols, and sanitation practices were enforced to prevent accidents or health risks.

Declaration on the Use of Artificial Intelligence (AI): The researcher confirmed that this study used AI tools solely for drafting, organizing, and refining the structure and wording of the research paper. All content, ideas, analysis, and

conclusions presented were based on the researcher's own understanding, reviewed literature, and planned research procedures. AI was not used to generate data, fabricate findings, or replace the researcher's independent judgment; all information derived from AI-assisted drafting was reviewed, verified, and validated by the researcher for accuracy, consistency, and compliance with academic standards.

Statistical Treatment

Weighted means summarized learners' practical skills. Standard deviations described the spread of the reported ratings. Paired-sample t tests compared the pretest and posttest scores of the same learners.

Operational Definitions

Baking and Pastry Production. Refers to the TLE/TVL specialization in which Grade 9 learners at Mactan National High School developed knowledge and hands-on abilities in preparing, baking, and finishing flour-based products such as crinkles; it covers the five core competency areas assessed in this study.

Instructional Guide Integrating the Use of Station Rotation Strategy. The tangible output of this research; a structured, ready-to-use reference document designed to help TLE teachers organize and implement the five-station learning approach, including workstation plans, time schedules, activity outlines, assessment checklists, and adaptation tips for resource-limited classrooms.

Measurement and Weighing of Ingredients. Refers to the accurate determination of ingredient quantities using digital scales and standard measuring tools; operationally assessed as the ability to zero equipment, level dry ingredients, measure liquids at eye level, and match recipe specifications during pre-test and post-test crinkles preparation.

Mise en Place and Preparation. The preliminary organizational phase in which learners gathered, identified, arranged, and checked all ingredients, tools, and equipment in proper order and in a clean, safe workspace before beginning actual baking; evaluated as part of the pre-intervention and post-intervention performance assessments.

Mixing and Baking Techniques. The sequential procedures of combining ingredients, shaping dough, and controlling oven temperature and duration; operationally measured by the ability to follow the correct mixing order, avoid over-mixing, bake crinkles at 180°C for 12 to 15 minutes, and recognize visual signs of doneness.

Practical Skills of Grade 9 Learners. The observable, hands-on abilities demonstrated by the respondents during crinkles preparation; assessed through a performance-based rubric across the five competency areas before and after the Station Rotation Strategy was implemented.

Product Presentation and Quality. The visual appeal, consistency, and sensory characteristics of the finished baked product; operationally evaluated by uniformity of size and shape, distinct surface crackle, even coating of confectioners' sugar, acceptable texture and color, and attractive arrangement on plates or in packaging.

Safety and Sanitation Practices. The consistent application of hygiene and workplace safety standards throughout all baking activities; operationally assessed as proper handwashing, wearing of PPE, correct tool handling, cross-contamination prevention, waste disposal, and post-activity cleaning of workstations.

Station Rotation Strategy. The instructional intervention used in this study; a learner-centered approach in which the class was divided into small groups that moved every 5 minutes through five dedicated workstations, each focused on one competency area, to provide repeated, guided hands-on practice and maximize limited tools and materials.

Results and Discussion

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Tables 3–12 present item-level ratings before and after station rotation. The five domain means were Fairly Proficient at pretest. At posttest, mise en place and preparation and safety and sanitation were Highly Proficient; measurement and weighing, mixing and baking, and product presentation and quality were Proficient.

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)

Pretest Performance

Table 3
Mise en Place and Preparation

Indicators	**WM**	**SD**	**VD**
1. Checks and verifies all tools, equipment, and ingredients before starting.	2.10	0.77	FP
2. Organizes work area systematically for smooth workflow.	2.25	0.54	FP
3. Cleans and sanitizes tools and surfaces prior to use.	2.23	0.69	FP
4. Selects correct tools and utensils appropriate for the task.	2.23	0.65	FP
5. Reads and interprets recipe accurately before preparation.	2.28	0.67	FP
6. Prepares ingredients according to required form (sifted, melted, softened, etc.).	2.25	0.70	FP
7. Arranges items in logical order of use to avoid confusion.	2.38	0.70	FP
8. Checks expiry and quality of all raw materials.	2.30	0.71	FP
9. Follows proper sequence of preparation steps.	2.10	0.77	FP
10. Completes all advance preparations before actual baking begins.	2.30	0.68	FP
Overall	2.24	0.69	FP

