



Insight into Assessment Tools for Culinary Competence and Nutritional Knowledge for Nigerian Tertiary Students

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ABSTRACT

This study explores the development and application of validated assessment tools aimed at enhancing culinary competence and nutritional knowledge among Nigerian tertiary students. Grounded in Social Cognitive Theory, the study highlights core concepts such as self-efficacy, observational learning, and motivation, aligning them with the design and validation of educational instruments. A systematic multi-phase approach was employed to conceptualize, develop, test, and refine assessment tools, incorporating expert input, pilot testing, and statistical validation. Findings demonstrate that these tools provide quantifiable insights into students' culinary abilities and nutritional literacy, enabling data-driven curriculum improvements and targeted interventions. The study also presents a practical model to guide educators in selecting context-appropriate and culturally sensitive tools. By bridging theory and practice, the study emphasizes the transformative potential of assessment-driven education in fostering healthier behaviors. The implications extend to public health, educational planning, and policy development, calling for broader application, continuous adaptation, and interdisciplinary collaboration.

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1. INTRODUCTION

In recent years, the growing awareness of the critical relationship between food choices and health outcomes has intensified the global call for improved nutrition education and culinary competence. The escalating incidence of diet-related illnesses, such as obesity, hypertension, type 2 diabetes, and cardiovascular disease, has highlighted the urgent need to foster health-conscious behaviors through early educational interventions ([Short et al., 2023](#)). Nutrition is no longer regarded merely as a background factor in health but as a proactive agent in disease prevention and wellness promotion. As a result, the education sector has become a critical platform for promoting lifelong skills in nutrition and food preparation, particularly within tertiary institutions where young adults make autonomous lifestyle decisions.

Among tertiary-level students in Nigeria, the transition to independent living often coincides with increased exposure to fast food, processed meals and limited knowledge of healthy food choices. Globalization, urbanization, and the adoption of convenience-based lifestyles have drastically reshaped eating patterns, especially among youth populations. Studies indicate that university students frequently face challenges such as budget constraints, limited access to nutritious food, and a lack of culinary skills, all of which contribute to poor dietary habits ([Domínguez et al., 2021](#)). Within this vulnerable demographic, unhealthy eating patterns can become normalized, leading to long-term consequences that stretch beyond the academic environment into broader public health implications.

Culinary competence and nutritional knowledge are essential life skills that empower individuals to make informed food choices, prepare balanced meals, and develop sustainable dietary habits. Culinary competence refers not only to cooking skills but also to the application of food safety principles, understanding of ingredient combinations, and the mastery of various cooking techniques ([Tan et al., 2022](#)). It includes the ability to plan, prepare, and serve meals that are both nutritious and culturally appropriate. On the other hand, nutritional knowledge encompasses a person's understanding of macronutrients and micronutrients, dietary guidelines, nutritional labels, and the interplay between food and health outcomes. Together, these skills play a pivotal role in shaping the food environment within households and communities.

Despite their importance, culinary and nutrition education is often marginalized within formal academic settings. When taught, such subjects are typically theoretical, lacking the practical and evaluative components necessary for deep learning and behavioral change. This gap underscores the need for assessment-driven approaches that not only impart knowledge but also evaluate the application and retention of skills. Assessment tools, when appropriately designed and validated, serve as vital instruments for measuring student progress, identifying knowledge gaps, and guiding instructional strategies. They provide both educators and students with measurable data that can inform decision-making, tailor interventions, and ultimately foster improvement.

Assessment instruments serve a dual purpose: they are both evaluative and instructional. By integrating assessments into the learning process, educators create opportunities for reflective learning and real-time feedback. For instance, practical assessments involving food preparation and planning can simulate real-world challenges and encourage students to apply classroom knowledge in meaningful ways. Additionally, well-structured assessments promote critical thinking and problem-solving, encouraging students to consider nutritional outcomes,

ingredient substitutions, and culinary innovations. These competencies are essential not only in personal dietary choices but also in professional settings such as food service, hospitality, public health, and education.

One of the foundational theories underpinning this study is Social Cognitive Theory (SCT), proposed by Albert Bandura. SCT offers a multidimensional understanding of learning and behavior, emphasizing the interaction between personal factors, environmental influences, and behaviors. Central to this theory are the constructs of self-efficacy, observational learning, motivation, and self-regulation, all of which are deeply relevant to the acquisition of culinary and nutritional skills. According to SCT, learning is not a passive absorption of information but an active process shaped by experience, modeling, reinforcement, and personal agency. Assessment tools, when aligned with SCT principles, can reinforce positive behaviors, build confidence, and promote long-term skill acquisition.

Self-efficacy, for example, is enhanced when students receive constructive feedback on their culinary tasks, understand their areas of improvement, and achieve measurable progress. Observational learning is facilitated through scenario-based assessments and practical demonstrations that mimic real-life cooking challenges (Ring *et al.*, 2019). Motivation is strengthened when students perceive assessments as fair, relevant, and directly connected to their personal goals. Lastly, self-regulation is supported through tools that encourage students to set culinary goals, monitor their dietary behaviors, and adjust their strategies accordingly. In this way, SCT provides a robust theoretical foundation for designing and implementing effective assessment tools in nutrition education.

The Nigerian educational context presents unique challenges and opportunities for implementing such assessment-driven frameworks. Cultural diversity, regional food practices, resource limitations, and varying levels of instructor expertise influence how nutrition and culinary education are delivered and received. Many tertiary institutions lack access to modern teaching kitchens, standard curricula for food and nutrition education, or comprehensive tools for evaluating student competence. Despite these challenges, there is an increasing recognition of the role that education can play in improving dietary behaviors and reducing the national burden of nutrition-related diseases. Integrating validated assessment tools into curriculum design represents a practical and scalable strategy for addressing these concerns.

In response to these dynamics, this study seeks to bridge the gap between theoretical learning and practical application by focusing on the development and implementation of validated assessment instruments for culinary competence and nutritional knowledge. By adopting a structured, multi-phase approach to tool development—encompassing conceptualization, expert input, pilot testing, statistical validation, and implementation—the study aims to provide a replicable model for educators, researchers, and policymakers. These instruments are designed to be contextually relevant, culturally sensitive, and adaptable to the specific needs of Nigerian tertiary institutions.

Furthermore, this paper aims to explore how such assessment tools can influence course design, teaching methods, student engagement, and broader public health outcomes. It seeks to answer critical questions such as: How can we measure culinary and nutritional competence in a meaningful way? What theoretical principles should guide the development of such tools? How can these assessments be integrated into existing curricula to enhance student learning and promote healthier behaviors? And what are the broader implications of this approach for education and public health policy in Nigeria?

By addressing these questions, the study contributes to an emerging field of inquiry that intersects nutrition education, behavioral science, educational assessment, and public health. It highlights the transformative potential of assessment-driven education and positions culinary competence and nutritional knowledge as foundational skills in the pursuit of a healthier, more informed population. Ultimately, this research aspires to promote a generation of Nigerian students who are not only academically accomplished but also equipped with the life skills necessary to make sound dietary decisions, reduce health risks, and positively influence their communities.

While the global educational discourse increasingly recognizes the importance of skills-based learning, there remains a gap in translating theoretical nutrition knowledge into practice—particularly in developing countries like Nigeria. Traditional approaches to nutrition education often rely heavily on passive content delivery and standardized testing, with limited opportunities for experiential learning. This results in students who may understand dietary recommendations in theory but lack the competence to apply them in everyday life. Bridging this divide requires tools that not only convey knowledge but also assess, reinforce, and refine practical skills.

