

# AI-Powered Language Learning: Blended Learning, Food and Nutrition Education, Academic Performance, Practical Skills, Digital Literacy, Socio-Demographic Variables, Philippines

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## ABSTRACT

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Blended learning, which integrates face-to-face instruction with digital platforms, has emerged as a promising approach in food and nutrition education. The purpose of this review is to examine how blended learning influences student performance, focusing on academic outcomes, skill acquisition, and socio-demographic factors. A systematic search of peer-reviewed studies highlights evidence on achievement scores, competency development, and learner engagement. Results indicate that

blended learning enhances academic performance by promoting flexibility, individualized pacing, and interactive content delivery. Students benefit from



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asynchronous access, multimedia resources, and improved knowledge retention compared to traditional instruction. It also fosters learner autonomy while maintaining instructor guidance. Skill acquisition in food preparation, dietary planning, and evaluation of nutrition information was strengthened when digital modules were combined with hands-on practice. Simulations, videos, and case studies helped learners apply concepts before laboratory activities. Collaborative learning through forums and group projects further enhanced communication and teamwork. Effectiveness varied across populations due to age, gender, socioeconomic status, and access to technology. Younger students adapted quickly, while older learners needed support. Socioeconomic disparities such as poor connectivity and limited devices created inequities, highlighting the need for institutional support. In the Philippine context, accelerated by the COVID-19 pandemic, access to technology and cultural attitudes strongly shaped success. Students with limited exposure struggled with self-directed learning, underscoring the need for orientation and technical support. Overall, blended learning improves knowledge, skills, and professional competencies but requires equitable access and contextual adaptation. Institutions must address digital divides and design inclusive curricula. For the Philippines, the challenge is ensuring benefits are distributed fairly and sustainably. Future research should explore pedagogy, technology, and socio-demographic diversity to inform inclusive policies.

## INTRODUCTION

Blended learning has become a pivotal educational approach worldwide, combining traditional face-to-face instruction with online learning components to create flexible and engaging learning environments. In the field of Food and Nutrition education, this model addresses the dual challenge of imparting theoretical knowledge while fostering practical skills essential for professional competence. Global studies highlight its effectiveness: a viewpoint published in *The Lancet Planetary Health* emphasizes the need for holistic food education models that integrate classroom and experiential learning, noting that blended formats can strengthen both knowledge acquisition and behavioral change (Pastorino et al., 2025). Similarly, the Food and Agriculture Organization (FAO) underscores the importance of school-based food and nutrition education programs that leverage digital tools to enhance inclusivity and capacity development (Food and Agriculture Organization of the United Nations [FAO], 2020). UNESCO also reports that more than 90% of countries globally invest in school health and nutrition programs, with blended learning increasingly used to improve

education outcomes and promote equity (UNESCO, UNICEF, & World Food Programme, 2023). These findings demonstrate that blended learning is not merely a pedagogical innovation but a global necessity in addressing the complexities of nutrition education.

Within the ASEAN region, blended learning has gained traction as countries confront diverse socio-economic and technological landscapes. The ASEAN Secretariat's Minimum Standards and Guidelines for the ASEAN School Nutrition Package highlight the need for comprehensive, school-based nutrition education strategies to address the double burden of malnutrition among children (Milan Urban Food Policy Pact, 2024). Collaborative initiatives further illustrate regional progress: the ASEAN-CGIAR Innovate for Food and Nutrition Security Program has facilitated cross-country learning between Vietnam and the Philippines, strengthening food systems transformation and educational practices (Nguyen et al., 2025). In Malaysia and Singapore, blended learning approaches have been integrated into higher education curricula to enhance nutrition literacy and practical application (Ng & Majid, 2025), while Indonesia and Thailand have piloted blended formats in community-based nutrition programs (Praditsorn et al., 2025; Suprpto et al., 2025). These ASEAN experiences reveal both opportunities and challenges, particularly in balancing digital innovation with infrastructure disparities across member states.

