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THE 3M (MAXIMIZE, MODIFY & MIMIC) APPROACH AS AN INSTRUCTIONAL STRATEGY IN FOOD AND BEVERAGE SERVICES COMPETENCIES AMIDST LIMITED MATERIALS AND EQUIPMENT

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Abstract

Food and Beverages instruction is central to Technology and Livelihood Education (TLE). This study examined changes in Grade 10 learners' performance after instruction using the Maximize, Modify, and Mimic (3M) Approach at Mactan National High School during School Year 2026–2027. The quasi-experimental one-group pretest–posttest design involved 35 learners in the TLE-10 remediation program. The researcher-made 30-item multiple-choice assessment covered Food Preparation and Production, Beverage Service and Mixology, and Dining and Service Operations. The manuscript reports content validation, pilot testing, and a Cronbach's alpha of 0.82. The intervention ran for four weeks and used structured discussion, visual presentations, and demonstrations because materials and equipment were limited. The study used means, standard deviations, and paired-sample t tests. The reported overall mean rose from 5.57 to 8.17. Reported posttest means for the three domains were 7.94, 8.40, and 8.17, respectively, and the paired comparisons yielded $p < .001$. These results describe improved test performance within the group. The design cannot establish that the strategy alone caused the gains, and the assessment did not directly measure independent practical performance. The findings informed an instructional guide for teaching Food and Beverages when resources are limited.

Keywords: Maximize, Modify, and Mimic (3M) Approach; Food and Beverages competencies; resource limitations; quasi-experimental design; instructional strategy; Grade 10 TLE; Mactan National High School

Introduction

Food and beverages education stands as a foundational pillar within Technology and Livelihood Education (TLE), tasked not only with building hands-on culinary proficiency but also with fostering nutritional awareness, safe food handling, and sustainable livelihood capabilities learners can apply across personal and professional spheres. Practical instruction is especially vital: it bridges concepts with real-world use, cultivating agency, self-reliance, and industry-aligned readiness central to TLE's mandate. Bjørkkjær et al. (2023) affirm that well-structured food education yields enduring gains in health, sustainability, and well-being, extending benefits far beyond the classroom. UNESCO (2026) reinforces this by framing food literacy as integral to Education for Sustainable Development, advancing both Quality Education and Responsible Consumption and Production goals. Vaughan (2026) further establishes that formal practical food skills instruction is linked to a 15% reduction in childhood obesity and consistently better dietary choices outcomes only fully realized when learners learn through direct, hands-on engagement.

Despite this proven value, meaningful practical delivery faces persistent and widespread limitations. A global survey found that while 96% of educators regard food education as essential, only 15% integrate it regularly, with insufficient materials, limited time, and inadequate facilities as leading barriers (FoodEducators, 2024). In the Philippines, these gaps are equally pronounced: Navarro (2024) documents that public schools frequently contend with substandard kitchens, unreliable utilities, and damaged facilities that disproportionately hinder hands-on subjects. Even under the MATATAG curriculum, many schools cannot provide the ingredients, equipment, or dedicated spaces needed for consistent practice. Lessons are often reduced to demonstrations, lectures, or textbook work approaches that fail to build the confidence, technical habit, and competence the curriculum intends. Leaving skill development to informal

home learning does not resolve this; family capacity to teach such skills varies widely, widening rather than closing opportunity gaps (Positive Action Staff, 2025).

Responding to these constraints demands not compromise, but a purpose-built, context-responsive strategy the 3M Approach. This unified framework works through three interconnected pillars: Maximizing every available material, space, or community asset; Modifying activities to retain full competency alignment while using accessible supplies; and Mimicking proven best practices from better-resourced settings, adapted to local realities. It deliberately decouples quality instruction from the need for fully equipped laboratories or large budgets, making meaningful learning feasible regardless of starting conditions. Soliman and Gabutin (2025) note that community-connected food literacy efforts can lift overall competence by 38% and practical cooking skills by 51.9%, yet such gains remain fragile without standardized, embedded methods. The 3M model addresses this by turning ad-hoc resourcefulness into a replicable system ensuring inclusive, consistent instruction rather than occasional, uneven practice.

At Mactan National High School, these national and global challenges take specific, daily form. TLE teachers and learners contend with limited functional work areas, inconsistent availability of cooking ingredients and consumables, and crowded schedules that shorten or cancel practical sessions. While instructors often improvise creatively, these efforts remain individual, unwritten, and uncoordinated—there is no shared framework to systematically stretch available resources, redesign lessons, or draw on community support. Effective approaches are not captured or passed along, creating uneven experiences across classes and skill levels. What is missing is exactly what the 3M Approach provides: a shared, documented structure to turn existing constraints into manageable, effective learning opportunities. Institutionalizing this strategy here will make high-quality food and beverages instruction predictable, equitable, and sustainable for every learner.

Existing literature clearly confirms food education's importance and identifies resource shortages as a primary barrier. However, studies tend to examine infrastructure gaps, general life skills, or community partnerships separately there is little empirical inquiry into integrated instructional frameworks that combine resource management, activity adaptation, and local outreach specifically for food and beverages instruction in under-resourced Philippine public schools. No published work has yet evaluated the 3M Approach as a unified strategy to deliver TLE competencies amid limited provisions. This study addresses that gap by assessing the approach's effectiveness, documenting its implementation, and identifying what supports or hinders it. The findings will offer clear, evidence-based guidance to advance inclusive, practical food education aligned with national reforms and global sustainability goals.

Theoretical and Conceptual Framework and Legal Bases

This study assumed that using 3-M Approach in teaching Food and Beverages could improve the performance of the grade 10 learners in TLE. Likewise, it is anchored on the following theories, Constructivism (Piaget, 1936; Vygotsky, 1978), Social Learning Theory (Bandura, 1977), Resourcefulness and Adaptive Expertise Theory (Brown & Campione, 1996; Dweck, 2006), and Sustainable Livelihoods and Contextualized Learning Theory (Scoones, 1998; UNESCO, 2021).

Constructivism (Piaget, 1936; Vygotsky, 1978). Specifically, Constructivism posits that learners actively build knowledge and skills through direct experience, problem-solving, and social interaction rather than passively receiving information. For instance, Piaget (1936) explains that understanding develops as learners adapt to their environment through assimilation and accommodation, constructing meaning from hands-on engagement. Meanwhile, Vygotsky (1978) adds that learning is fundamentally social: skills are mastered with guidance from more knowledgeable others, such as teachers, peers, or community members, within the learner's Zone of Proximal Development.

Accordingly, this theory underpins the core premise of the Maximize, Modify, and Mimic (3M) Approach: that meaningful learning in Food and Beverages competencies occurs through active practice, even when standard facilities are scarce. In particular, Maximizing available resources and Modifying activities align with Piaget's view that learners construct competence by working with what is accessible and adjusting methods to meet goals. Likewise, Mimicking best practices and engaging community practitioners reflects Vygotsky's emphasis on social guidance, helping learners master skills in food preparation, beverage service, and dining operations that they could not develop

independently. Ultimately, the theory justifies assessing changes in pre-test and post-test performance as evidence of active knowledge construction, and supports the development of an instructional guide that prioritizes doing and adapting over reliance on ideal equipment.