Table 4
Measurement and Weighing of Ingredients

Indicators	**WM**	**SD**	**VD**
1. Uses appropriate measuring tools for liquid and dry ingredients.	2.43	0.67	FP
2. Weighs ingredients accurately using weighing scale.	2.40	0.58	FP
3. Measures dry ingredients correctly (level off, no packing unless specified).	2.23	0.65	FP
4. Measures liquid ingredients at eye level on flat surface.	2.40	0.62	FP
5. Follows exact quantity specified in the recipe.	2.38	0.73	FP
6. Avoids estimating or guessing amounts.	2.28	0.63	FP
7. Re-checks measurements before combining ingredients.	2.48	0.67	FP
8. Uses correct unit of measurement (grams, milliliters, cups, etc.).	2.48	0.67	FP
9. Measures ingredients in the order listed in the recipe.	2.05	0.71	FP
10. Minimizes waste and spillage while measuring.	2.33	0.61	FP
Overall	2.34	0.67	FP

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Table 5
Mixing and Baking Techniques

Indicators	**WM**	**SD**	**VD**
1. Applies correct mixing method (creaming, folding, kneading, etc.).	2.13	0.59	FP
2. Mixes ingredients at the right speed and duration.	2.35	0.65	FP
3. Prevents over-mixing or under-mixing of batter or dough).	2.28	0.67	FP
4. Prepares and pans products properly before baking.	2.13	0.75	FP
5. Sets oven temperature accurately as required.	2.15	0.76	FP
6. Pre-heats oven at the correct time.	2.13	0.75	FP
7. Monitors baking time and checks doneness properly.	2.33	0.69	FP
8. Uses proper tools and protective gear when handling oven.	2.15	0.61	FP
9. Follows correct cooling procedures after baking.	2.30	0.75	FP
10. Maintains consistency and texture of the final product.	2.35	0.73	FP
Overall	2.23	0.70	FP

Table 6
Product Presentation and Quality

Indicators	**WM**	**SD**	**VD**
1. Produces uniform size, shape, and portion of baked items.	2.18	0.83	FP
2. Achieves correct color, crust, and appearance.	1.98	0.76	FP
3. Shows proper texture and internal structure.	2.08	0.76	FP
4. Exhibits good taste and flavor balance.	2.38	0.66	FP
5. Plates or arranges products neatly and attractively.	2.23	0.65	FP
6. Applies finishing or decoration appropriately and neatly.	2.23	0.65	FP
7. Uses appropriate packaging or serving ware.	2.35	0.69	FP
8. Meets expected quality standards for the baked product.	2.35	0.69	FP
9. Shows consistency across multiple batches or pieces.	2.43	0.63	FP
10. Output looks professional and appetizing.	2.18	0.67	FP
Overall	2.24	0.71	FP

Table 7
Safety and Sanitation Practices

Indicators	**WM**	**SD**	**VD**
1. Observes proper personal hygiene (handwashing, clean uniform, hairnet, etc.).	2.35	0.65	FP
2. Uses proper protective equipment (apron, gloves, pot holders).	2.18	0.67	FP
3. Handles sharp tools and equipment carefully and correctly.	2.28	0.59	FP
4. Maintains clean and organized work area at all times.	2.25	0.66	FP
5. Separates raw and finished products to avoid contamination.	2.38	0.73	FP

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Indicators	WM	SD	VD
6. Disposes waste properly and keeps surroundings tidy.	2.15	0.69	FP
7. Follows safety procedures when using ovens and machines.	2.15	0.73	FP
8. Stores leftover ingredients and materials safely and correctly.	2.28	0.67	FP
9. Reports any spills, breakage, or accident immediately.	2.43	0.67	FP
10. Leaves the workstation clean, dry, and sanitized after use.	2.28	0.67	FP
Overall	2.27	0.68	FP