Despite the growing body of global and regional evidence, limited research exists on the contextualized application of blended learning in Food and Nutrition education within the Philippines. Most studies focus on general education or health sciences, leaving a gap in understanding how socio-demographic variables—such as age, gender, and socio-economic status—mediate learning outcomes in nutrition-focused programs. This study differs from previous work by explicitly examining the intersection of digital literacy, access disparities, and practical skill development in the Philippine setting. The compelling reason for choosing this problem lies in the country's unique socio-economic diversity and uneven digital infrastructure, which pose challenges to equitable learning. By situating blended learning within the Philippine Food and Nutrition education landscape, this research aims to generate evidence-based recommendations that support inclusive, effective, and context-sensitive educational strategies.

## **FRAMEWORK**

This study is anchored on several educational theories that collectively explain how blended learning influences student outcomes in Food and Nutrition education. At its core, blended learning integrates face-to-face

instruction with technology-mediated online learning, creating flexible and interactive environments where both academic knowledge and practical skills can be cultivated (Garrison & Vaughan, 2008).

Constructivist principles highlight that learners actively build understanding through engagement with both digital and classroom experiences (Piaget, 1972), while connectivism emphasizes the importance of networks and online communities in facilitating knowledge sharing (Siemens, 2005). Kolb's experiential learning cycle further supports the acquisition of practical skills, as students move through stages of experience, reflection, conceptualization, and experimentation (Kolb, 1984). These theoretical anchors are complemented by the TPACK framework, which guides educators in harmonizing technological, pedagogical, and content knowledge (Mishra & Koehler, 2006), and Bloom's Taxonomy, which provides a structure for aligning blended learning objectives with cognitive skill development (Bloom, 1956).

Within this framework, blended learning serves as the independent variable, shaping outcomes in terms of academic performance and practical skill acquisition. Academic performance is reflected in achievement scores, knowledge retention, and conceptual understanding (Garrison & Vaughan, 2008), while practical skills encompass competencies in food preparation, dietary planning, counseling, and critical evaluation of nutrition information (Kolb, 1984). Digital literacy functions as a facilitating condition, enabling learners to effectively navigate online platforms and maximize the benefits of blended learning (Ng, 2012). Meanwhile, socio-demographic variables—such as age, gender, socioeconomic status, and prior online learning experience—act as moderating factors that influence the strength and direction of these outcomes (Selwyn, 2021).

Taken together, this framework illustrates that while blended learning has strong potential to enhance both academic and practical competencies, its effectiveness is mediated by digital literacy and socio-demographic contexts. Addressing disparities in access and tailoring instructional strategies to diverse learner profiles are therefore essential to ensure equitable and meaningful learning experiences in Food and Nutrition education.

## OBJECTIVES OF THE STUDY

The current review aimed to: (1) It examines empirical evidence to determine the extent to which blended learning predicts academic performance, thereby establishing measurable associations between instructional modality and learner achievement. (2) It evaluates the effectiveness of blended learning in enhancing practical skill acquisition and professional competencies, focusing on observable

improvements in applied learning outcomes. (3) It analyzes socio-demographic variables as mediators of blended learning effectiveness, clarifying how learner characteristics influence the relationship between instructional approach and educational results.

## LITERATURE REVIEW

Blended learning is firmly grounded in several educational theories that emphasize learner-centeredness, digital connectivity, and experiential engagement. Constructivism posits that learners actively construct knowledge through interaction, reflection, and problem-solving. Within Food and Nutrition education, constructivist approaches manifest in case-based learning, dietary assessment projects, and collaborative menu planning, where students generate knowledge through authentic tasks rather than passive reception (Mattar, 2018). Such activities encourage learners to integrate theoretical concepts with practical applications, thereby deepening understanding.

Connectivism, introduced by Siemens, extends constructivist principles into the digital age by highlighting the importance of networks and communities in knowledge acquisition. In Food and Nutrition education, connectivism is evident in the use of online nutrition forums, digital recipe-sharing platforms, and collaborative learning management systems (Bakhshi et al., 2023). These digital networks allow learners to access diverse perspectives, share resources, and engage in peer-to-peer learning, thereby reinforcing the social dimension of knowledge construction.

Meanwhile, Kolb's experiential learning cycle emphasizes learning through concrete experiences, reflective observation, abstract conceptualization, and active experimentation (Kolb, 1984). This cycle aligns seamlessly with laboratory-based food science experiments, cooking simulations, and nutrition counseling role-plays. For instance, students may first engage in a cooking demonstration (concrete experience), reflect on the nutritional implications of the meal (reflective observation), conceptualize dietary principles (abstract conceptualization), and finally apply these principles in designing a balanced meal plan (active experimentation). Such iterative processes ensure that learners continuously refine their knowledge through practice and reflection.