Next is Social Learning Theory (Bandura, 1977). Essentially, Social Learning Theory states that learning takes place through observation, imitation, and modeling within social contexts. As such, Bandura (1977) argues that individuals acquire new behaviors and competencies by observing others, such as teachers, skilled practitioners, or peers, and reproducing those actions, especially when they see positive outcomes or receive encouragement. Furthermore, learning is also shaped by self-efficacy: the belief in one's capacity to execute tasks successfully.

In line with this, this theory directly supports the Mimic component of the 3M Approach, where learners observe and emulate proper food preparation, mixology, and service techniques demonstrated by teachers or local experts. Notably, it explains why structured modeling builds confidence and accuracy in performance, even with limited tools. Additionally, the theory also frames the study's inquiry into challenges: observing adaptive practices helps learners develop resilience and resourcefulness amid shortages. Moreover, it links to the expected improvement in post-test results, as guided observation and practice strengthen both skill mastery and self-assurance, key outcomes the study aims to measure and translate into usable instructional guidelines.

The third theory is Resourcefulness and Adaptive Expertise Theory (Brown & Campione, 1996; Dweck, 2006). To begin with, Brown and Campione (1996) define adaptive expertise as the ability to adjust procedures, repurpose materials, and innovate to achieve learning goals when standard methods or resources are unavailable. Complementing this, Dweck (2006) complements this with the growth mindset framework, which holds that capabilities can be developed through effort, strategy, and persistence rather than being fixed traits. Taken together, these perspectives emphasize that effective teaching and learning depend not on having perfect conditions, but on the ability to adapt to prevailing circumstances.

Hence, this theory anchors the Maximize and Modify components of the 3M Approach, addressing the core challenge of limited facilities in teaching Food and Beverages. It follows that, it justifies moving beyond ad-hoc improvisation to a structured strategy that teaches learners to use available materials creatively and adjust tasks without compromising competency standards. Consequently, the theory underpins the study's focus on measuring performance before and after implementation, identifying challenges encountered, and determining whether adaptive methods yield significant improvements in skills like food production and service. Finally, it also supports the development of an instructional guide that formalizes adaptability as a core teaching and learning competency.

Lastly, Sustainable Livelihoods and Contextualized Learning Theory (Scoones, 1998; UNESCO, 2021). Specifically, Scoones (1998) frames sustainable livelihoods as the capabilities, assets, and activities that enable people to sustain themselves and improve their well-being. In turn, UNESCO (2021) extends this through contextualized learning, which holds that education must be relevant to learners' local realities, resources, and future opportunities to be meaningful and effective. Both perspectives, emphasize that skills are most valuable when they align with the actual contexts where they will be applied.

For this reason, this theory grounds the study's focus on delivering practical, usable Food and Beverages competencies that match the resources and opportunities available to Grade 10 learners in Mactan National High School. It also validates the 3M Approach's emphasis on working within existing limitations rather than waiting for ideal conditions, ensuring that skills in food preparation, beverage service, and operations remain relevant for home use, livelihood, or further study. Ultimately, the theory also supports the study's final objective: developing an instructional guide that can be replicated in similar resource-constrained settings, promoting equitable access to quality TLE education that empowers learners for sustainable application beyond the classroom.

Together, these theories provide a unified and robust foundation for the study: Constructivism (Piaget, 1936; Vygotsky, 1978) establishes that meaningful skills in Food and Beverages are built through active practice and social guidance rather than passive instruction, justifying the 3M Approach's focus on hands-on engagement even with limited facilities; Social Learning Theory (Bandura, 1977) reinforces the value of observation and modeling inherent

in the "Mimic" component, showing how guided demonstration builds both competence and confidence; Resourcefulness and Adaptive Expertise Theory (Brown & Campione, 1996; Dweck, 2006) validates the "Maximize" and "Modify" components by framing adaptability and creative use of resources not as compromise, but as essential competencies that foster growth and resilience; and Sustainable Livelihoods and Contextualized Learning Theory (Scoones, 1998; UNESCO, 2021) ensures that the strategy remains grounded in local realities, linking classroom learning to practical, long-term application and equitable opportunity. Together, they confirm that the 3M Approach is theoretically sound, purpose-aligned, and capable of addressing resource constraints without lowering standards, supporting the study's aim to measure its effectiveness and develop a replicable instructional guide for inclusive, quality TLE instruction.

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.

Republic Act No. 10533, otherwise known as the Enhanced Basic Education Act of 2013, institutionalizes the K to 12 Basic Education Program and designates Technology and Livelihood Education (TLE) as one of the core learning areas from Grades 7 to 10. The law mandates that the curriculum shall be learner-centered, inclusive, and relevant to local conditions, with the explicit goal of equipping learners with vocational competence, livelihood skills, work ethics, and entrepreneurial values. It further provides that education delivery must be flexible enough to adapt to available resources and community needs, ensuring that quality learning is accessible regardless of school setting or socioeconomic status.

Accordingly, this law serves as the primary legal foundation for the present investigation, as it confirms the State's mandate to deliver meaningful TLE instruction even when standard facilities are inadequate. Since the study evaluates the 3M Approach as a strategy to teach Food and Beverages competencies despite limited materials, the Act's emphasis on flexibility and contextualization validates the use of adaptive methods such as maximizing available resources, modifying activities, and mimicking best practices. Furthermore, it reinforces the principle that resource constraints should not prevent learners from acquiring prescribed competencies, thereby justifying the need to assess and institutionalize context-responsive interventions that uphold equity and quality in education.

Complementing this national law, DepEd Order No. 003, s. 2024, or the MATATAG Curriculum Framework, sets the current national standards for basic education, reaffirming TLE's role in developing functional, practical skills aligned with industry expectations and community realities. The policy explicitly prioritizes contextualization, localization, and resourcefulness in instruction, directing educators to use locally available materials, adjust tasks to fit existing conditions, and engage stakeholders to support learning. It likewise underscores that curriculum standards must be met without requiring all schools to have identical or ideal facilities, recognizing that public schools operate under varying levels of resource availability.

In line with these provisions, the MATATAG framework directly supports the study's premise that the 3M Approach is consistent with current educational reforms. By encouraging teachers to maximize what is accessible, modify activities appropriately, and replicate established standards through observation and practice, the policy aligns perfectly with the three core components of the intervention being evaluated. Additionally, the framework's focus on inclusive and equitable learning strengthens the study's rationale, proving that finding effective ways to work within limitations is not only permitted but actively promoted by the Department of Education to ensure no learner is disadvantaged by resource gaps.

Specifically governing the implementation of TLE, DepEd Order No. 42, s. 2016, lays down the implementing policies for Home Economics and Livelihood Education, now integrated under Technology and Livelihood Education, specifying the required competencies, standards, and delivery mechanisms for the subject. The issuance explicitly acknowledges that many public schools lack complete laboratories, tools, and consumables, and therefore authorizes the use of improvised materials, alternative procedures, and community partnerships to achieve learning outcomes. It

further states that teachers are expected to exercise professional judgment in adapting instructional methods without compromising the quality and integrity of the competencies being taught.