Assessment instruments, when well-crafted, can bridge the classroom and the kitchen, allowing students to engage with nutrition concepts through hands-on, scenario-based, and reflective exercises. Their use helps establish an objective and measurable standard for evaluating not just what students know but also what they can do with that knowledge. Moreover, by incorporating assessment into a continuous feedback loop, educators can monitor progress, personalize instruction, and adapt content to reflect student needs and contextual challenges. This dynamic model aligns with modern pedagogical principles that prioritize active learning, competency-based education, and learner-centered strategies.

Importantly, the integration of assessment tools also provides insight into systemic issues—such as curricular gaps, resource constraints, and teaching quality—enabling institutions to identify and address areas of improvement. For example, results from the widespread implementation of such tools can inform policy recommendations, teacher training programs, and national curriculum revisions. At the same time, these tools offer a low-cost, scalable means of evaluating and improving dietary behaviors, which is particularly relevant in resource-limited settings where widespread malnutrition and food insecurity persist.

In Nigeria, where food-related health challenges coexist with rising food insecurity, nutrition education must be both effective and culturally relevant. The country's diverse culinary traditions, socio-economic disparities, and evolving food environment require assessment strategies that reflect local realities. Validated tools must account for regional dietary practices, affordability of healthy foods, and student familiarity with kitchen practices. As such, this paper not only develops tools rooted in educational theory but also emphasizes contextual sensitivity and inclusivity.

The core theoretical anchor of this work, Social Cognitive Theory, lends itself particularly well to addressing these complexities. Its focus on reciprocal determinism—where individual behavior, personal factors, and environmental influences interact—provides a robust framework for designing assessment interventions that influence behavior change. The theory acknowledges that knowledge alone is insufficient to shift behavior. Rather, confidence (self-efficacy), modeling (observational learning), motivation, and opportunities to apply knowledge in relevant settings are also necessary. These constructs are embedded in the assessment strategies proposed in this study, ensuring that tools are not merely evaluative but transformative.

In line with this theoretical foundation, the study introduces a practical model that guides educators through the process of selecting and implementing assessment tools. This model considers key factors such as alignment with learning outcomes, theoretical grounding, validity and reliability, feasibility, cultural relevance, and feedback mechanisms. It provides a structured pathway for transforming abstract educational goals into tangible, measurable actions that can drive curriculum development, student engagement, and public health impact.

Thus, the purpose of this paper is threefold:

First, to investigate and document the theoretical and practical basis for developing and validating assessment tools for culinary competence and nutritional knowledge;

Second, to demonstrate how these tools can be implemented in the Nigerian tertiary education context to enhance learning outcomes and foster positive health behaviors;

Third, to introduce a comprehensive model that can guide educators and policymakers in designing, selecting, and adapting culturally appropriate and pedagogically sound assessment instruments.

The novelty of this study lies in its interdisciplinary and context-specific approach. While international literature offers several models for culinary and nutrition assessment, few are grounded in African educational settings or aligned with the lived realities of Nigerian students. This paper contributes to the literature by offering a model built on both global best practices and local relevance, thereby addressing a critical gap in research and practice.

The impact of this research is twofold. Educationally, it promotes a competency-based, evidence-driven approach to teaching food and nutrition, supporting better learning outcomes and greater student empowerment. Publicly, it supports the long-term goal of reducing diet-related diseases and fostering healthier communities through informed dietary choices. By equipping students with the knowledge and skills to prepare nutritious meals and interpret nutritional information, the study contributes to national and global efforts to improve food literacy and health equity.

2. LITERATURE REVIEW

2.1. General Information

The intersection of culinary competence and nutritional knowledge has become a critical area of focus in health promotion and education. Growing evidence supports the idea that individuals equipped with practical cooking skills and sound nutrition understanding are more likely to adopt and maintain healthier dietary habits (Tan *et al.*, 2022). In an era where convenience foods dominate the food landscape and non-communicable diseases continue to rise, the development of effective, theory-based educational interventions has emerged as a global priority.

Culinary competence encompasses a diverse set of practical skills, including food preparation, cooking methods, kitchen safety, and menu planning. Beyond the act of cooking, it involves the ability to integrate nutritional principles into meal preparation, select appropriate ingredients, and execute dishes that are both palatable and healthful (Figueroa *et al.*, 2021). Studies show that culinary skills are associated with better diet quality, increased vegetable and fruit intake, and reduced reliance on ultra-processed foods (Metcalf & Leonard, 2018). For university students, these skills are vital as they often begin making independent food choices during this life stage.

Nutritional knowledge, on the other hand, refers to the understanding of macronutrients, micronutrients, dietary guidelines, and the relationship between diet and health outcomes.

It includes the ability to read food labels, interpret dietary recommendations, and evaluate the health impact of food choices. According to (Monteiro *et al.*, 2017), higher levels of nutritional knowledge are positively correlated with healthier eating behaviors and a lower risk of chronic disease. However, knowledge alone does not guarantee behavioral change, underscoring the importance of integrating assessment and behavioral theories into nutrition education.

In Nigeria, studies highlight the increasing prevalence of poor eating habits among tertiary students, often characterized by low fruit and vegetable intake, irregular meals, and a preference for fast food due to limited time, skills, or resources (Kalkan, 2019). Despite these challenges, few structured programs exist to assess and strengthen students' culinary and nutrition literacy. This gap is exacerbated by the lack of validated assessment tools tailored to the Nigerian cultural and educational context.

Assessment tools are essential instruments for evaluating learners' knowledge, skills, and behavioral intentions in a structured and objective manner. They serve as a bridge between theoretical learning and practical application by quantifying what students know and can do. In culinary and nutrition education, such tools often include practical demonstrations, scenario-based questions, written examinations, self-assessment scales, and simulations (Spagnoli *et al.*, 2023). These tools are used not only to measure learning outcomes but also to guide instructional decisions, inform policy, and support personalized interventions.

Several studies have emphasized the significance of validating these tools to ensure reliability, cultural relevance, and pedagogical value. Validation involves multiple stages, including expert review, pilot testing, and statistical analysis to confirm that instruments measure what they are intended to measure (Murad *et al.*, 2021; Alordiah & Chenube, 2023). Reliability ensures that results are consistent and reproducible across different populations and settings. These two criteria—validity and reliability—are the foundations upon which educational assessments must rest.

A significant body of research supports the use of Social Cognitive Theory (SCT) as a theoretical framework for designing and applying assessment tools in food and nutrition education. SCT emphasizes the dynamic interaction between behavior, personal factors, and the environment and is especially relevant for skill-based learning (Rathod, 2023). Key constructs of SCT—including self-efficacy, observational learning, motivation, and self-regulation—have been shown to influence dietary behavior change and the acquisition of culinary competence (Metcalfe & Leonard, 2018; Hauser *et al.*, 2020).

For instance, students with high self-efficacy are more likely to try new recipes and cooking techniques, while observational learning through demonstrations or peer collaboration reinforces positive food behaviors. Motivational feedback from assessment outcomes can inspire further engagement, and self-regulation is supported when students can monitor their progress over time. These theoretical components align well with the design of formative assessments, where learning is scaffolded, feedback is continuous, and student agency is emphasized.

Recent global efforts in culinary medicine and experiential learning offer valuable insights (LeBlanc-Morales, 2019). In the United States, programs like the Culinary Medicine curriculum have integrated cooking labs into medical education, resulting in improved dietary habits among both students and their future patients (Hauser *et al.*, 2020). Similar initiatives in Europe and Asia have linked cooking education with enhanced nutrition literacy and self-reported health improvements (Murray *et al.*, 2016; Razavi *et al.*, 2020). However, few of these interventions are directly transferable to low-resource settings without significant adaptation to cultural and infrastructural realities.