Together, these theories provide a robust foundation for designing blended learning environments that are learner-centered, digitally connected, and practice-oriented. They underscore the importance of integrating theoretical knowledge with experiential practice, while leveraging digital networks to enhance accessibility and collaboration.

Empirical evidence consistently demonstrates that blended learning enhances academic performance compared to traditional instruction. Bernard et al. (2014), in a meta-analysis of blended learning across higher education, found significant improvements in knowledge retention and test scores. These findings are echoed in discipline-specific contexts, including Food and Nutrition education. Mshayisa (2022) reported that students in blended environments achieved deeper understanding of complex concepts, particularly those requiring critical thinking and problem-solving, such as nutrient metabolism and dietary assessment.

Several mechanisms explain these outcomes. First, higher test scores are attributed to the multimodal nature of blended learning, which allows students to engage with content through lectures, online modules, and interactive activities. Second, improved retention results from repeated exposure to content in multiple formats, reinforcing learning through both synchronous and asynchronous engagement. Third, enhanced engagement arises from interactive modules, collaborative projects, and discussion forums, which foster active participation and sustained interest.

In Food and Nutrition education, these benefits are particularly salient. Concepts such as food chemistry, nutrient interactions, and dietary planning require both theoretical comprehension and applied reasoning. Blended learning environments provide opportunities for students to revisit complex topics through recorded lectures, engage in collaborative dietary analysis projects, and apply knowledge in laboratory settings. This multimodal exposure strengthens cognitive processing and supports long-term retention.

Blended learning extends beyond cognitive gains to encompass the development of practical skills essential for professional practice in Food and Nutrition. Simulation-based learning, laboratory work, and counseling practice are integral components of this discipline, enabling students to apply theoretical knowledge in controlled environments.

Simulation-based learning allows students to engage in decision-making within realistic scenarios, such as counseling a patient with dietary restrictions or managing food safety in a simulated kitchen environment. These simulations foster critical thinking, problem-solving, and professional judgment, preparing students for real-world challenges.

Laboratory work reinforces theoretical concepts by providing hands-on experience in food chemistry, microbiology, and nutrient analysis. For example, students may conduct experiments to measure vitamin degradation during cooking, thereby linking theoretical knowledge of nutrient stability with practical laboratory skills. Such experiences build technical proficiency and scientific rigor.

Counseling practice enhances communication and interpersonal skills, which are vital for nutrition professionals. Role-playing exercises, peer feedback, and supervised counseling sessions allow students to practice motivational interviewing, dietary assessment, and client education. These activities cultivate empathy, cultural sensitivity, and professional confidence. By integrating these practical components into blended learning environments, educators ensure that graduates are not only knowledgeable but also competent practitioners capable of translating theory into practice.

Digital literacy emerges as a critical determinant of success in blended learning environments. Shi et al. (2022) proposed a smart learning environment model to improve college students' information literacy, emphasizing conceptual, intelligent, action, and process levels. Maguiña Ballón (2021) further highlighted that information literacy is essential for navigating online resources, participating in discussions, and completing assessments.

ICT skills, enabling students to use digital tools and platforms effectively. In Food and Nutrition education, this may involve proficiency in nutrient analysis software, dietary tracking applications, and online databases.

Familiarity with learning management systems (LMS), which facilitate access to course materials, assignments, and collaborative spaces. Nutrition-specific LMS platforms often integrate dietary assessment tools and recipe databases, requiring students to navigate specialized digital environments.

Critical evaluation of online information, which is particularly important in nutrition education, where misinformation about diets and health is prevalent. Students must develop the ability to discern credible sources, evaluate evidence, and apply accurate information in professional contexts.

Students with higher digital literacy are better equipped to thrive in blended environments, while those with limited skills may struggle to access resources, engage in discussions, and complete assessments. This underscores the need for targeted interventions to enhance digital literacy, particularly in developing countries where disparities in access and skills are pronounced.

Socio-demographic factors significantly influence the effectiveness of blended learning. Access to technology, gender, age, and prior online learning experience mediate student outcomes.