For this reason, this policy provides direct legal backing to the study's focus on managing limited resources while delivering Food and Beverages instruction. The Maximize and Modify components of the 3M Approach reflect exactly what this order prescribes: making full use of existing assets and adjusting activities to suit actual conditions, rather than halting lessons due to shortages. Moreover, the directive to engage community resources supports the study's inclusion of partnerships and observed best practices under the Mimic component, confirming that the proposed strategy is a legitimate implementation of existing TLE guidelines.

Finally, reinforcing the promotion of responsive teaching, DepEd Order No. 8, s. 2019, institutionalizes the adoption of innovative, context-appropriate instructional practices and resources to address gaps in facilities, materials, and learning delivery. The policy encourages educators to design, test, and implement creative interventions that improve access and quality, particularly in disadvantaged schools, and recognizes that strategies developed locally to overcome resource limitations are valid contributions to educational practice. It also provides the mechanism for documenting, evaluating, and institutionalizing such innovations for wider replication.

Consequently, this order explicitly authorizes the present research, as it formally endorses the development and evaluation of interventions like the 3M Approach, a structured innovation designed to sustain effective teaching despite constraints. The policy's emphasis on evidence-based practice justifies the study's objectives of measuring the approach's effectiveness, identifying challenges, and producing a replicable instructional guide. Ultimately, this legal basis confirms that the study aligns with the Department's commitment to continuously improve instruction through adaptive, resource-smart, and learner-centered solutions.

Synthesis. All legal issuances form a cohesive and authoritative framework that upholds the conduct of this study: Republic Act No. 10533 establishes the State's mandate to deliver inclusive, flexible TLE instruction regardless of resource availability; DepEd Order No. 003, s. 2024 reinforces this by prioritizing contextualization and resourcefulness under the MATATAG reform; DepEd Order No. 42, s. 2016 explicitly authorizes the use of alternative materials, adjusted procedures, and community partnerships in delivering TLE competencies; and DepEd Order No. 8, s. 2019 formally endorses the development, testing, and institutionalization of innovative interventions that address gaps in facilities and supplies. Taken together, these laws and policies confirm that the 3M Approach, with its focus on maximizing available resources, modifying activities appropriately, and mimicking industry standards, is not only legally permissible but fully aligned with the national education agenda. They validate the study's premise that resource constraints do not justify compromised learning outcomes, and that structured, adaptive strategies are essential to ensure equitable access to quality Food and Beverages education for all learners.

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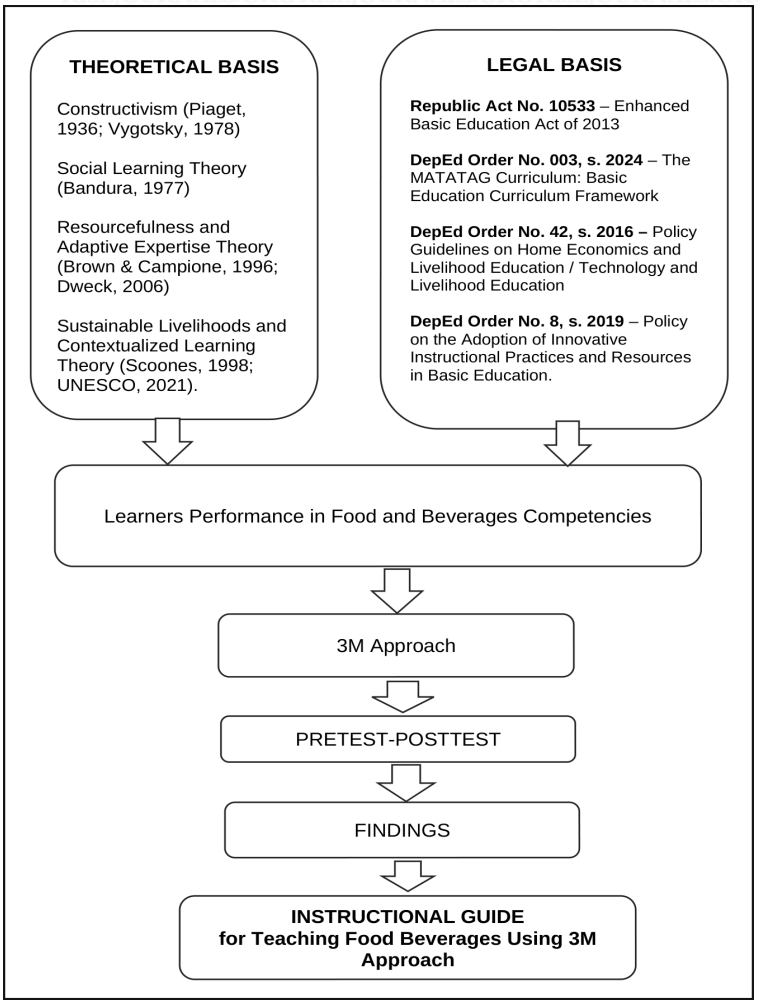


Figure 1
Theoretical and Conceptual Framework of the Study

Related Literature

Building on these legal and theoretical foundations, the following section reviews related literature and studies that examine the challenges of teaching practical subjects under resource constraints, explore existing adaptive instructional strategies, and emphasize gaps that this research seeks to address.

To begin with, Malinao and Miano (2025) found that implementing the MATATAG Curriculum presents significant hurdles for teachers, foremost among them limited resources and infrastructure, alongside insufficient training and heavy administrative demands. Despite these challenges, teachers respond with adaptive strategies such as improvising materials, collaborating with peers, and managing time creatively. The study emphasizes that sustained institutional backing, better resource allocation, and targeted professional development are essential to ease implementation, reduce teacher stress, and ensure that curriculum reforms translate into improved learning outcomes for all learners.

Consistently, Pontino (2026) found that TLE teachers face persistent challenges across three key areas: limited specialized training and professional development opportunities, acute shortages of tools, references, and consumables, and inadequate, often defective facilities that hinder practical instruction. Insufficient funding, weak resource management policies, and the lack of regular upskilling further compound these gaps, forcing teachers to

operate under difficult conditions that limit the delivery of quality, competency-based learning. To cope, teachers resort to personal initiative, such as self-funded training, peer mentoring, and maximizing existing supplies, alongside community partnerships and scheduling adjustments, highlighting the urgent need for institutional support and structured adaptive practices.

In the same manner, Barcelona et al. (2023) found that TLE teachers in Philippine public schools face three core sets of challenges: gaps in human and pedagogical capacity, limited resources, and difficulties sustaining learner engagement. To address these, teachers often use personal funds, render extra effort, and build partnerships with stakeholders, demonstrating high levels of resilience and resourcefulness. The study highlights that while teachers turn to vocational training and community links to improve delivery, systemic support and stronger institutional frameworks are still essential to ensure consistent, quality TLE instruction.

Similarly, Ronquillo (2023) found that TLE teachers faced multiple hurdles during modular instruction, most notably the heavy workload of checking and evaluating outputs, limited resources for module production, communication gaps with learners in remote areas, and combined teaching loads across different subjects. Demographic profile did not affect the extent of challenges, and respondents emphasized the need for improved school plans and support systems to sustain effective TLE delivery even under constrained conditions.