The Nigerian context presents unique considerations. Diverse regional cuisines, religious dietary practices, and socio-economic disparities influence both access to food and attitudes toward nutrition. Therefore, assessment tools must be sensitive not only to educational objectives but also to cultural relevance. They must reflect the food items, cooking methods, and health beliefs familiar to students. The failure to do so may lead to misinterpretation of results and diminished educational impact.

Despite these challenges, the integration of validated assessment tools into Nigerian tertiary education holds substantial promise. Tools that are contextually grounded and theoretically informed can transform the way nutrition and culinary education is delivered. They enable a shift from passive content delivery to active, skills-based learning and from generalized instruction to personalized feedback. Moreover, they open avenues for cross-sector collaboration—between education, public health, and food policy—fostering a more holistic approach to improving population health.

In sum, existing literature affirms the critical role of culinary competence and nutritional knowledge in promoting healthy lifestyles. It also underscores the need for reliable, culturally appropriate assessment tools that can guide educational strategies, support behavior change, and inform policy. This study contributes to this growing field by developing a model rooted in Social Cognitive Theory and tailored to the needs of Nigerian tertiary students. By doing so, it aims to fill a significant gap in both research and practice, offering tools that are not only theoretically robust but also practically effective.

2.2. Theoretical Framework and Learning Theories

In the quest to understand the complex network of variables that impact the acquisition of culinary skills and nutritional literacy, the Social Cognitive Theory presents itself as a persuasive and pertinent theoretical model ([Pang et al., 2019](#)). This theory, which has its roots in social learning and psychology, offers a prism through which to see the interaction of environmental, social, and psychological factors that influence people's nutritional knowledge and cooking habits ([Muzaffar et al., 2018](#)).

Albert Bandura's Social Cognitive Theory highlights the mutual relationship that exists between behaviour, the environment, and cognitive processes. Fundamentally, the idea acknowledges that learning happens as a result of imitation, observation, and the cognitive processes that support these behaviours ([Scaglioni et al., 2018](#)). This theoretical paradigm goes beyond conventional behaviourist models by emphasising how motivational factors, self-efficacy, and self-regulation affect learning outcomes ([Wang et al., 2022](#)).

Core Concepts and Their Alignment with Assessment Tools include several points:

- (i) **Self-Efficacy.** Self-efficacy is the conviction that one can carry out a particular task successfully. Self-efficacy is crucial when it comes to nutritional knowledge and culinary proficiency. Tools for evaluating culinary proficiency and nutritional knowledge are useful in boosting self-efficacy. People feel more confident about their ability to cook and understand nutrition when they see their skill level measured and confirmed by test results. This, in turn, increases their desire to keep picking up new knowledge and honing their abilities ([Murad et al., 2021](#)).
- (ii) **Observational Learning.** A cornerstone of the Social Cognitive Theory is observational learning, which holds that people pick up knowledge by watching the behaviours and results of others. Assessment tools offer possibilities for people to participate in observational learning by presenting a variety of settings and useful tasks. Students get insights into practical methods, problem-solving techniques, and the effects of

various decisions as they engage with problems and scenarios that mirror actual culinary and nutritional circumstances (Metcalfe & Leonard, 2018).

- (iii) Motivation. Motivation, which is an innate force that propels behaviour, fits in well with the assessment-driven methodology. Assessment tools provide a measurable incentive for improvement by measuring an individual's culinary proficiency and nutritional knowledge. These tools provide a feedback loop that feeds back into a motivation loop, where students see their progress and become more driven to improve. This drive also encompasses the promotion of improved eating habits, converting evaluation outcomes into actual behavioral modifications (Hauser *et al.*, 2020).
- (iv) Self-Regulation. The Social Cognitive Theory emphasises the significance of self-regulation, which includes goal-setting, tracking advancement, and modifying tactics in response to input. Self-regulation is naturally promoted by assessment instruments. People establish goals for their nutritional and culinary skills, track their progress with test results, and modify their approach to learning to close any gaps that are found (Wilson, 2023).

The Social Cognitive Theory offers a conceptual framework that helps us understand how assessment tools affect culinary competency and nutritional knowledge. This paradigm strongly emphasises self-efficacy, motivation, self-regulation, and observational learning. Users embark on a journey of empowerment as they engage with these materials, applying the main concepts of the theory to enhance learning outcomes and make informed dietary and food choices (Tan *et al.*, 2022).

3. METHOD

This study adopted a developmental research design aimed at creating, refining, and validating assessment tools for evaluating culinary competence and nutritional knowledge among Nigerian tertiary students. The process was anchored in Social Cognitive Theory, ensuring that the instruments reflected core constructs such as self-efficacy, observational learning, motivation, and self-regulation. A multi-phase approach was employed to guide the conceptualization, construction, testing, and validation of the assessment tools.

A rigorous, multi-phase procedure is needed to create assessment tools that accurately and comprehensively test culinary competency and nutritional knowledge while also making sure the instruments are in line with the intended results. This procedure involves a number of calculated actions that together support the validity and dependability of the instruments.

- (i) Step 1: Conceptualization and Planning. First, a conceptual framework outlining the essential components of nutritional knowledge and cooking proficiency that require evaluation is constructed. This framework directs the tool development process in later phases by acting as a roadmap. Outlining the kinds of exercises, scenarios, and questions that will most accurately assess people's skills and knowledge in these areas is part of the planning step (Spagnoli *et al.*, 2023).
- (ii) Step 2: Expert Involvement. Experts in the relevant fields—such as chefs, dietitians, teachers, and researchers—are crucial in developing the situations and questions for assessments. Their sophisticated knowledge of pedagogy, nutrition, and cooking methods guarantees that the instruments measure students' abilities precisely. Together, these professionals create test questions that measure not just factual knowledge but also critical thinking, problem-solving, and concept application (McWhorter *et al.*, 2022).

- (iii) Step 3: Question and Scenario Development. In this stage, scenarios and questions are carefully crafted to mirror real-life food situations and dietary conundrums. The format of the questions is designed to evaluate a variety of skills, from simple application to sophisticated memory recall. The purpose of scenarios is to imitate real-world culinary scenarios and push participants to come up with creative yet health-conscious culinary solutions ([Tan et al., 2022](#)).
- (iv) Step 4: Assessment Method Diversification. Assessment techniques are varied to capture culinary abilities and nutritional understanding fully. Through hands-on demonstrations, people can display their culinary creativity, safety precautions, and cooking abilities. Written examinations probe ideas such as dietary recommendations, the effects of cooking techniques on nutritional content, and nutrient interactions. They also delve into theoretical knowledge. Through immersive evaluation experiences, interactive simulations offer a virtual world where people may make real-time gastronomic and nutritional decisions ([Metcalf & Leonard, 2018](#)).
- (v) Step 5: Pilot Testing and Refinement. The assessment instruments are pilot-tested with a representative student sample before being widely used. This stage draws attention to any doubts, complexity, or contradictions in the situations and questions. Pilot tester feedback directs modifications, guaranteeing that the instruments are unambiguous, succinct, and precisely evaluate the targeted aspects of culinary proficiency and dietary expertise ([Nikolaus et al., 2023](#)).
- (vi) Step 6: Validation and Reliability Assessment. Thorough validation and reliability analysis are applied to the validated assessment instruments. This entails assessing the tool's ability to reliably measure culinary abilities and nutritional knowledge, as well as the internal consistency of the questions and the association between various assessment methods. The validity and reliability of the instruments are established through statistical analyses, giving confidence in their accuracy ([Murad et al., 2021](#)).
- (vii) Step 7: Implementation and Feedback Loop. The implementation phase begins with assessment instruments that have been modified and validated. Students' use of the instruments produces data on their performance, which may be examined to learn more about the state of nutrition and cooking. This data-driven methodology informs curricular improvements, interventions, and instructional tactics through a feedback loop ([Shor et al., 2023](#)).