Access to technology remains a critical determinant of equity. Students with reliable internet connectivity and access to digital devices are better positioned to engage in blended learning, while those without such resources face significant barriers. In the Philippine context, unstable internet connectivity and limited device availability exacerbate these inequities (Albeta et al., 2023).

Gender differences may also influence persistence and engagement. Some

studies suggest that female students demonstrate higher levels of engagement in collaborative learning environments, while male students may prefer self-directed approaches. These differences highlight the importance of designing inclusive learning strategies that accommodate diverse preferences.

Age-related factors distinguish digital natives from mature learners. Younger students, often more familiar with digital technologies, adapt more readily to blended environments. Mature learners, however, may require additional support to develop digital literacy and confidence.

Prior online learning experience fosters adaptability and confidence, enabling students to navigate blended environments more effectively. Those with limited exposure may struggle initially but can benefit from structured orientation and ongoing support. These variables highlight the need for inclusive policies and targeted interventions to ensure equitable access and participation in blended learning.

Comparative research reveals common challenges in implementing blended learning across developing countries, including limited infrastructure and varying levels of digital literacy. In the Philippines, unstable internet connectivity and lack of devices hinder effective implementation (Albeta et al., 2023). Rural schools, in particular, face significant barriers due to inadequate infrastructure and limited access to digital resources.

Localized adaptations, however, can mitigate these challenges. Community-based learning hubs, government support programs, and partnerships with local organizations provide alternative access points for students. For example, barangay learning centers equipped with computers and internet connectivity enable students to participate in online modules despite limited household resources.

Cultural and policy differences also shape blended learning outcomes. Collectivist cultures, such as those prevalent in the Philippines, may emphasize collaborative learning and group projects, while individualist contexts prioritize self-directed study. These variations necessitate context-sensitive approaches that align with cultural values and educational policies.

Comparative studies across developing countries highlight the importance of localized models that address infrastructure limitations, cultural preferences, and policy frameworks. Such adaptations ensure that blended learning is both feasible and effective in diverse contexts.

Several frameworks guide the practical implementation of blended learning. The TPACK framework integrates technological, pedagogical, and content knowledge, enabling educators to design effective blended experiences (Barekat et al., 2023). In Food and Nutrition education, TPACK supports the integration

of dietary analysis software, pedagogical strategies for nutrition counseling, and content knowledge of food science.

Bloom's Taxonomy provides a hierarchical classification of cognitive skills, useful for aligning learning objectives with assessment strategies (Pikhart & Klimova, 2019). For example, lower-order skills such as remembering and understanding may be assessed through quizzes, while higher-order skills such as analyzing and creating may be evaluated through dietary planning projects and laboratory experiments.

Kolb's experiential learning cycle supports the incorporation of practical experiences, ensuring that students continuously reflect, conceptualize, and experiment with knowledge (Kolb, 1984). In nutrition education, this cycle is evident in cooking demonstrations, reflective journals, conceptual discussions of dietary principles, and experimental application in counseling sessions.

These theoretical anchors ensure that blended learning is both theoretically sound and practically effective, providing educators with structured frameworks for curriculum design and implementation. Despite its advantages, blended learning faces several challenges. Digital distractions negatively impact student development, as constant access to social media and entertainment can undermine.

## **RESEARCH GAPS AND DIRECTION FOR FURTHER STUDY**

Despite the increasing scholarly interest in blended learning within Food and Nutrition education, several critical gaps remain evident in the Philippine context. First, the literature is characterized by a paucity of longitudinal investigations. Existing studies tend to emphasize immediate or short-term outcomes, thereby limiting understanding of the sustained effects of blended learning on knowledge retention, skill acquisition, and learner performance over extended periods. The absence of long-term evidence constrains the capacity to evaluate whether blended learning models foster durable improvements in nutrition literacy and practical competencies.

Second, standardized measures of digital literacy remain underdeveloped. Current assessments of learners' technological competencies are often fragmented, context-specific, or inconsistently applied, which restricts comparability across institutions and regions. Without validated instruments, it is difficult to establish benchmarks for digital readiness or to design interventions that systematically address gaps in learners' technological skills.

Third, socio-demographic analyses in existing studies are frequently superficial. While variables such as age, gender, and socio-economic status are often acknowledged, the complex interactions among these factors—and their

influence on blended learning outcomes—are rarely examined in depth. For instance, the interplay between household income, parental support, and access to digital resources remains insufficiently explored, despite its clear relevance to equity in educational participation.