Likewise, Manlangit (2025) found that TLE teachers in Northern Samar encounter moderate challenges across four key domains: insufficient tools and learning resources, limited access to professional development, inadequate laboratory facilities, and learners' difficulties in grasping practical concepts. While low student interest is less pronounced, gaps in equipment and training consistently hinder hands-on instruction. The study emphasizes that addressing these issues requires a holistic approach, including improved resource allocation, targeted capacity building, and responsive teaching strategies.

Corroborating these findings, Martos and Olores (2025) found that TLE/TVL teachers in Central Visayas face moderate difficulties across five key areas: facilities and material resources, stakeholder support, learning materials, professional qualifications, and industry exposure. Significant variations in challenges were observed based on age, sex, and plantilla position, confirming that resource shortages and limited backing remain systemic barriers to effective instruction. The study underscores the urgent need for targeted interventions, including improved resource allocation, industry linkage, and adaptive teaching strategies.

Adding further perspective, Layese et al. (2024) explored the lived experiences of TLE teachers assigned to teach outside their specialization in Moalboal and Badian, Cebu, identifying five core themes: struggles, silver lining, always ready, uplifting, and "jack of all trades." Findings reveal that teachers face dual challenges, teaching unfamiliar subjects alongside limited resources, yet respond through continuous learning, peer support, and resourcefulness. Their adaptive practices, collaborative problem-solving, and commitment to quality instruction enable them to sustain effective delivery under difficult conditions.

Furthermore, Yorpo, Libre, and Bautista (2025) assessed the suitability of learning resources used in TLE instruction across a municipality in the Negros Island Region, finding that overall suitability for printed and digital materials is rated high, though variations exist when grouped by select demographic factors. The study confirms that while teachers make effective use of available resources, continued improvement in resource utilization is needed, alongside increased funding, structured support systems, and stronger stakeholder collaboration to sustain quality TLE delivery.
In addition, Flores et al. (2023) explored the lived experiences of TLE teachers in private institutions using blended learning, identifying five core themes: teaching strategies encountered, persistent struggles, positive outcomes, coping mechanisms, and overall effects on instruction. The study underscores that shifting modalities demands adaptive methods and continuous professional engagement, reinforcing the value of flexible, context-responsive approaches.
Moreover, Alberca (2025) found that teachers facing limited learning materials demonstrate core strengths in resourcefulness, adaptability, and community collaboration, using local assets, repurposing supplies, and building partnerships to sustain instruction. The study identifies three key coping mechanisms: optimizing available resources, working collectively with peers and stakeholders, and integrating community support.

Turning specifically to Food and Beverages instruction, Untalan and Andal (2025) explored the lived experiences of Grade 12 Food and Beverage Services NCII passers, noting key challenges such as the gap between assessment standards and actual industry demands, physical demands of service tasks, and workflow efficiency issues. Learners developed coping strategies like structured work sequences and consistent practice, building greater confidence and self-efficacy. The study indicates that training must align more closely with real-world practice, and proposes an enhanced performance training plan integrating experiential and technology-supported learning to better prepare learners for the workforce.

Complementing this, Bhakat and Bhardwaj (2024) assessed food and beverage service training across hospitality schools from the perspectives of learners, faculty, and industry practitioners, revealing notable gaps between current curriculum delivery and workplace expectations. While stakeholders agree on the importance of core competencies, perceptions of training effectiveness differ widely; the study emphasizes that aligning school instruction with industry standards and refining practical skills development are critical to improving graduate readiness and professional performance.

Synthesis. these studies consistently show that while TLE and Food and Beverages instruction faces persistent challenges related to resources, facilities, training, and alignment with standards, teachers and learners demonstrate strong resilience and capacity to adapt through improvisation, peer collaboration, community engagement, and continuous improvement. However, most existing accounts focus on individual coping practices rather than unified, documented frameworks, indicating a clear need for structured, evidence-based strategies that systematically maximize available assets, adjust activities appropriately, and mobilize wider support to ensure equitable, quality learning for all.

Methods

Design and Flow of the Study

This study employed a quasi-experimental one-group pretest–posttest research design to assess the effectiveness of the 3M Approach as an instructional strategy for teaching Food and Beverages competencies. The design involved a single group of participants who received the intervention, with all learners exposed to the same conditions and instructional method throughout the study. Creswell (2014) explained that this design is appropriate when the goal is to measure change within the same group before and after an intervention, especially when random assignment or separate grouping is not feasible or ethically appropriate.

A separate control group was not established in this study for valid, context-specific reasons. First, all Grade 10 learners under the Food and Beverages strand at Mactan National High School experienced the same limitations in facilities, tools, and learning resources; creating a distinct comparison group would not have produced meaningfully different baseline conditions. Second, withholding the improved 3M strategy from any section would have been unfair, as all learners deserved equal access to the enhanced instructional approach. Third, each learner served as their own control through the pretest, which established individual and group starting proficiency against which post-intervention progress was measured. This approach strengthened the analysis by focusing on actual change rather than comparison across potentially uneven subgroups.

Data collection followed a clear sequence: the pretest was administered to establish baseline performance across the three competency areas; the 3M Approach was then implemented as the sole teaching strategy throughout the intervention period; and the posttest was conducted immediately after to measure resulting performance levels. Difference between pretest and posttest scores was analyzed to determine whether the intervention produced a significant improvement in student competencies. This design directly addressed the study's focus and provided a practical, ethical, and rigorous method for evaluating the strategy within the school's real operating conditions.

This study adopted the Input–Process–Output (IPO) model to organize the research systematically and logically. This framework guided the entire inquiry by defining the sequence of activities, the variables under investigation, and the

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tangible result of the work, ensuring that every step remained focused on assessing the 3M Approach and translating findings into practical application.

Input. In the input phase, the study considered two primary sets of data that formed the basis of the assessment. These included the pre-intervention performance of Grade 10 learners in Food and Beverages competencies across three key domains: Food Preparation and Production, Beverage Service and Mixology, and Dining and Service Operations. This phase also covered the post-intervention performance of the same group of learners in identical competency areas, as well as relevant details regarding the implementation of the Maximize, Modify, and Mimic (3M) Approach throughout the teaching period.

Process. For the process phase, the study employed a quasi-experimental one-group pretest–posttest design to measure changes in student performance following the intervention. Data gathering began when formal approval was secured from concerned school authorities, after which informed consent was obtained from the respondents and their parents or guardians once the purpose, scope, and procedures of the study were fully explained. The pre-assessment was administered to establish baseline score of the Grade 10 learners, the 3M Approach was implemented consistently as the sole instructional strategy throughout the teaching period, and the post-assessment was conducted immediately upon completion of the intervention. All completed assessment tools were retrieved, verified for accuracy and completeness, and subjected to statistical treatment. Descriptive statistics were computed to describe performance levels before and after the strategy, while inferential statistics were applied to determine whether the observed difference in scores was statistically significant.

Output. The output of this study was an evidence-based Instructional Guide for Teaching Food and Beverages Using the 3M Approach. This consolidated document presented the tested strategies, adapted activities, and resource-efficient practices applied during the research, organized into a structured, ready-to-use reference. It offered TLE teachers a standardized framework to deliver quality, competency-based instruction even when materials, equipment, and facilities were limited.