When these phases are combined, evaluation instruments are produced that are accurate, dependable, and precisely designed to represent the core of culinary proficiency and nutritional understanding. These resources present a comprehensive viewpoint, recognising that knowledge of nutrition and cooking techniques are related aspects of a larger effort to promote healthy living ([Metcalf & Leonard, 2018](#)).

3.1. Conceptualization and Planning

The initial phase involved identifying the key constructs of culinary competence and nutritional knowledge to be assessed. A conceptual framework was developed to define specific skill and knowledge domains, guided by existing literature and educational standards. These domains included food preparation, safety practices, recipe planning, nutrient identification, dietary guidelines, and food label interpretation.

3.2. Expert Consultation

A panel of subject matter experts—including registered dietitians, culinary educators, food science lecturers, and curriculum specialists—was assembled to evaluate the relevance, appropriateness, and clarity of the assessment content. The experts contributed to the formulation of realistic scenarios, practical tasks, and knowledge-based questions that reflected real-life cooking and dietary decisions within the Nigerian context.

3.3. Tool Development for Question and Scenario Development

Assessment tools were developed in multiple formats to reflect both cognitive and psychomotor learning outcomes. These included:

- (i) Written questionnaires for theoretical knowledge (e.g., nutrient functions, label reading)
- (ii) Scenario-based items that measured decision-making in culinary and nutritional contexts
- (iii) Practical assessment rubrics for evaluating food preparation skills, hygiene practices, and plating
- (iv) Self-assessment scales for measuring students' confidence and self-efficacy related to cooking and nutrition

Each item was aligned with the learning outcomes identified in the conceptual framework and formatted to ensure clarity, relevance, and cultural sensitivity.

3.4. Assessment Method Diversification

To capture the full spectrum of culinary and nutritional competencies, a diversified assessment strategy was adopted. This approach combined various methods to ensure comprehensive evaluation and to accommodate different learner strengths and learning styles. Written tests measured foundational theoretical knowledge, including dietary guidelines, nutrient roles, and food labeling. Scenario-based assessments challenged students to apply concepts to real-world situations, testing their problem-solving and decision-making abilities. Practical demonstrations provided direct observation of food preparation skills, hygiene practices, and safe cooking techniques. Additionally, interactive simulations and reflective self-assessment scales were included to foster deeper learner engagement and self-regulation. This methodological diversity strengthened the reliability and authenticity of the assessment process and ensured alignment with the multidimensional nature of food and nutrition education.

3.5. Pilot Testing

The preliminary tools were pilot-tested on a sample of 60 tertiary students from three institutions in Delta State, Nigeria, representing different academic disciplines and backgrounds. Participants completed the tools under standardized conditions and were later invited to provide feedback on item clarity, relevance, and difficulty. This phase allowed the researchers to identify ambiguous wording, overlapping items, and cultural inconsistencies.

3.6. Validation and Reliability Testing

Following pilot testing, the tools underwent validity and reliability assessments:

- (i) Content validity was determined through expert review using a relevance rating scale.

- (ii) Construct validity was tested via exploratory factor analysis (EFA) to confirm the underlying dimensions of the assessment items.
- (iii) Criterion-related validity was evaluated by comparing tool scores to observed behaviors during practical cooking sessions.
- (iv) Reliability was assessed using Cronbach's alpha to determine internal consistency, and test-retest reliability was measured over a two-week interval using a subset of the sample.

Credibility in the construction of assessment tools is based on validation and reliability, which guarantee that the instruments measure what they are supposed to measure and consistently produce trustworthy results. These ideas are crucial to the development of evaluation instruments for nutritional knowledge and culinary proficiency because they validate the validity and relevance of the instruments ([Murad et al., 2021](#)).

The process of validation guarantees that the evaluation instruments accurately measure the aspects of culinary proficiency and nutritional awareness that they are intended to gauge. The instruments run the danger of giving inaccurate or insufficient insights about people's talents in the absence of validation ([Lathrop & Ezell, 2016](#)). Contrarily, consistency in measuring is ensured by reliability. When given to the same people in comparable circumstances, trustworthy assessment instruments produce comparable results, demonstrating the stability and accuracy of the instruments.

Steps in Validation are in the following:

- (i) Pilot Testing. Pilot testing is frequently the first step on the path to validation. The assessment techniques are used by representative groups of professionals, instructors, and students. In this stage, the input from the participants clarifies any possible doubts, problems, or areas of misunderstanding in the scenarios and questions. Through pilot testing, tool creators can improve their tools' usability and alignment with desired results ([McWhorter et al., 2022](#)).
- (ii) Content Validity. In order to determine whether the questions and situations effectively reflect the aspects of culinary competence and nutritional knowledge under evaluation, content validity is applied. Experts in the relevant field carefully review each question to make sure it follows accepted guidelines, adequately assesses abilities, and measures comprehension ([Alordiah & Ossai, 2023](#); [Metcalf & Leonard, 2018](#)).
- (iii) Construct Validity. The alignment of the assessment instruments with theoretical constructs is examined in terms of construct validity. As proposed in the conceptual framework, statistical analyses like factor analysis investigate if the instruments evaluate different aspects of culinary ability and nutritional knowledge ([Alordiah, 2020](#); [Bailey et al., 2019](#)).
- (iv) Criterion-Related Validity. The assessment of the instruments' association with defined criteria is known as criterion-related validity. In this instance, it looks into whether people with higher scores for culinary proficiency or nutritional awareness also display behaviors or results that are consistent with these qualities ([Tan et al., 2022](#)).

Steps in the Reliability Assessment are the following:

- (i) Internal Consistency. The reliability of the assessment tools' questions is measured by their internal consistency. Cronbach's alpha is one statistical measure that evaluates how comparable the answers to questions measuring the same construct ([Vaske et al., 2017](#)).
- (ii) Test-Retest Reliability. Retest-ability assesses how consistently results hold up over time. Researchers can examine the stability and reproducibility of the evaluation

instruments by giving them to the same people twice and comparing the results (Radd-Vagenas *et al.*, 2018).

- (iii) Statistical Analysis. The use of statistical methods is essential for determining validity and reliability. In addition to Cronbach's alpha, methods such as factor analysis, regression analysis, and correlation analysis shed light on the connections between the questions, the consistency of the scores, and the underlying concepts (Alordiah & Chenube, 2023; Morji, 2021).

The foundations of assessment tool creation are validity and reliability (Tao *et al.*, 2023). We may confidently use these measures to influence educational plans, interventions, and policies if they reliably measure culinary competency and nutritional understanding (Hazra, 2017). We explore the transformative landscape where statistically sound assessment tools enable students, educators, and policymakers to develop a generation with the culinary abilities and nutritional knowledge required for a healthier and more nourished future (Tan *et al.*, 2022).

3.7. Model Development based on Implementation and Feedback loop

Based on the results, a model for selecting and implementing assessment tools was constructed. This model included practical guidelines for aligning assessment methods with learning outcomes, integrating Social Cognitive Theory, ensuring cultural relevance, and maintaining psychometric rigor.

3.8. Ethical Considerations

Participation was voluntary, and informed consent was obtained from all students involved in the pilot study. Anonymity and confidentiality were maintained throughout. Ethical clearance was obtained from the appropriate institutional review board before data collection.

4. RESULTS AND DISCUSSION

The developmental and validation process of the assessment tools yielded several significant findings, each reflecting the strength and applicability of structured, theory-driven educational evaluation. Results are presented in terms of the stages of tool development—pilot testing feedback, validity and reliability measures, and model formation—and are discussed alongside the constructs of Social Cognitive Theory to highlight their educational and public health implications.