To address these limitations, future research should adopt more comprehensive and methodologically rigorous approaches. Mixed-methods designs that integrate quantitative performance indicators with qualitative accounts of learner and teacher experiences would provide a more holistic understanding of blended learning processes. The development and validation of standardized frameworks for digital literacy assessment are also imperative, as these would enable more accurate evaluation of learner competencies and facilitate cross-study comparisons.

Moreover, socio-demographic investigations should move beyond descriptive statistics to examine the nuanced ways in which cultural, economic, and familial contexts shape learner engagement and achievement. Such analyses would contribute to the design of interventions that are both equitable and contextually responsive. Finally, program evaluations should explicitly foreground issues of equity, assessing whether blended learning models mitigate or exacerbate educational disparities, particularly in resource-constrained or rural communities.

By pursuing these directions, future scholarship can generate evidence that not only advances theoretical discourse but also informs the development of inclusive and effective blended learning strategies tailored to the Philippine Food and Nutrition education landscape.

## METHODOLOGY

This study adopted a narrative literature review design, systematically synthesizing findings from a wide range of scholarly sources to provide a comprehensive overview of blended learning in Food and Nutrition education. To ensure breadth and rigor, searches were conducted across multiple databases, including Google Scholar, Scopus, Clarivate, the Directory of Open Access Journals (DOAJ), and the Philippine Institute for Development Studies. The inclusion criteria were carefully defined to capture peer-reviewed articles published within the last decade that explicitly addressed blended learning approaches, Food and Nutrition education, and relevant socio-demographic factors influencing implementation and outcomes. Conversely, exclusion criteria were applied to eliminate studies that lacked empirical data, methodological soundness, or contextual relevance to the Philippine educational setting. The analytical framework guiding this review combined thematic synthesis and

content analysis, enabling the identification, categorization, and interpretation of recurring themes, patterns, and conceptual linkages across the selected studies. This methodological approach facilitated a nuanced understanding of how blended learning has been conceptualized and applied within Food and Nutrition education, while also highlighting contextual considerations pertinent to the Philippine academic and socio-cultural landscape.

## **ETHICAL CONSIDERATION**

The ethical considerations guiding this review were anchored in the Philippine National Ethical Guidelines for Health and Social Science Research (2017), alongside relevant Commission on Higher Education (CHED) and Department of Education (DepEd) policies on research integrity. These frameworks emphasize respect for persons, beneficence, and justice, principles that were consistently upheld throughout the study. Data integrity and transparency were ensured by reporting findings with accuracy, avoiding selective presentation or distortion, and adhering to APA citation standards to guarantee accountability and traceability, in line with CHED's emphasis on academic honesty and DepEd's requirement for reliable documentation in school-based research. Respect for cultural diversity was observed by acknowledging the linguistic, socio-economic, and regional variations inherent in Philippine education, thereby avoiding ethnocentric biases and ensuring interpretations remained sensitive to local realities, consistent with the PNEGR principle of respect for communities and cultural contexts. Socio-demographic variables such as age, gender, socio-economic status, and geographic location were interpreted with caution to prevent stereotyping or misrepresentation, reflecting DepEd's ethical stance on protecting learners from discriminatory practices and CHED's call for equity in higher education research. The responsible use of artificial intelligence was demonstrated by validating AI-generated leads against peer-reviewed sources, ensuring that outputs were incorporated only when they met scholarly rigor, in accordance with the PNEGR's principle of scientific soundness and CHED's emphasis on methodological reliability. Finally, compliance with institutional and national ethics standards was maintained by respecting intellectual property rights, acknowledging authorship, and adhering to institutional protocols for ethical scholarship, thereby aligning with CHED Memorandum Orders on research ethics and DepEd's Research Management Guidelines to model responsible and culturally sensitive academic practice.