Posttest Performance

Table 8
Mise en Place and Preparation

Indicators	WM	SD	VD
1. Checks and verifies all tools, equipment, and ingredients before starting.	4.10	0.70	P
2. Organizes work area systematically for smooth workflow.	4.23	0.69	HP
3. Cleans and sanitizes tools and surfaces prior to use.	4.18	0.70	P
4. Selects correct tools and utensils appropriate for the task.	4.18	0.63	P
5. Reads and interprets recipe accurately before preparation.	4.28	0.63	HP
6. Prepares ingredients according to required form (sifted, melted, softened, etc.).	4.20	0.64	P
7. Arranges items in logical order of use to avoid confusion.	4.20	0.68	P
8. Checks expiry and quality of all raw materials.	4.13	0.68	P
9. Follows proper sequence of preparation steps.	4.43	0.77	HP
10. Completes all advance preparations before actual baking begins.	4.15	0.73	P
Overall	4.21	0.69	HP

Table 9
Measurement and Weighing of Ingredients

Indicators	WM	SD	VD
1. Uses appropriate measuring tools for liquid and dry ingredients.	3.88	0.64	P
2. Weighs ingredients accurately using weighing scale.	4.28	0.63	HP
3. Measures dry ingredients correctly (level off, no packing unless specified).	4.08	0.72	P
4. Measures liquid ingredients at eye level on flat surface.	4.35	0.76	HP
5. Follows exact quantity specified in the recipe.	4.13	0.75	P
6. Avoids estimating or guessing amounts.	4.15	0.69	P
7. Re-checks measurements before combining ingredients.	4.10	0.66	P
8. Uses correct unit of measurement (grams, milliliters, cups, etc.).	4.15	0.69	P
9. Measures ingredients in the order listed in the recipe.	4.03	0.72	P

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Indicators	WM	SD	VD
10. Minimizes waste and spillage while measuring.	4.28	0.59	HP
Overall	4.14	0.70	P

Table 10
Mixing and Baking Techniques

Indicators	WM	SD	VD
1. Applies correct mixing method (creaming, folding, kneading, etc.).	4.13	0.81	P
2. Mixes ingredients at the right speed and duration.	4.28	0.74	HP
3. Prevents over-mixing or under-mixing of batter or dough).	4.25	0.66	HP
4. Prepares and pans products properly before baking.	4.18	0.70	P
5. Sets oven temperature accurately as required.	4.13	0.71	P
6. Pre-heats oven at the correct time.	4.23	0.65	HP
7. Monitors baking time and checks doneness properly.	4.28	0.63	HP
8. Uses proper tools and protective gear when handling oven.	4.03	0.72	P
9. Follows correct cooling procedures after baking.	4.20	0.75	P
10. Maintains consistency and texture of the final product.	4.08	0.65	P
Overall	4.18	0.71	P

Table 11
Product Presentation and Quality

Indicators	WM	SD	VD
1. Produces uniform size, shape, and portion of baked items.	4.28	0.71	HP
2. Achieves correct color, crust, and appearance.	4.13	0.71	P
3. Shows proper texture and internal structure.	4.13	0.71	P
4. Exhibits good taste and flavor balance.	4.28	0.74	HP
5. Plates or arranges products neatly and attractively.	4.20	0.56	P
6. Applies finishing or decoration appropriately and neatly.	4.15	0.73	P
7. Uses appropriate packaging or serving ware.	4.20	0.60	P
8. Meets expected quality standards for the baked product.	4.23	0.69	HP
9. Shows consistency across multiple batches or pieces.	4.13	0.56	P
10. Output looks professional and appetizing.	4.08	0.72	P
Overall	4.18	0.68	P

Table 12
Safety and Sanitation Practices

Indicators	WM	SD	VD
1. Observes proper personal hygiene (handwashing, clean uniform, hairnet, etc.).	4.03	0.69	P

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Indicators	WM	SD	VD
2. Uses proper protective equipment (apron, gloves, pot holders).	4.10	0.66	P
3. Handles sharp tools and equipment carefully and correctly.	4.30	0.68	HP
4. Maintains clean and organized work area at all times.	4.30	0.71	HP
5. Separates raw and finished products to avoid contamination.	4.28	0.63	HP
6. Disposes waste properly and keeps surroundings tidy.	4.33	0.65	HP
7. Follows safety procedures when using ovens and machines.	4.15	0.73	P
8. Stores leftover ingredients and materials safely and correctly.	4.08	0.65	P
9. Reports any spills, breakage, or accident immediately.	4.20	0.56	P
10. Leaves the workstation clean, dry, and sanitized after use.	4.43	0.59	HP
Overall	4.22	0.67	HP