4.1. Feedback from Pilot Testing

Pilot testing was conducted with 60 students across three tertiary institutions. The students completed the draft versions of the written knowledge assessment, scenario-based items, and practical task rubrics. Open-ended feedback from participants revealed that while most items were considered relevant and reflective of their experiences, several respondents expressed difficulty with terminology related to specific nutrients (e.g., "polyunsaturated fats") and cooking techniques not commonly practiced in local households. In response, language simplification and contextual adaptation were made. For instance, unfamiliar terms were replaced with regionally relevant examples (e.g., "egusi soup" instead of "vegetable-based meal") to increase accessibility and cultural resonance.

Educators who participated in administering the pilot assessments provided further insights. They emphasized the importance of balancing theoretical rigor with practical

applicability and suggested that written items be supplemented with visual prompts (e.g., food images, cooking process illustrations). This feedback informed subsequent revisions, ensuring that the final tool suite accommodated multiple learning styles and literacy levels.

4.2. Content and Construct Validity

Expert panel review established strong content validity, with most items scoring high (above 0.85) on the relevance rating scale. Items aligned well with targeted learning outcomes such as understanding food groups, interpreting nutritional labels, applying food safety principles, and demonstrating cooking skills. The experts confirmed that the tools adequately reflected the range of knowledge and skills expected of tertiary students in food and nutrition courses.

Construct validity was assessed using exploratory factor analysis (EFA), which revealed three dominant dimensions:

- (i) Nutritional Literacy and Label Interpretation
- (ii) Culinary Skill and Food Safety Practices
- (iii) Self-Efficacy in Meal Planning and Execution

These factors closely mirrored the domains proposed in the original conceptual framework and supported the theoretical alignment with Social Cognitive Theory. The emergence of self-efficacy as a distinct factor reinforces Bandura's claim that belief in one's competence significantly influences behavior (Breslin, 2017). In this context, students who scored higher on self-efficacy-related items were also more likely to perform confidently in practical assessments, suggesting the utility of the tools in both diagnostic and predictive capacities.

4.3. Reliability Analysis

Reliability testing confirmed the internal consistency and temporal stability of the tools. Cronbach's alpha values for the subscales ranged from 0.81 to 0.89, indicating strong internal reliability. The test-retest reliability coefficient over a two-week interval was 0.84, demonstrating the tool's capacity to produce consistent results over time.

Such high reliability suggests that these instruments can serve as dependable measures of culinary and nutrition-related competencies. In educational settings, this consistency ensures that student progress can be tracked accurately, and instructional adjustments can be made based on reliable performance indicators. From a broader perspective, these findings validate the practicality of embedding these tools into formal teaching curricula and health education interventions.

4.4. Application of Social Cognitive Theory

The results also provide empirical support for the theoretical underpinnings of the study. Self-efficacy, a central construct in Social Cognitive Theory, emerged as both a measured outcome and a predictor of behavior. Students who reported high confidence in their ability to prepare meals were more engaged during practical assessments, took greater initiative in planning dishes, and demonstrated better hygiene practices. These outcomes affirm Bandura's assertion that individuals are more likely to act when they believe in their ability to succeed.

Observational learning was facilitated through scenario-based assessment items that prompted students to evaluate or reflect on hypothetical culinary decisions. Many students reported that the scenarios mirrored real-life situations they faced, such as deciding whether to use fresh vegetables or canned options, or choosing between frying and steaming. This

alignment between the assessment environment and lived experiences enhances transferability, a crucial factor in applied learning contexts.

The tools also supported motivational learning by providing immediate and constructive feedback. During the pilot sessions, students received formative feedback based on their responses and performance. This process was reported to increase student engagement and motivation to improve, especially when linked with personal goal-setting and instructor encouragement. In this way, the assessments served not only as evaluative mechanisms but also as instructional tools, fostering a positive learning climate.

Finally, the data confirmed the role of self-regulation in nutritional behavior change. Students used the self-assessment component to identify areas of strength and weakness, set personal goals, and monitor their development over time. Several participants noted that being able to measure their own progress increased their accountability and motivation to practice healthier cooking habits outside the classroom. This aligns with SCT's principle that self-monitoring and goal-setting are essential components of sustainable behavior change (Wilson, 2023).

4.5. Practical and Educational Impact

The validated tools demonstrated clear potential to improve teaching and learning outcomes in nutrition and food-related disciplines. Educators involved in the pilot phase reported increased student participation and more informed classroom discussions following assessment sessions. The tools enabled them to diagnose gaps in student understanding, adapt lesson plans accordingly, and provide targeted support where necessary.

From a curriculum design perspective, the use of assessment tools introduced a formative structure to course delivery. Instead of relying solely on summative evaluations (e.g., end-of-semester exams), instructors began integrating assessments as ongoing feedback tools that guided student progress. This shift encouraged a more dynamic, responsive, and learner-centered pedagogy.

Additionally, the tools proved adaptable across disciplines. While designed for students in nutrition and home economics programs, the instruments were found useful for students in related fields such as hospitality, public health, and teacher education. This cross-disciplinary relevance enhances the tools' scalability and sustainability.

4.6. Public Health and Behavioral Implications

The integration of validated assessment tools into tertiary-level education holds important implications not only for academic success but also for public health outcomes. Poor dietary habits among Nigerian youth have been linked to rising rates of obesity, hypertension, and nutrient deficiencies (Domínguez *et al.*, 2021). By equipping students with measurable culinary and nutrition skills, the study provides a pathway toward healthier behaviors that can extend beyond the classroom into homes, communities, and workplaces.

The feedback loop generated by these tools reinforces behavioral accountability. Students who were able to visualize their progress—via scores, feedback, and goal tracking—reported increased awareness of food choices and confidence in applying healthy cooking practices. Some participants began adopting meal planning techniques, reducing their intake of processed foods, and exploring affordable alternatives to high-fat or high-sodium items. These behaviors suggest that assessment-driven education may serve as a catalyst for reducing diet-related diseases in the long term, especially when implemented on a larger scale.

The findings also highlight the potential for social transfer. Students frequently shared knowledge acquired through the assessments with peers, roommates, and family members, effectively becoming nutrition advocates in their own environments. This ripple effect, where individual learning leads to community-level change, reflects the principles of social diffusion theory and strengthens the case for integrating assessment-based food literacy education in institutional settings.

4.7. Contextual and Cultural Sensitivity

A major strength of the developed tools is their cultural adaptability. Many assessment items were tailored to reflect local ingredients, cooking practices, and dietary norms, which increased relevance and learner engagement. This approach addressed previous concerns in nutrition education, where curricula were often imported or overly theoretical, limiting their applicability in diverse Nigerian communities.

For example, recipe-based scenarios incorporated staple Nigerian dishes such as yam porridge, jollof rice, and akara. These familiar contexts made it easier for students to relate to assessment items and improved their confidence in applying nutritional principles to their own diets. Students noted that they were more likely to engage with content that "looked like their own kitchen" rather than foreign examples.

Such cultural alignment is critical for equity in education. Tools that recognize students' backgrounds, resources, and experiences help reduce learning disparities and foster inclusivity. Furthermore, they make nutrition education more meaningful and transformative, shifting it from an abstract concept to an actionable, everyday skill.

4.8. Assessment Tools and Model Outcomes

The development and application of assessment tools for culinary competence and nutritional knowledge were guided by the multi-step framework summarized in **Table 1** as a model on selecting assessment tools for culinary competence and nutritional knowledge. This model functioned as both a developmental guide and an evaluative structure, ensuring that assessment tools were grounded in theory, aligned with intended learning outcomes, and adaptable to the Nigerian educational context.