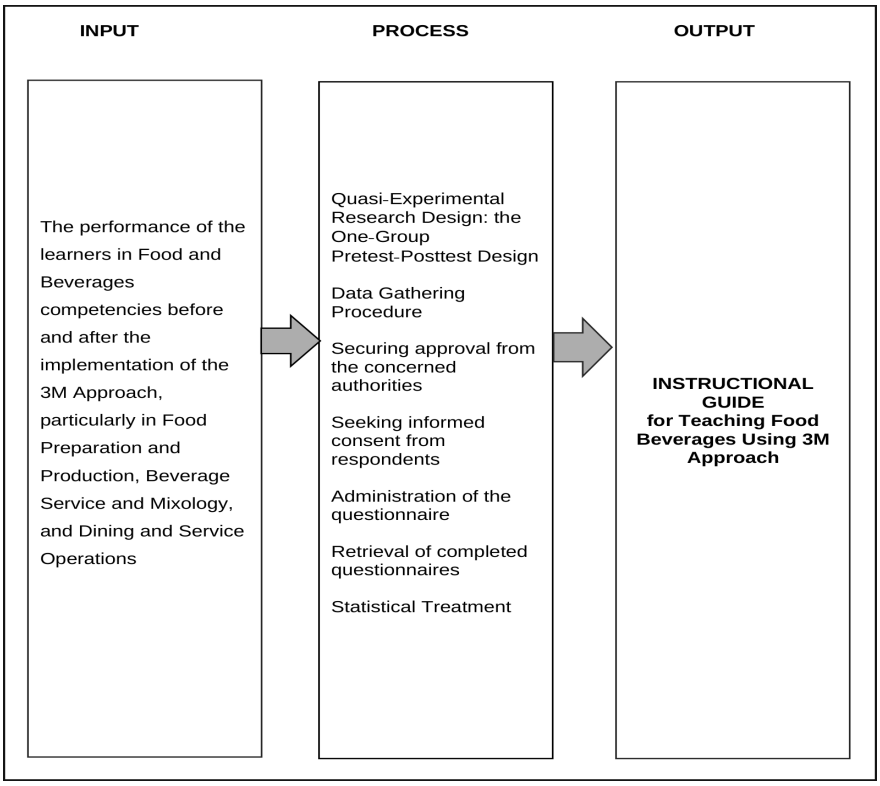


Figure 2
Flow of the Study

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Research Environment and Respondents

The study was conducted at Mactan National High School, located in Mactan, Lapu-Lapu City, Cebu. It was classified as a very large public secondary school, headed by Principal IV Rowena Sagarino, and was also the institution where the researcher was employed as a TLE Grade 10 teacher. This setting was highly appropriate for the study for several key reasons. First, as a very large public secondary school, it reflected the typical conditions and challenges faced by many institutions across the country, including limited facilities and insufficient learning materials for practical TLE instruction. Second, the school implemented Food and Beverages under the Technology and Livelihood Education curriculum, which made it the ideal venue to test and validate the effectiveness of the 3M Approach. Third, the researcher's direct assignment to the school ensured easier coordination and closer monitoring of the intervention. Moreover, the school served a diverse population of learners from varying socioeconomic backgrounds, many of whom benefited greatly from adaptive and resource-smart instructional strategies that did not depend on ideal or costly equipment. Finally, conducting the study within this setting ensured that the findings and the resulting instructional guide were directly relevant and beneficial to Mactan National High School.

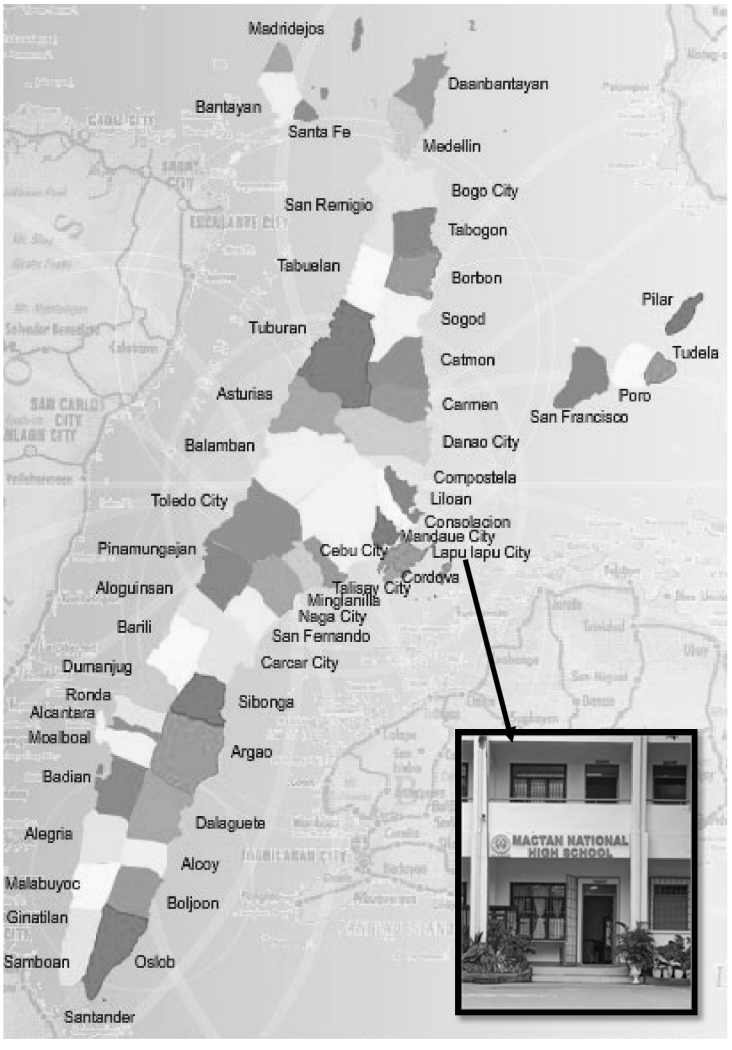


Figure 3
Location Map of the Research Environment

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The respondents of the study were the thirty-five (35) Grade 10 learners enrolled in the TLE-10 remediation program at Mactan National High School. They were selected using purposive sampling based on specific inclusion criteria: they were officially enrolled Grade 10 learners, were currently participating in the TLE-10 remediation program for Food and Beverages competencies, had obtained ratings below the required proficiency level in the pre-assessment, secured proper parental consent, and committed to attending all assessment and intervention activities. This sampling method ensured that the participants were exactly those who benefited most from the intervention and whose performance clearly showed how effective the 3M Approach was in addressing identified learning gaps.

Table 1
Distribution of Respondents

Environment	**Frequency (f)**	**Percentage (%)**
Mactan National High School	35	100
Total	35	100

Instrument and Scoring

The primary data-gathering tool used in this research was a researcher-made pre-test and post-test designed to measure the performance of Grade 10 learners in Food and Beverages competencies. The assessment covered three core domains: Food Preparation and Production, Beverage Service and Mixology, and Dining and Service Operations. The test consisted of 30 multiple-choice items, with 10 questions allocated to each domain. Every item was crafted to reflect practical situations, safety standards, and adaptive decision-making directly tied to the three pillars of the 3M Approach Maximize available resources, Modify activities, and Mimic best practices so that the assessment matched exactly the focus of the intervention.