Summary and Paired Comparisons

Table 13
Reported Pretest and Posttest Performance by Domain

Indicators	WM (Before)	WM (After)	Mean Difference	VD
Mise En Place and Preparation	2.24	4.21	1.97	HP
Measurement and Weighing Ingredients	2.34	4.14	1.80	P
Mixing and Baking Techniques	2.23	4.18	1.95	P
Product Presentation and Quality	2.24	4.18	1.94	P
Safety and Sanitary Practices	2.27	4.22	1.95	HP
Overall	2.26	4.19	1.93	P

The reported overall mean increased from 2.26 to 4.19, a difference of 1.93 points. Mise en place and preparation showed the largest reported gain (1.97 points), and measurement and weighing showed the smallest (1.80 points). These descriptive differences do not establish that gains differed significantly between domains.

Table 14
Reported Paired-Sample t Tests

Indicators	Mean (Before)	Mean (After)	Mean Difference	t-value	p-value	Decision	Interpretation
Mise En Place and Preparation	2.24	4.21	1.97	36.38	<0.001	Reject H_0	There is a significant difference
Measurement and Weighing Ingredients	2.34	4.14	1.80	39.14	<0.001	Reject H_0	There is a significant difference
Mixing and Baking Techniques	2.23	4.18	1.95	43.14	<0.001	Reject H_0	There is a significant difference

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Indicators	Mean (Before)	Mean (After)	Mean Difference	t-value	p-value	Decision	Interpretation
Product Presentation and Quality	2.24	4.18	1.94	39.27	<0.001	Reject H_0	There is a significant difference
Safety and Sanitary Practices	2.27	4.22	1.95	54.67	<0.001	Reject H_0	There is a significant difference
Overall Weighted Mean	2.26	4.19	1.93	42.52	<0.001	Reject H_0	There is a significant difference

The reported paired comparisons yielded $p < .001$ across all five domains and for the overall comparison. These results describe change within the study group. Because the study used one group without a comparison group, the results do not isolate the effect of station rotation from other influences.

The study links the observed gains to opportunities for repeated practice and immediate feedback at each station, as discussed in relation to mastery learning (Bloom, 1968). The five stations also connect preparatory and procedural skills with the quality of the finished product and adherence to safety and sanitation standards. The guide translates that structure into tasks, teacher roles, and performance indicators.

Output of the Study

The proposed guide responds to the Fairly Proficient baseline ratings across all five competency areas. It uses crinkles production to organize practice in preparation, measurement, mixing and baking, presentation, and safety and sanitation.

The guide specifies learner activities, teacher feedback, and success indicators at each station. It also includes pre-assessment, formative checks, and post-assessment. These are components of the proposed guide, separate from the measured outcomes reported above.

Instructional Guide In Baking And Pastry Production

Rationale

Baking and Pastry Production demands consistent, hands-on practice across five core competency areas mise en place and preparation, measurement and weighing of ingredients, mixing and baking techniques, product presentation and quality, and safety and sanitation practices yet traditional demonstration-centered instruction often limits individual participation, leaving learners with uneven proficiency, uncertain technique, and gaps in critical skills. Pre-assessment results from this study confirmed that Grade 9 learners at Mactan National High School operated only at the Fairly Proficient level across all areas, indicating they could follow basic procedures but lacked systematic organization, precision, technical confidence, and reliable safety habits. The Station Rotation Strategy addresses these challenges by restructuring the learning environment into focused workstations where small groups rotate every 5 minutes, ensuring every learner actively practices each competency repeatedly rather than observing passively. Post-intervention findings further validated this approach, showing statistically significant improvement across all skill areas and advancing learners to Proficient or Highly Proficient levels, proving that this model maximizes limited resources, builds equal hands-on experience, and transforms basic familiarity into dependable, industry-aligned competence. This guide was therefore developed to standardize and sustain this effective intervention, providing teachers with clear, practical tools to implement the strategy consistently even in resource-constrained classrooms.