Each component of the model was tested and refined during the study:

- (i) **Defining Desired Learning Outcomes:** Educators identified specific competencies—such as food preparation techniques, label interpretation, and nutrient categorization—as foundational skills. Assessment items targeting these areas showed high item-total correlation ($r > 0.70$), confirming alignment with defined learning goals.
- (ii) **Assessment Method Consideration:** The combination of written tests, scenario-based items, and hands-on practical assessments provided a multidimensional approach. Results indicated that students performed better when assessments were varied, supporting the use of multimodal formats. Practical assessments were particularly effective in reinforcing procedural knowledge and boosting student engagement.
- (iii) **Theoretical Alignment:** The Social Cognitive Theory constructs were operationalized within the tools, with measurable outcomes linked to self-efficacy, observational learning, and motivation. Statistical analysis revealed that students with higher self-efficacy scores also showed higher practical task scores ($r = 0.62$), validating the relevance of SCT as a guiding framework.
- (iv) **Validity and Reliability Assessment:** As discussed earlier, content and construct validity were confirmed through expert input and factor analysis. The final version of the tools

achieved a Cronbach's alpha of 0.87, indicating high internal consistency. The tools reliably captured the core domains of culinary and nutritional competence.

- (v) **Cultural Relevance and Practicality:** Adjustments based on local feedback—such as referencing common Nigerian dishes—enhanced student comprehension and reduced ambiguity. This localization improved response accuracy and satisfaction, as confirmed by qualitative feedback from both students and instructors.
- (vi) **Implementation and Feedback Loops:** The tools were deployed across multiple sessions with embedded feedback components. Students used results to set goals, monitor personal development, and request support where needed. This continuous feedback loop created a culture of formative learning, where assessment was integrated into the learning process, not separated from it.

Overall, the assessment tools proved to be effective, culturally appropriate, and pedagogically impactful. They fostered not only improved educational outcomes but also heightened personal agency in health-related decision-making among students. These results reinforce the broader claim that validated, context-sensitive assessment tools are transformative—not only as evaluative measures but as instructional catalysts in both culinary education and public health.

Table 1. A Model on selecting assessment tools for culinary competence and nutritional knowledge for Nigerian tertiary students.

Step	Description	Action	Indicator
Define Desired Learning Outcomes	Clearly define the desired learning outcomes related to culinary competence and nutritional knowledge.	Identify specific skills and knowledge areas to be assessed.	Clearly articulated learning outcomes related to culinary competence and nutritional knowledge.
Consider Assessment Methods	Evaluate different assessment methods such as written exams, practical assessments, observations, and self-assessment questionnaires.	Determine which assessment methods align with the defined learning outcomes.	List of assessment methods that align with the defined learning outcomes.
Theories	Consider the Social Cognitive Theory or any other related theories.	Determine which theory align with your learning outcome.	A theory that align with the defined learning outcome
Assess Alignment and Validity	Ensure the selected assessment tools align with the desired learning outcomes and measure students' abilities accurately.	Review the content and format of assessment tools for alignment with learning outcomes.	Validity study conducted to confirm assessment tools measure desired competencies accurately.
Consider Practicality and Feasibility	Assess the practicality and feasibility of implementing the chosen assessment tools within the Nigerian tertiary education context.	Evaluate available resources, time constraints, and scalability of chosen assessment tools.	Assessment tools deemed practical and feasible for implementation in the given context.
Pilot Testing and Refinement	Conduct pilot testing and gather feedback to refine and improve the assessment tools.	Administer tools to a small student sample and gather assessor feedback.	Feedback collected and used to refine and improve assessment tools.

Table 1 (continue). A Model on selecting assessment tools for culinary competence and nutritional knowledge for Nigerian tertiary students.

Step	Description	Action	Indicator
Consider Cultural Relevance	Ensure the assessment tools are sensitive to the cultural context of Nigerian tertiary students.	Evaluate assessment tools for cultural sensitivity and relevance.	Assessment tools deemed culturally sensitive and relevant for Nigerian tertiary students.
Ongoing Evaluation and Adaptation	Continuously evaluate the effectiveness of the assessment tools and make necessary adaptations.	Regularly review the validity and reliability of assessment tools.	Assessment tools consistently evaluated and updated based on validity and reliability.

Based on **Table 1**, it provides a thorough framework for choosing evaluation instruments intended especially for assessing nutritional awareness and culinary proficiency among Nigerian university students.

- (i) **Define Desired Learning Outcomes:** This first stage highlights how important it is to specify exactly what culinary competency and nutritional understanding students should possess. Teachers create explicit learning objectives by defining the precise knowledge and skill domains that need to be evaluated. These objectives form the basis for the choice of relevant assessment instruments.
- (ii) **Consider Assessment Methods:** In this case, teachers assess a range of assessment techniques, including written tests, practical evaluations, observations, and self-assessment surveys. The objective is to ascertain which approaches most closely correspond with the specified learning objectives, making certain that the selected instruments accurately assess students' culinary proficiency and nutritional awareness.
- (iii) **Select Theory:** Teachers look at several theories, like the Social Cognitive Theory. The focus is to verify whether these theory will help to achieve the learning outcomes, making sure that students culinary proficiency and nutritional awareness can be asessed actually through the application of these theories.
- (iv) **Assess Alignment and Validity:** In this step, the emphasis is on making sure that the assessment instruments chosen appropriately gauge students' aptitudes in relation to the specified learning objectives. Teachers verify that the tools' format and content match the learning objectives by going over them. Furthermore, a validity study is carried out to confirm that the assessment instruments correctly measure the required competencies.
- (v) **Consider Practicality and Feasibility:** Educators evaluate the viability and practicality of using the selected evaluation instruments in the Nigerian tertiary education context in this step. Considerations like time restrictions, scalability, and resource availability are taken into account to make sure the chosen tools can be successfully incorporated into the learning environment.
- (vi) **Pilot Testing and Refinement:** A small sample of students are given the assessment instruments as part of a pilot test, and assessors' input is gathered. In order to fix any problems or concerns found during the testing process, this feedback is essential for enhancing and optimising the tools.

- (vii) Consider Cultural Relevance: This phase highlights how crucial it is to make sure the evaluation instruments are pertinent and sensitive to cultural differences, taking into account the many cultural backgrounds of Nigerian university students. Teachers assess the tools for cultural appropriateness to make sure the students' cultural backgrounds are represented.
- (viii) Ongoing Evaluation and Adaptation: Lastly, the methodology supports ongoing assessments of the assessment instruments' efficacy and the gradual implementation of any required modifications. The validity and reliability of the instruments are regularly reviewed to make sure they continue to be a reliable means of assessing students' nutritional knowledge and culinary proficiency.

Essentially, this model offers educators a methodical way to choose, create, and improve assessment instruments that are in line with learning goals, sensitive to cultural differences, and useful for gauging students' proficiency in the culinary arts and nutritional knowledge in the context of Nigerian tertiary education. By taking these actions, educators can improve the standard of assessment procedures and eventually help Nigerian tertiary students succeed academically and in their whole educational experience.

4.9. Finalization of the Assessment Model

The final stage of the study resulted in the creation of a model for selecting and applying assessment tools for culinary competence and nutritional knowledge in Nigerian tertiary institutions. This model (presented earlier in Table 1) includes the following components:

- (i) Defining learning outcomes aligned with national curriculum standards
- (ii) Evaluating assessment methods for compatibility with outcomes and learner contexts
- (iii) Aligning with theory, specifically Social Cognitive Theory, to ensure learning constructs are embedded
- (iv) Ensuring cultural sensitivity and practicality for implementation across diverse institutions
- (v) Establishing validity and reliability through rigorous statistical and qualitative analysis
- (vi) Implementing and refining tools using feedback and continuous review

This model serves as both a framework and a checklist for educators, curriculum developers, and policymakers. It emphasizes the importance of context, inclusivity, and continuous evaluation. Most importantly, it positions assessment not as an endpoint but as an integral part of the learning journey.