The researcher developed this instrument because no existing standardized questionnaire fully matched the specific objectives of the study. Available published tools focused mainly on general culinary knowledge or instruction under ideal resource conditions, but none directly assessed learners' ability to apply adaptive strategies amid limited materials and equipment. Because the study centered on a context-responsive strategy, the instrument needed to present scenario-based items that reflected the actual challenges and decisions learners faced in their daily classroom setting. This direct alignment ensured that the test measured exactly what the intervention intended to improve.

To establish the quality of the tool, formal validation procedures were carried out. A panel of three experts who already earned a master's degree in TLE reviewed the test for content alignment, clarity, and appropriateness to Grade 10 learners. Items that were unclear or not strongly linked to the study's objectives were revised based on their feedback before the tool was finalized.

A pilot test was then conducted with 15 Grade 10 learners in Mactan Airbase High School who did not form part of the actual respondents but shared similar learning conditions and backgrounds. Reliability was computed using Cronbach's alpha, which yielded a coefficient of 0.82. This result confirmed that the instrument had good internal consistency and reliability, as the value exceeded the widely accepted threshold of 0.70. The same validated and reliable tool was administered as both pre-test and post-test to ensure consistent and fair measurement of change in student performance.

This section presents the scoring procedure used to interpret the pre-test and post-test performance of Grade 10 learners across the three learning dimensions: Food Preparation and Production, Beverage Service and Mixology, Dining and Service Operations. The test consists of 10 items each.

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Table 2
Scoring Procedure as Reported

Level of Proficiency	**Raw Score Range (Per Dimension = 10)**	**Equivalent Value (%)**	**Verbal Interpretation**
Proficient	8 – 10	74 and below	Demonstrates limited understanding of the topic; requires constant guidance.
Approaching Proficiency	6 – 7	75 – 79	Demonstrates basic understanding; needs further support to explain ideas independently.
Developing	4 – 5	80 – 89	Demonstrates satisfactory understanding; can discuss and apply concepts with minimal guidance.
Beginning	0 – 3	90 – 100	Demonstrates comprehensive and critical understanding; analyzes and applies knowledge accurately and consistently.

The raw score categories in Table 2 match the categories used in the frequency tables. Its percentage equivalents and verbal descriptions do not align with the direction of the raw score categories. The proficiency levels attached to the reported mean scores are therefore presented as source labels and should be interpreted with caution.

Data Gathering Procedure

The data gathering for this study was carried out in three major stages: the Preliminary Stage, the Data Gathering Stage, and the Post-Data Gathering Stage. Each stage followed systematic, ethical steps to ensure credibility, validity, and rigor throughout the entire research process.

Preliminary Stage. In the Preliminary Stage, the researcher first secured formal approval from the Office of the Schools Division Superintendent (SDS) to conduct the study. Once approval was granted, an endorsement letter signed by the SDS was submitted to the Office of the Public Schools District Supervisor (PSDS) for further clearance. After receiving the PSDS confirmation, the researcher presented both documents to the School Head of Mactan National High School to obtain final permission to conduct the study within the school. Upon receiving positive confirmation from all concerned authorities, the researcher met with the selected participants during their free time to explain briefly the study's purpose, scope, and procedures. When the learners expressed willingness to take part, the researcher distributed informed consent forms that clearly outlined the study details, as well as the participants' rights—including voluntary involvement and the freedom to withdraw at any time without penalty. Signed forms were collected before any assessment or intervention began.

Data Gathering Stage. The Data Gathering Stage started once all preparations and consent procedures were complete. First, the researcher administered the pre-test to the selected respondents to establish their baseline proficiency across Food Preparation and Production, Beverage Service and Mixology, and Dining and Service Operations. Immediately afterward, the 3M Approach was implemented over a period of four weeks within the regularly scheduled TLE remediation sessions. Given the limited materials and equipment available in the school, the strategy was delivered through a structured combination of discussion, visual presentation, and demonstrated samples rather than full independent hands-on practice. The researcher used prepared PowerPoint presentations to discuss each principle in detail: Maximize focused on how to make the most of every available item and avoid waste; Modify explained how to adjust procedures or substitute resources without compromising safety or quality; and Mimic illustrated how to follow professional standards, correct sequence, and proper techniques even under constrained conditions. Realistic examples, step-by-step visuals, and finished sample outputs were shown and explained to help learners visualize exactly how each practice worked in actual application. Every session connected the principles directly to scenarios they would likely encounter, and the researcher clarified questions and reinforced key points throughout. This method ensured consistent, clear instruction despite the lack of sufficient supplies for every student to practice individually.

The post-test was administered exactly two days after the final session of the intervention period to measure changes in learning outcomes while the lessons and examples remained fresh in mind.

Post Data Gathering Stage. In the Post-Data Gathering Stage, all completed test papers were retrieved, reviewed for completeness, and subjected to appropriate statistical treatment. The data were tabulated and analyzed to determine pre-test and post-test performance levels, as well as whether a significant difference existed between the two sets of scores. The processed results were then synthesized to answer the specific research questions and served as the evidence-based foundation for developing the Instructional Guide for Teaching Food and Beverages Using the 3M Approach. All records were kept confidential, and findings were presented in aggregated form only to protect the privacy of every participant.

Ethical Considerations

First, informed consent was secured from all respondents and their parents or legal guardians prior to any data collection. The researcher clearly explained the purpose, procedures, benefits, and risks of the study, as well as the voluntary nature of participation, and emphasized that learners might withdraw from the research at any time without penalty or effect on their academic standing.

Second, confidentiality and anonymity were observed at all times. All personal information, assessment results, and related responses were treated as strictly private and were used solely for academic purposes. Real names were replaced with codes or pseudonyms in all records, documents, and the final manuscript to prevent identification.

Third, proper use of artificial intelligence was practiced responsibly; AI tools were used only for organization, formatting, and initial drafting support, while all analysis, interpretation, and intellectual content represented the researcher's original work and was properly acknowledged in accordance with institutional standards.

Fourth, safe-keeping of data was maintained by storing all physical and digital records in password-protected files and secured storage, accessible only to the researcher and the adviser. All data were retained for the required period and disposed of properly after the completion of the study.

Finally, the entire research process strictly followed the Cebu Technological University research format and policies, ensuring that all procedures complied with institutional requirements, DepEd guidelines, and established ethical standards for educational research.

Statistical Treatment

The study reported means and standard deviations to summarize performance and used paired-sample t tests to compare scores before and after instruction for the same learners.

Operational Definitions

To ensure clear understanding and consistent interpretation of the concepts used in this study, the following terms are defined operationally based on how they are applied and measured in the research:

Beverage Service and Mixology. Refers to the competency area involving the preparation, handling, and proper serving of different beverages, as well as the application of basic mixing techniques and service standards. In this study, it pertains to the specific set of skills assessed in the pre-test and post-test to measure learners' proficiency before and after the implementation of the 3M Approach.