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Objectives

Elevate learners' practical competence across all five core competency areas.
Equip teachers with a structured, adaptable framework that organizes instruction into functional workstations, defines clear activities and expectations for each station, and establishes consistent assessment and feedback methods to support differentiated learning and equal participation among all learners.

Develop learners' professional work habits, confidence, and sense of responsibility alongside technical skills, preparing them not only for academic success but also for further training, national certification, or livelihood opportunities in the food industry where precision, safety consciousness, and consistent quality performance are essential.

Scheme Of Implementation

The Station Rotation Strategy is organized around five dedicated workstations, each corresponding to one core competency area, with the class divided into small groups of four learners to ensure manageable participation and adequate supervision. The implementation spans one week of regular TLE class sessions, with groups rotating to a new station every 5 minutes and completing two full cycles per session to reinforce learning; crinkles cookie production serves as the consistent practice task throughout, with baking duration maintained at 12 to 15 minutes at 180°C to ensure comparability and focus. At each station, learners engage in guided practice, independent application, and peer observation, while the teacher circulates to demonstrate techniques, correct errors immediately, and validate correct practice; after all stations are visited, learners perform a full independent bake without stations to consolidate their skills and demonstrate integrated mastery. Pre-assessment establishes baseline proficiency before rotation begins, and post-assessment follows the same format to measure growth directly, with the guide's procedures, checklists, and schedules adapted as needed to match class size, available tools, and specific classroom conditions, ensuring the approach remains feasible and effective across different teaching contexts.

The Instructional Guide

Subject: Technology and Livelihood Education – Baking and Pastry Production
Grade Level: Grade 9
Strategy: Station Rotation Strategy
Focus Product: Crinkles Cookies
Implementation Period: 1 Week
Rotation Interval: 5 minutes per station
Group Size: 4 learners per group

Station 1 : Mise En Place And Preparation
Purpose: To develop systematic preparation habits and efficient workflow organization.
Activities: Identify, gather, and verify all ingredients, tools, and equipment against the recipe list; clean and sanitize surfaces and tools before use; arrange items in logical order of preparation; prepare ingredients as required: sift flour, measure sugar, soften butter, melt chocolate; check expiry and quality of all raw materials; confirm all pre-baking preparations are complete before proceeding.
Teacher's Role: Inspect workstations, demonstrate efficient organization, provide feedback on completeness and orderliness.
Success Indicator: All items ready, workspace clean and arranged, preparation steps fully completed.

Station 2 : Measurement And Weighing Of Ingredients
Purpose: To build accuracy, precision, and confidence in measuring both dry and liquid ingredients.

Activities: Use digital scale for dry ingredients; zero before each weighing; level dry ingredients; do not pack unless specified; measure liquids at eye level on a flat surface; follow exact quantities listed in the recipe; avoid estimating; re-check measurements before combining; use correct units: grams, milliliters, cups; minimize waste and spillage.
Teacher's Role: Verify measurements, demonstrate proper technique, correct errors immediately, explain how accuracy affects final product quality.
Success Indicator: All quantities match recipe specifications; tools used correctly; no guessing or estimating.

Station 3 : Mixing And Baking Techniques
Purpose: To master correct mixing methods, oven management, and baking procedures.
Activities: Follow proper sequence: cream butter and sugar → add eggs → incorporate dry ingredients; mix at correct speed and duration; avoid over-mixing or under-mixing; pre-heat oven to 180°C before baking; shape uniform dough balls; roll in confectioners' sugar; arrange on baking sheet with proper spacing; bake 12–15 minutes; monitor doneness visually; cool on tray 5 minutes, then transfer to rack.
Teacher's Role: Demonstrate mixing strokes, supervise safe oven use, guide recognition of doneness cues, remind of temperature and timing.
Success Indicator: Correct mixing sequence followed; temperature and timing accurate; dough handled properly; product baked evenly.

Station 4 : Product Presentation And Quality
Purpose: To connect process decisions with final quality and develop professional presentation standards.
Activities: Evaluate crinkles: size, shape, crackle surface, color, texture; compare against reference samples; arrange attractively on plates or packaging; assess flavor balance and consistency; identify areas for improvement in next batch; present finished product neatly and professionally.
Teacher's Role: Display quality benchmarks, guide objective self-evaluation, discuss how preparation and mixing affect appearance and taste.
Success Indicator: Uniform products with distinct crackle, good color, consistent size, neat arrangement, and appetizing presentation.