4.10. Data Analysis

This study offers a comprehensive exploration into the development, validation, and implementation of assessment tools designed to measure culinary competence and nutritional knowledge among Nigerian tertiary students. The findings affirm the central premise that educational assessment, when rooted in robust theoretical models and culturally relevant practices, serves not merely as a tool for measurement but as a transformative agent for learning and behavior change.

One of the key insights derived from the research is the multifunctional role of assessment tools in shaping both instructional delivery and student learning experiences. By using a structured, theory-driven development model grounded in Social Cognitive Theory, the study demonstrated how tools could be crafted to align with learning outcomes, engage learners, and produce measurable improvement in both knowledge and skill. These tools served not

only to assess learning but also to guide curriculum planning, improve pedagogical strategies, and promote health-conscious behaviors.

From a theoretical perspective, the integration of Social Cognitive Theory (SCT) into the development process proved invaluable. SCT's core constructs—self-efficacy, observational learning, motivation, and self-regulation—were explicitly embedded in the design of the tools and validated through the results. Students with higher self-efficacy scores consistently demonstrated better performance in both written and practical assessments. This reinforces Bandura's assertion that confidence in one's capabilities is directly related to task engagement and success. The incorporation of observational learning through scenario-based tasks allowed students to model real-life decision-making, while the self-assessment components fostered self-regulation and reflection—critical components in developing lifelong healthy behaviors.

A significant outcome of the study was the high reliability and validity of the assessment instruments. The tools displayed strong internal consistency (Cronbach's $\alpha = 0.87$), robust construct validity confirmed via factor analysis, and positive student reception during pilot testing. This psychometric strength provides assurance that the instruments can be used across different institutional settings and adapted for broader educational and health initiatives. Furthermore, the practical orientation of the tools—particularly the inclusion of cooking demonstrations and scenario-based assessments—allowed students to apply their knowledge in meaningful ways, bridging the traditional gap between theory and practice.

The study also highlights the importance of cultural relevance in assessment design. Nigerian tertiary students come from diverse ethnic, regional, and socio-economic backgrounds, each of which influences their dietary habits and culinary practices. The tools developed in this research deliberately incorporated local food items, regional recipes, and culturally familiar scenarios. This localization was instrumental in boosting student engagement, comprehension, and confidence. Educators reported that students responded more enthusiastically to assessments that reflected their lived experiences, which supports the argument that culturally grounded education enhances learning outcomes and inclusivity.

Beyond academic achievement, the study reveals broader public health implications. Students reported adopting healthier food practices, greater awareness of nutritional content, and improved self-confidence in cooking. These behavioral shifts suggest that validated assessment tools can serve as foundational interventions for population-level health outcomes. When implemented at scale, such tools can contribute to reducing non-communicable diseases, promoting nutrition-sensitive education, and empowering individuals with lifelong health skills. The ripple effect—where students influence their peers and households with improved practices—amplifies the impact beyond the classroom.

Nevertheless, the research also uncovered key challenges. Resource limitations in some institutions—particularly in terms of kitchen facilities, teaching materials, and instructor training—posed barriers to full implementation of practical assessments. The anxiety expressed by some students during hands-on evaluations highlights the need to create supportive assessment environments that prioritize learning over performance judgment. Addressing these concerns requires institutional investment, teacher training, and partnerships with organizations that can provide access to resources and experiential learning opportunities.

The development of the assessment selection model was a major contribution of the study. The model outlines clear, actionable steps for educators and curriculum developers, ranging from defining learning outcomes to ensuring cultural sensitivity and conducting pilot testing.

Importantly, the model is adaptable and scalable, making it suitable for diverse educational contexts beyond Nigeria. It supports a formative approach to assessment that emphasizes continuous improvement, learner feedback, and contextual appropriateness—principles that are increasingly valued in 21st-century education.

In sum, this discussion affirms the transformative potential of assessment tools in culinary and nutrition education. When thoughtfully designed, validated, and aligned with educational theory and local realities, these tools do far more than evaluate—they inspire. They transform students from passive recipients of information into active agents of change, capable of making informed dietary decisions, preparing nutritious meals, and promoting health within their communities. As such, validated assessment tools should be considered essential components of education and public health strategies aimed at nurturing well-rounded, health-literate, and competent individuals.

4.11. Role of Assessment in Health Education

Assessment plays a pivotal role in transforming health education from theoretical instruction into a dynamic, outcome-driven process. In the context of culinary competence and nutritional knowledge, validated assessment tools serve as strategic instruments that bridge the gap between learning and behavior, offering both diagnostic insights and educational direction. These tools provide measurable, actionable feedback that can shape curriculum design, guide instructional interventions, and support the development of self-regulated learners capable of making informed health decisions.

One of the primary contributions of assessment tools in health education is their ability to foster personalized learning experiences. By identifying individual strengths and weaknesses, assessments enable educators to tailor teaching strategies that address specific needs. Students benefit from timely feedback that encourages reflection and promotes deeper engagement with course content. This individualized approach enhances learning outcomes and supports the development of practical skills, especially in hands-on disciplines like nutrition and culinary arts.

Furthermore, assessments play a critical role in enhancing student motivation and self-efficacy. When learners can visualize their progress through structured evaluations—whether via written tests, practical tasks, or self-assessments—they develop a greater sense of agency over their learning journey. This empowerment is vital in health education, where long-term behavior change depends on internal motivation and confidence in one's ability to act. Assessment outcomes provide tangible proof of improvement, which reinforces students' belief in their capacity to adopt and maintain healthier lifestyle practices.

Assessment tools also contribute to curriculum innovation and refinement. Data derived from student performance can be analyzed to reveal gaps in instructional design or content delivery. For example, if students consistently underperform in meal planning or label interpretation, educators can adjust the curriculum to include more experiential learning or targeted tutorials. This feedback loop transforms assessment into a continuous quality improvement mechanism within the educational system.

In addition, assessments create opportunities for interdisciplinary integration and experiential learning. Through hands-on demonstrations, scenario-based simulations, and real-world problem-solving activities, students are encouraged to apply theoretical knowledge in practical contexts. These immersive experiences not only enhance understanding but also prepare students for real-life health decisions. As students engage in food preparation tasks, assess nutritional content, and reflect on their choices, they develop the cognitive and behavioral competencies needed to navigate complex food environments.

Importantly, assessment tools serve as conduits for public health advancement. Tertiary students represent a critical population in shaping future dietary norms and health practices. Equipping them with both knowledge and practical competence through assessment-guided education ensures that they are capable of modeling and promoting healthy behaviors within their families and communities. The ripple effect of such empowerment has the potential to reduce the burden of diet-related diseases and improve population-level health outcomes.

Moreover, in resource-constrained settings such as many Nigerian institutions, assessment tools offer a cost-effective and scalable strategy for health promotion. When integrated into existing curricula, they can function without the need for extensive infrastructure or expensive equipment. By aligning assessments with local dietary practices and cultural contexts, educators can achieve high engagement and relevance even in low-resource environments.

Finally, assessment fosters autonomy and lifelong learning. Students who regularly engage with reflective assessments are more likely to develop self-monitoring habits, goal-setting behaviors, and a proactive approach to health maintenance. These attributes are essential for adapting to changing health information and food environments in adulthood. In this way, assessment does not simply conclude the learning process—it extends it, cultivating a mindset oriented toward continuous improvement and informed living.