Dining and Service Operations. Refers to the set of competencies covering table setup, order taking, food and beverage serving procedures, guest interaction, and proper work ethics in a dining environment. Operationally, it is one of the three domains measured in the performance assessment before and after the intervention.

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Food and Beverages Competencies. Refers to the prescribed knowledge, skills, and attitudes required under the Grade 10 TLE curriculum for Food and Beverages services. In this study, it collectively includes Food Preparation and Production, Beverage Service and Mixology, and Dining and Service Operations, evaluated through pre-test and post-test assessments.

Food Preparation and Production. Refers to the skills involved in selecting, preparing, and presenting food items following standard procedures, safety practices, and quality requirements. Operationally, it is one of the three core areas assessed to determine the effect of the 3M Approach on learner performance.

Instructional Plan. Refers to the output of the study, a structured lesson plan developed based on the findings to help teachers deliver Food and Beverages lessons using the 3M Approach even with limited resources. It serves as a practical reference for planning and implementing instruction.

Level of Performance. Refers to the degree of proficiency demonstrated by the learners in the identified Food and Beverages competencies. Operationally, it is measured using a validated performance assessment tool administered before (pre-test) and after (post-test) the intervention.

Maximize, Modify, and Mimic (3M) Approach. Refers to the instructional strategy used in this study, which involves making the most of available resources, adjusting activities to existing conditions, and emulating industry-standard best practices to deliver quality instruction. It is the independent variable whose effectiveness is being determined.

Post-test Performance. Refers to the learners' level of proficiency in the three competency areas measured after they have undergone instruction using the 3M Approach. It is compared against the pre-test results to determine significant differences.

Pre-test Performance. Refers to the learners' initial level of proficiency in the identified competency areas prior to the implementation of the 3M Approach. It serves as the baseline data to assess the intervention's effect.

Results and Discussion

Tables 3–8 show the distribution of test scores in each domain. All six frequency distributions total 35 learners. The most frequent pretest band was 6–7 for Food Preparation and Production and Dining and Service Operations, and 4–5 for Beverage Service and Mixology. After instruction, the 8–10 band was the most frequent in all three domains.

Pretest Performance

Table 3
Food Preparation and Production

Score	**Frequency**	**Percentage**	**Level**
8 – 10	0	0.00%	Proficient
6 – 7	20	57.14%	Approaching Proficiency
4 – 5	14	40.00%	Developing
0 – 3	1	2.86%	Beginning
Total	35	100%	
Mean Raw Score	5.57		
Mean Percentage Score	55.71%		
Standard Deviation			

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Table 4
Beverage Service and Mixology

Score	**Frequency**	**Percentage**	**Level**
8 – 10	2	5.71%	Proficient
6 – 7	13	37.14%	Approaching Proficiency
4 – 5	20	57.14%	Developing
0 – 3	0	0.00%	Beginning
Total	35	100%	
Mean Raw Score	5.51		
Mean Percentage Score	55.14%		
Standard Deviation	1.17		

Table 5
Dining and Service Operations

Score	**Frequency**	**Percentage**	**Level**
8 – 10	2	5.71%	Proficient
6 – 7	18	51.43%	Approaching Proficiency
4 – 5	13	37.14%	Developing
0 – 3	2	5.71%	Beginning
Total	35	100%	
Mean Raw Score	5.63		
Mean Percentage Score	56.29%		
Standard Deviation	1.33		

Posttest Performance

Table 6
Food Preparation and Production

Score	**Frequency**	**Percentage**	**Level**
8 – 10	18	51.43%	Proficient
6 – 7	17	48.57%	Approaching Proficiency
4 – 5	0	0.00%	Developing
0 – 3	0	0.00%	Beginning
Total	35	100%	
Mean Raw Score	7.94		
Mean Percentage Score	79.43%		
Standard Deviation	1.21		

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Table 7
Beverage Service and Mixology

Score	Frequency	Percentage	Level
8 – 10	28	80.00%	Proficient
6 – 7	7	20.00%	Approaching Proficiency
4 – 5	0	0.00%	Developing
0 – 3	0	0.00%	Beginning
Total	35	100%	
Mean Raw Score	8.40		
Mean Percentage Score	84.00%		
Standard Deviation	1.12		

Table 8
Dining and Service Operations

Score	Frequency	Percentage	Level
8 – 10	25	71.43%	Proficient
6 – 7	8	22.86%	Approaching Proficiency
4 – 5	2	5.71%	Developing
0 – 3	0	0.00%	Beginning
Total	35	100%	
Mean Raw Score	8.17		
Mean Percentage Score	81.71%		
Standard Deviation	1.36		

Summary and Paired Comparisons

Table 9
Reported Pretest and Posttest Means and Proficiency Labels

Indicators	Mean (Pre-test)	Level	Mean (Post-test)	Level
Food Preparation and Production	5.57	Developing	7.94	Approaching Proficient
Beverage Service and Mixology	5.51	Developing	8.40	Proficient
Dining and Service Operations	5.63	Developing	8.17	Proficient

The reported gains were 2.37 points in Food Preparation and Production, 2.89 in Beverage Service and Mixology, and 2.54 in Dining and Service Operations. Beverage Service and Mixology showed the largest descriptive gain. This comparison does not establish a statistically significant difference in gains between domains.

Table 10
Reported Paired-Sample t Tests

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Indicators	Mean (Pre-test)	Mean (Post-test)	Mean Difference	t-value	p-value	Decision	Interpretation
Food Preparation and Production	5.57	7.94	2.37	9.14	<0.001	Reject H_0	There is a significant difference
Beverage Service and Mixology	5.51	8.40	2.89	11.45	<0.001	Reject H_0	There is a significant difference
Dining and Service Operations	5.63	8.17	2.54	10.02	<0.001	Reject H_0	There is a significant difference
Overall Weighted Mean	5.57	8.17	2.60	22.94	<0.001	Reject H_0	There is a significant difference

The study reported $p < .001$ for each of the three domain comparisons and for the overall comparison. These results concern changes within a single group. They do not isolate the effect of the 3M Approach or demonstrate independent performance in a practical setting, because the study used a multiple-choice assessment.

The findings are consistent with the study's use of visual examples, modeled procedures, and contextualized tasks. The approach connects the resource constraints described in the Introduction with classroom decisions about using available supplies, adapting procedures, and modeling professional practice. The findings informed the proposed instructional guide; the study did not separately test that guide.

Output of the Study

The proposed guide responds to the baseline score distributions and the gains reported after the four-week intervention. It organizes teaching around the same three competencies assessed in the study: food preparation and production, beverage service and mixology, and dining and service operations.

The guide turns the three 3M principles into lesson steps and checks for understanding that teachers can use when ingredients, equipment, tableware, or space are limited. The implementation schedule and lesson activities describe the proposed guide, separate from the measured test results.

Instructional Guide for Teaching Food and Beverages Using the 3M Approach

Rationale

The guide addresses limited facilities, ingredients, and workspace in Food and Beverages instruction. It uses discussion, visual presentations, and demonstrated examples to help teachers show how available resources can be used efficiently while maintaining safety and quality standards.