Station 5 : Safety And Sanitation Practices
Purpose: To turn hygiene and safety awareness into consistent, automatic professional habits.
Activities: Wash hands thoroughly before and after tasks; wear complete PPE: apron, hairnet, proper uniform; handle sharp tools and hot equipment carefully; keep workspace clean throughout; wipe spills immediately; separate raw and ready-to-serve items; dispose waste properly; segregate when possible; clean, sanitize, and dry station after use; store leftover ingredients safely and label clearly.
Teacher's Role: Model and inspect all protocols, reinforce positive practices, correct lapses immediately, explain reasons for each rule.
Success Indicator: PPE worn consistently; workspace clean and organized; no cross-contamination risks; area fully sanitized before leaving.

Assessment Framework

Pre-Assessment: Independent crinkles bake without stations; rated across all five competencies
Formative Assessment: Observation checklists completed at each station during rotation
Post-Assessment: Independent crinkles bake without stations; same rubric applied to measure growth
Rubric Scale: 4.21–5.00 Highly Proficient; 3.41–4.20 Proficient; 2.61–3.40 Moderately Proficient; 1.81–2.60 Fairly Proficient; 1.00–1.80 Developing

Conclusion

The implementation of the Station Rotation Strategy proved to be an effective learner-centered intervention that transformed the Grade 9 learners' overall competence in Baking and Pastry Production, moving them from basic,

inconsistent performance to confident, proficient practice across every critical skill area. By structuring instruction into focused, repeated practice stations, the approach addressed the fundamental limitations of traditional demonstration-based teaching, turning passive observation into active, guided, and individualized hands-on experience that built not just technical ability but also the professional habits, attention to detail, and sense of responsibility essential in food preparation. The consistent, statistically significant improvement across all competencies confirms that the strategy organizes learning in a way that matches how practical skills are best acquired: through sequential, focused practice, immediate feedback, and repeated application in realistic conditions. Ultimately, these results demonstrate that when instruction is designed to ensure every learner actively performs each task rather than just watching it, learners can achieve industry-aligned standards of proficiency even in resource-limited classroom settings, preparing them more meaningfully for further training, national certification, or livelihood opportunities in the food industry.

Recommendations

Based on the findings and conclusions of the study, the following recommendations are proposed:

To School Administrators. The Station Rotation Strategy should be institutionalized as a standard instructional approach in Technology and Livelihood Education (TLE), particularly in Baking and Pastry Production, and integrated into the school's annual work plan and teacher development programs. Administrators may allocate funds to acquire additional baking tools, measuring equipment, and safety gear to support fully functional learning stations, ensuring that every student has equal access to hands-on practice. They may also encourage and facilitate the sharing of successful implementation practices across grade levels and specializations, and schedule regular monitoring to sustain quality instruction.

To TLE/Baking Teachers. Adopt the Station Rotation Strategy as a core method in teaching Baking and Pastry Production, designing stations that target each competency area systematically and providing immediate, specific feedback during rotation to reinforce correct practice. Prepare clear activity guides, simplified checklists, and rubrics for each station to guide learners independently; adjust rotation schedules and groupings to match class size and available resources; and emphasize not just task completion but the development of professional habits such as thorough preparation, precision, and safety consciousness. Integrate the developed Contextualized Instructional Guide into daily lesson planning to standardize and strengthen implementation.

To Learners. Continue practicing the systematic work habits developed through the strategy: prepare thoroughly before starting, measure accurately, follow correct techniques consistently, pay attention to quality throughout the entire process, and observe safety and sanitation protocols at all times. Treat every baking activity as an opportunity to build proficiency and confidence, seek feedback actively, and take responsibility for maintaining a safe, organized, and clean workspace. Apply these skills not only in school but also in home-based baking activities, as they form the foundation of future career readiness and entrepreneurial potential in the food industry.