In summary, assessment in health education functions as a catalyst for deep learning, behavior change, and systemic impact. It supports students, educators, and institutions in building capacity for health-conscious, competent individuals who can contribute meaningfully to personal well-being and public health advancement. Validated tools designed for culinary and nutritional education stand as a model for how assessment can transform knowledge into practice and learners into agents of change.

4.12. Limitations and Challenges

Despite the promising results, several limitations and challenges emerged during tool development and implementation. First, resource constraints posed barriers in some institutions, particularly in implementing the practical components of the assessment. Limited access to kitchen facilities, cooking equipment, or demonstration spaces hindered full participation in the practical assessment segment. Addressing these gaps requires institutional investment and strategic partnerships with local food organizations, community kitchens, or home economics laboratories.

Second, while student feedback was overwhelmingly positive, some participants reported anxiety related to performance in the practical sessions. Although these assessments were formative, the perceived pressure of being "watched and evaluated" may have influenced performance. Educators noted the importance of emphasizing formative assessment as a learning opportunity rather than a judgmental exercise. Incorporating peer feedback and reflective journaling may help mitigate this issue in future iterations.

Third, the tools' reliance on self-reporting for certain items (e.g., self-efficacy scales) introduces potential biases. Students may overestimate their competence or respond in socially desirable ways. While this is a common limitation in educational research, triangulating self-reports with observational data and performance outcomes can help address these concerns.

4.13. Implications

Beyond tertiary institutions, the study's findings can be extended to secondary schools, community centers, vocational training programs, and public health campaigns. The tools and model developed here can serve as adaptable templates for various educational levels and community needs. For example, simplified versions of the tools can be used in youth health workshops, while more advanced versions could support culinary certification programs or professional development for nutrition educators.

Additionally, the data generated through these assessments can inform policy decisions related to school nutrition, youth health promotion, and curriculum reform. Ministries of education and health can use validated tools to assess the nutritional literacy of future teachers, healthcare workers, and other professionals whose roles impact population health.

The interdisciplinary potential of this approach is also noteworthy. By integrating insights from education, psychology, public health, and food science, the study exemplifies the value of collaborative frameworks in tackling complex health challenges. In a country like Nigeria, where educational outcomes and public health metrics are deeply intertwined, such holistic strategies are vital.

Also, there are important ramifications for the measurement and evaluation community from the study on using validated assessment instruments for nutritional knowledge and culinary competency:

- (i) The necessity of developing measures that effectively capture complex characteristics like culinary ability and nutritional knowledge is highlighted by the development and validation of assessment tools. This study establishes a standard for other sectors by demonstrating how stringent validation procedures can guarantee the validity and reliability of assessment instruments.
- (ii) The study highlights the necessity of assessment instruments customised for certain circumstances, like culinary techniques and knowledge of nutrition. This emphasises how crucial it is to match assessment content to the distinct cultural and geographic characteristics of a group, as this enhances the tools' contextual validity.
- (iii) This study has consequences outside of academic settings. Measurement and evaluation play a critical role in generating beneficial outcomes, and the ideas of tool development and validation can be used to a wide range of situations, such as workplace training, community health programmes, and public health efforts.
- (iv) The study shows how assessment data can be used to inform decisions about schooling. Professionals in measurement and evaluation can use the findings of this study to support evidence-based strategies that improve student learning outcomes and the efficacy of education.

The implications of integrating assessment tools for culinary competence and nutritional knowledge are equally pertinent for nutrition educators:

- (i) Utilising evaluation techniques, nutrition educators can pinpoint students' areas of strength and weakness. With the use of this data-driven approach, educational content can be customised to meet the specific needs of each learner.
- (ii) The study demonstrates how assessment instruments might improve students' interest in learning about nutrition. Education professionals can maintain learners' motivation and engagement in their learning process by measuring progress and giving prompt feedback.
- (iii) The study's emphasis on realistic simulations and demonstrations can serve as an inspiration for nutrition educators. By facilitating experiential learning, these

techniques help students close the knowledge gap between theory and real-world application.

- (iv) The assessment-driven method promotes learning autonomy and self-control. Nutrition instructors can empower students to take charge of their education by helping them create objectives, track their progress, and use the findings of their assessments to inform their future culinary and nutritional experiments.

5. CONCLUSION

Pulling the threads of this article together reveals a captivating tale that emphasises the transforming power of nutritional knowledge and culinary competency approved assessment tools. We have looked at how this model enable educators, students, and policymakers to bring in a new era of health consciousness and culinary skill via the prism of the Social Cognitive Theory. We have seen the fusion of theory and practice in the creation and development of evaluation instruments in Nigerian postsecondary institutions. With their ability to provide empirical insights that guide curriculum design, facilitate individualised interventions, and promote evidence-based evaluation, this model can completely change the field of health and home economics education. We have identified how evaluation tools enhance the power of education by promoting critical thinking, autonomy, and confidence. This study has far-reaching ramifications that provide insight on the public health situation. Better nutrition knowledge and cooking abilities are powerful weapons against diet-related health problems that might completely change Nigeria's health trajectory. Obstacles like resource constraints and cultural nuances serve as a constant reminder that careful planning, flexibility, and tact are essential while utilising these instruments. To fully understand the long-term effects and reveal the lasting influence of assessment-driven activities, more research is required. Collaborations among disciplines may produce comprehensive answers that go beyond institutional boundaries. Furthermore, this model's validity in a variety of educational contexts calls for further research and presents opportunities for national reform. Validated evaluation instruments have become essential components that connect theory, practice, empowerment, and transformation in the larger picture of health education. We invite researchers, educators, and policymakers to make use of the model presented in this article in order to improve the state of health and education in Nigeria and elsewhere.

A path forward for additional action and development is provided by the insights obtained from the combination of proven evaluation instruments for nutritional knowledge and culinary competency. To optimise the transformative capacity of these instruments and encourage healthier ways of living, the following suggestions are put forth:

- (i) To monitor the long-term effects of assessment-driven initiatives, conduct longitudinal studies. Over an extended period, Researchers may assess how assessment tools developed through the implementation of this model have affected students' cooking habits and dietary preferences in order to ascertain their long-term implications on public health outcomes.
- (ii) Promote multidisciplinary collaboration amongst nutrition educators, psychologists, public health experts, and measurement and evaluation specialists. This collaboration could lead to comprehensive strategies that address a wide range of culinary skills and nutrition education topics.
- (iii) Acknowledge the significance of cultural inclusion while developing assessment tools. Work together with specialists in anthropology and cultural studies to make sure that

the assessment's content represents the variety of Nigeria's dietary customs and culinary traditions.

- (iv) Encourage the distribution of funds to assist in the creation and application of assessment instruments. To further develop and grow these tools, this might involve funding grants for research, teacher training, and technological investments.
- (v) Give teachers the training they need to integrate assessment instruments into their lesson plans. Giving teachers the tools they need to give tests and analyse the data can improve the way that students learn in general.
- (vi) Increase the use of assessment instruments outside of traditional educational settings. Work together with neighbourhood community centres, cooking classes, and medical facilities to reach a larger audience and foster a health-conscious society.
- (vii) Examine whether assessment instruments can be scaled in different educational contexts, such as elementary and secondary schools. We can raise a generation that possesses fundamental culinary skills and nutritional knowledge by including these tools at a young age.
- (viii) Encourage cross-border cooperation to exchange experiences and best practices in incorporating nutritional information and culinary competency assessment methods. Innovative techniques can be informed by global experiences, which can enhance the implementation process.

5. AUTHORS' NOTE

The authors declare that there is no conflict of interest regarding the publication of this article. Authors confirmed that the paper was free of plagiarism.

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