Objectives

Based on the study outcomes, this guide aims to:
Raise learners' proficiency in Food Preparation and Production, Beverage Service and Mixology, and Dining and Service Operations from basic to competent levels, even without fully equipped laboratories or abundant supplies;
Equip learners with the ability to maximize available materials, modify procedures safely without compromising standards, and mimic professional practices in resource-limited settings; and

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Provide a standardized, cost-effective instructional framework that enables consistent, fair, and competency-aligned Food and Beverages delivery across all sections of the class.

Scheme of Implementation

Table 11
Implementation Scheme

Phase	Duration	Key Activities
Orientation & Baseline	Day 1	Administer pre-test; introduce the 3M principles- Maximize, Modify, Mimic- and explain how each will be applied throughout the lessons; review classroom expectations and safety rules.
Intervention Period	Weeks 1–4	Deliver all lessons through structured discussion, PowerPoint presentation, and demonstrated examples; explicitly identify and label each practice under the corresponding 3M principle; hold guided decision-making discussions to reinforce adaptive reasoning; sessions follow the regular TLE remediation schedule.
Week 1 Food Preparation & Production	3 sessions	Focus on portion planning, ingredient substitution, waste reduction, tool improvisation, and following correct sequence despite adjustments.
Week 2 Beverage Service & Mixology	3 sessions	Focus on safe reuse of glassware, approved alternatives, maintaining ratios and hygiene, proper sequence, and portioning with limited garnishes.
Week 3 Dining & Service Operations	3 sessions	Focus on cleaning and reusing tableware, flexible layout while observing standards, role coordination, service flow, and consistent etiquette.
Week 4 Integration & Review	2 sessions	Combine all three domains in scenario-based practice; present new constraint situations and guide learners to apply all three 3M principles together; clarify remaining questions and reinforce key standards.
Post-Test & Closure	Day following final session	Administer post-test; summarize progress; collect feedback on the clearest and most challenging parts of the lessons.

Core Principles of the 3M Approach

Table 12
Core Principles

Principle	Definition	Guiding Rule
MAXIMIZE	Use every available item efficiently, reduce waste, and stretch existing supplies to serve more learners.	Nothing is wasted unless unsafe; plan portions and workflow before starting.
MODIFY	Adjust tools, quantities, or methods to match what is on hand without lowering safety, hygiene, or quality standards.	Change how it is done, never what standard must be met.
MIMIC	Follow correct professional sequence, measurements, etiquette, and judgment regardless of setting or available equipment.	Standards do not change—only the way they are demonstrated adapts.

Lesson 1 Food Preparation And Production

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Objective: Apply 3M principles to safe, efficient food preparation with limited ingredients and tools.

Table 13
Lesson 1 Instructional Sequence

Step	Instructional Action	3M Connection	Check for Understanding
1	Show photos of available vs. ideal ingredients and tools; discuss which items are present and which are missing.	Identify resources to Maximize	Ask: What do we have, and how can each be used fully?
2	Demonstrate portioning, using all edible parts, and proper storage of leftovers.	Maximize reduce waste	Ask: Why is careful planning the first step in saving supplies?
3	Explain safe ingredient substitution and tool alternatives; emphasize that ratio, taste, and safety remain unchanged.	Modify adjust method, not standard	Ask: What must stay the same even when we use a different tool?
4	Present professional flow charts and checklists; follow same order and decision-making sequence in demonstration.	Mimic observe industry logic	Ask: Which step matters most even if we do not have the perfect equipment?
5	Guide learners through scenario: Ingredient runs short; tool breaks; space is smaller than planned. Discuss responses.	Integrate all three principles	Ask: How do all three work together in this situation?
Assessment	Short quiz + written explanation of how to adjust one recipe for smaller class portions		

Lesson 2 Beverage Service And Mixology

Objective: Maintain balance, hygiene, and professional service standards with limited glassware and supplies.

Table 14
Lesson 2 Instructional Sequence

Step	Instructional Action	3M Connection	Check for Understanding
1	Demonstrate immediate, safe cleaning and reuse of glassware between rounds.	Maximize — extend usable items	Ask: What rule must we follow when we reuse service items?
2	Show approved substitute ingredients; stress that flavor balance, hygiene, and portion ratio do not change.	Modify — preserve core quality	Ask: What happens to the drink if we change amounts to save supplies?
3	Demonstrate correct sequence, measuring, and presentation; explain that appearance and technique match professional settings.	Mimic — uphold service standards	Ask: Why is correct order important even in practice sessions?

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Step	Instructional Action	3M Connection	Check for Understanding
4	Practice decision-making: limited garnish, unavailable mixer, broken measuring tool.	Apply principles together	Ask: How do we decide what to change and what to keep?
Assessment	Short quiz + list of two safe substitutions and one way to conserve limited garnishes		

Lesson 3 Dining And Service Operations

Objective: Deliver organized, respectful, and standards-compliant service with limited tableware and space.

Table 15
Lesson 3 Instructional Sequence

Step	Instructional Action	3M Connection	Check for Understanding
1	Show how to arrange, clean, and reset items efficiently; reuse safely rather than replace.	Maximize manage available service sets	Ask: How does planning table order save time and supplies?
2	Demonstrate alternative layouts and simplified but correct settings when space or items are few; never skip essential standards.	Modify adapt arrangement, not etiquette	Ask: What part of table setting can never be removed?
3	Present service flow, timing, and courtesy; follow same order and respect as full dining service.	Mimic practice professional conduct	Ask: What do guests notice first regardless of the setting?
4	Role-play: fewer servers than guests; limited space; missing serving pieces.	Integrate all three principles	Ask: Which principle guides the team to solve this together?
Assessment	Short quiz + sketch or written description of an adapted but correct table layout		

Conclusion

The study concluded that resource limitations alone do not preclude meaningful learning in Food and Beverages education, as the 3M Approach effectively transformed constrained conditions into teachable opportunities by centering on clear discussion, visual presentation, and demonstrated examples that built strong, consistent proficiency without requiring fully equipped laboratories. The framework—focused on maximizing available items, modifying procedures without compromising standards, and mimicking professional practices—proved to be a valid, equity-centered instructional model rather than a temporary workaround, producing statistically significant gains across all competency areas and elevating learners from basic understanding to proficient performance. This confirmed that quality, standards-aligned instruction depends more on purposeful, context-responsive pedagogy than on ideal facilities, and that explicitly teaching adaptive reasoning and resourcefulness equips learners not only to master curriculum requirements but also to develop the flexible, livelihood-ready expertise essential for real-world application.

Recommendations

Based on the findings and conclusions, the following recommendations are offered:

DepEd officials and curriculum planners are encouraged to include the 3M Approach in MATATAG implementation guides and recognize demonstration and scenario-based assessment as valid evidence of proficiency; TLE teachers should structure lessons around the three pillars and maintain a shared resource bank to support consistent instruction; school administrators may schedule weekly collaborative planning, prioritize multi-use tools, and build community partnerships for supplies and expertise; parents and stakeholders can contribute safe usable items and practical local knowledge; Grade 10 learners are advised to apply the three principles at home and keep a practice record to build adaptability; and future researchers should extend the study duration, test other specializations, and explore combined presentation and hands-on delivery to further strengthen proficiency outcomes.

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