To Parents and Guardians. Support learners by providing encouragement and opportunities to practice basic baking and food preparation skills at home, reinforcing the values of cleanliness, accuracy, patience, and responsibility. When possible, create a safe space for simple kitchen activities and acknowledge the connection between home practice and school success, helping to build the confidence and practical experience that strengthen their child's readiness for further training or livelihood work.

To Future Researchers. Conduct similar studies over a longer period or across different grade levels and specializations to further validate the effectiveness of the Station Rotation Strategy. Explore its impact on related variables such as learner motivation, independent problem-solving, or long-term skill retention; compare outcomes with other instructional approaches; and investigate how the model may be adapted or expanded to include more advanced baking competencies, assessment formats, or inclusive practices for diverse learners.

References

Abapo, J. M. C. (2024). Project C TIP: Gearing up TLE and TVL teachers towards the improvement of learners' industrial skills. DepEd Tangub City. https://tangub.deped.gov.ph/wp-content/uploads/2024/12/X_2024_Abapo_Project-C-Research.pdf

Aftab, M. J., Tasleem, S., & Hadayat, H. (2022). Effect of mastery learning approaches in improving students' learning outcomes at elementary level. *Pakistan Journal of Social Research, 4*(4), 692–700. https://doi.org/10.52567/pjsr.v4i04.883

Anagnostopoulou, V., García Valcárcel Muñoz-Repiso, A., & Casillas Martín, S. (2023). Enhancing inclusion and critical thinking with station rotation model: A research proposal. Proceedings of the European Conference on Education 2023. The International Academic Forum. https://papers.iafor.org/wp-content/uploads/papers/ece2023/ECE2023_71195.pdf

Anagnostopoulou, V., García Valcárcel, A., & Casillas Martín, S. (2025). A systematic review of the effectiveness of the station rotation model in blended learning. *Bordón Revista de Pedagogía, 77*(4), 11–33. https://doi.org/10.13042/Bordon.2025.110138

Balendres, A. D., & Diel, A. M. (2025). Learners' interest and exposure to baking: Influence on their baking performance. *International Journal of All Research Writings, 6*(7), 94–102. https://ijarw.com/PublishedPaper/IJARW2403.pdf

Barliana, M. S., Alhapip, L., Jorge, A. C. A. P., & Rahmawati, Y. (2020). Vocational education: The new development and change in the adaptive curriculum of learning model. *Innovation of Vocational Technology Education, 16*(2), 160–173. https://doi.org/10.17509/invotec.v16i2.28479

Campbell, D. T., & Stanley, J. C. (1963). *Experimental and quasi-experimental designs for research*. Rand McNally.

CEHD Communications. (2025, December 19). Learning through baking. Texas A&M University College of Education & Human Development. https://education.tamu.edu/learning-through-baking/

Center for Culinary Arts Manila. (2025, December 8). How the fundamentals in Baking & Pastry Arts nurtures precision without limiting creativity. https://v1.cca-manila.edu.ph/featured/how-the-fundamentals-in-baking-pastry-arts-nurtures-precision-without-limiting-creativity-cca-manila/

Cleveland Clinic. (2026, March 4). Social learning theory. https://my.clevelandclinic.org/health/articles/social-learning-theory

Creswell, J. W. (2014). *Research design: Qualitative, quantitative, and mixed methods approaches* (4th ed.). SAGE Publications.

Creswell, J. W. (2021). *Research design: Qualitative, quantitative, and mixed methods approaches* (5th ed.). SAGE Publications.

Cunanan, M. L. (2026). Factors affecting baking performance of food technology learners in laboratory classes. *The International Review of Multidisciplinary Research, 1*(8), 156–165. https://doi.org/10.67167/vertex.396

Department of Defense Education Activity. (2025, February 13). Station rotations transform early childhood education in DoDEA's 21st century learning. https://www.dodea.edu/news/articles/station-rotations-transform-early-childhood-education-dodeas-21st-century-learning

Draayer, R. (2021). The impact of station rotations in 2nd grade reading (Master's thesis). Northwestern College. https://nwcommons.nwciowa.edu/cgi/viewcontent.cgi?article=1279&context=education_masters

Dulnuan-Boligon, J. B., & Castro, E. H. (2026). Bread and pastry production competency of Grade 11 learners toward work instructions manual development. *International Journal of Progressive Research in Science and Engineering, 7*(5), 5–8. https://doi.org/10.65138/ijprse.2026.v7i05.1273

Fraenkel, J. R., & Wallen, N. E. (2019). *How to design and evaluate research in education* (10th ed.). McGraw-Hill Education.

Fraenkel, J. R., Wallen, N. E., & Hyun, H. H. (2019). *How to design and evaluate research in education* (10th ed.). McGraw-Hill Education.

Fulbeck, E., Seidel, D., Atchison, D., & Giffin, J. (2020). Personalizing student learning with station rotation: Practitioner brief. American Institutes for Research. https://www.air.org/sites/default/files/Station-Rotation-Practitioner-Brief-Final-July-2020.pdf

Gaña, R. L. (2025, February 21). Teaching strategies in Technology and Livelihood Education: Enhancing student learning outcomes. DepEd Division of Bataan. https://depedbataan.com/wp-content/uploads/2025/02/TEACHING-STRATEGIES-IN-TECHNOLOGY-AND-LIVELIHOOD-EDUCATION-ENHANCING-STUDENT-LEARNING-OUTCOMES.pdf

Kurt, S. (2021, January 4). Robert Gagné's taxonomy of learning. Educational Technology. https://educationaltechnology.net/robert-gagnes-taxonomy-of-learning/

Leland, R. P. (2025). Mastery learning and the school learning theory of J.B. Carroll. 2025 ASEE Annual Conference & Exposition. https://doi.org/10.18260/1-2--56958

Mallari, M. C. (2024, August 7). Empowering education: The crucial role of teacher professional development. Department of Education Regional Office III. https://region3.deped.gov.ph/sanjose/empowering-education-the-crucial-role-of-teacher-professional-development/

Maryland State Department of Education. (2025, August). Program of study guide: Baking and pastry arts. https://marylandpublicschools.org/programs/documents/cte/standards/het_baking_and_pastry_arts-a.pdf

McLeod, S. (2026, June 19). Gagne theory of learning. Simply Psychology. https://www.simplypsychology.org/conditions-of-learning-gagne.html

Mende, C., Oswald Egg, M. E., & Caves, K. (2025). Vocational education and training (VET) system governance: A systematic literature review. *Journal of Vocational Education & Training, 77*(2), 1419–1453. https://doi.org/10.1080/13636820.2025.2461586

Oktarianto, M. L., Hidayat, A., Ghofur, A., & Dasna, I. W. (2025). The effect of station rotation learning model on critical thinking in elementary school level learners. *International Journal of Instructional Technology and Learning, 8*(8), 13292.

Oledan, A. M. B. (2025). Exploring learners' perceptions and experiences of the station rotation model in blended mathematics learning. Salud, Ciencia y Tecnología, 5, Article 2287. https://doi.org/10.56294/saludcyt20252287

Organisation for Economic Co-operation and Development. (2025). Vocational education and training systems in nine countries. https://www.oecd.org/en/publications/vocational-education-and-training-systems-in-nine-countries_1a86eb6c-en/full-report/introduction_608be399.html

Santos, C. M., & Aquino, J. M. (2023). The level of effectiveness of bread and pastry production training program and graduates employability in the province of Laguna. *Sustainability in Food and Agriculture, 4*(1), 46–51. https://doi.org/10.26480/sfna.01.2023.46.51

Schunk, D. H., & DiBenedetto, M. K. (2023). Albert Bandura's legacy in education. *Theory Into Practice, 62*(3), 205–206. https://doi.org/10.1080/00405841.2023.2226560

Selvaraj, V., Velayudham, S., Buckingham, L. R., & Tamilarasan, P. (2023). Impact of Gagne's model on L2 online environments. *Computer Assisted Language Learning Electronic Journal, 42*(1), 64–84. https://www.researchgate.net/publication/367361589_Impact_of_Gagne

Tucker, C. (2021, October 29). The station rotation model: Prioritize differentiation, student agency & 4Cs of 21st century learning. https://catlintucker.com/2021/10/station-rotation-model/

Vlădescu, C. (2023). The relationship between mastery learning models and academic achievement in mathematics. *International Electronic Journal of Mathematics Education, 18*(4), em0751. https://doi.org/10.29333/iejme/13705