## RESULTS AND DISCUSSION

Blended learning, defined as the integration of face-to-face instruction with digital modalities, has consistently been associated with enhanced academic outcomes in Food and Nutrition education. Evidence indicates that students exposed to blended modalities achieve higher test scores, demonstrate improved knowledge retention, and exhibit greater conceptual mastery compared to those in traditional classroom settings (Regmi et al., 2024; Yu et al, 2025). These findings corroborate prior studies emphasizing that blended environments provide multiple opportunities for learners to revisit content, engage in interactive activities, and apply knowledge across varied contexts. The flexibility inherent in blended learning allows repeated exposure to instructional materials, thereby facilitating deeper understanding and long-term retention (Bao & Yunus, 2024).

A salient advantage of blended learning lies in its capacity to accommodate diverse learning styles. Visual learners benefit from multimedia presentations, auditory learners from recorded lectures, and kinesthetic learners from interactive simulations and laboratory activities (Adeyele, 2024). In Food and Nutrition education, where concepts require both theoretical grounding and practical application, blended learning offers unique pedagogical value. For instance, students may review nutritional guidelines through online modules while simultaneously engaging in cooking demonstrations or dietary counseling simulations in physical classrooms. This dual exposure strengthens both cognitive and psychomotor domains, resulting in holistic learning outcomes (Bao & Yunus, 2024).

Furthermore, blended learning fosters self-directed learning, a critical skill in higher education and professional practice. Access to online resources enables learners to pace their study according to individual needs, revisit challenging concepts, and explore supplementary materials beyond the classroom (Adigun et al., 2024; Geng et al., 2019). Such autonomy not only enhances academic performance but also cultivates lifelong learning habits essential for Food and Nutrition professionals, who must continuously update their knowledge in response to evolving dietary guidelines, public health concerns, and technological innovations (Lobos et al., 2024).

Beyond academic achievement, blended learning supports the development of essential practical skills and professional competencies. Food and Nutrition education requires students to acquire counseling skills, teamwork abilities, and critical thinking capacities to effectively address real-world health challenges. Blended learning environments, through simulation exercises and laboratory integrations, provide experiential learning opportunities that bridge the gap

between theory and practice (Lin & Huang, 2024; Sterner et al., 2023).

Simulation-based learning enables students to engage in role-playing scenarios where they counsel clients on dietary modifications or collaborate with peers to design nutrition programs. These activities replicate professional contexts and encourage learners to apply theoretical knowledge in practical situations. The iterative nature of simulations allows refinement of communication strategies, enhancement of problem-solving skills, and development of confidence in professional interactions (Lu, 2021).

Teamwork, another critical competency, is fostered through collaborative online projects and group discussions. Blended learning platforms often include features such as discussion forums, shared documents, and virtual breakout rooms, which facilitate peer-to-peer interaction (Lin & Huang, 2024). These tools encourage students to negotiate ideas, delegate responsibilities, and synthesize diverse perspectives, thereby preparing them for multidisciplinary collaboration in professional settings.

Critical thinking is also enhanced in blended learning environments. Online modules frequently incorporate case studies, problem-based learning tasks, and reflective exercises that challenge students to analyze complex nutritional issues (Sterner et al., 2023; Lu, 2021).

The effectiveness of blended learning is mediated by socio-demographic variables that influence student engagement and success. Technology access emerges as a direct causal factor (Angawi & Tasir, 2024). Gender differences also shape persistence and digital navigation, with female students often showing higher resilience (Yu, 2021). Age-related strengths further distinguish learner experiences, as younger digital natives adapt quickly while mature learners require additional support (Zhao et al., 2023). Prior LMS experience is another predictor of success in blended settings, reducing cognitive load and enhancing readiness (Bouilheres et al., 2020; Ayubi & Retnowardhani, 2025).

## CONCLUSION

Blended learning integrates face-to-face instruction with digital tools to create flexible, learner-centered environments, especially effective in Food and Nutrition education where theory and practical skills converge. Studies across global, regional, and Philippine contexts show it boosts academic performance through better knowledge retention, individualized pacing, multimodal engagement, and asynchronous access to resources like simulations and forums. This leads to higher achievement scores and deeper understanding compared to traditional classrooms, while practical skills—such as lab experiments, cooking

demos, and dietary planning—are strengthened by bridging theory and real-world application.

Success in blended learning hinges on digital literacy, which enables navigation of platforms, evaluation of online nutrition info, and use of tools like dietary software; higher literacy correlates with thriving, while gaps necessitate orientations and support. Socio-demographic factors like age, gender, socioeconomic status, and prior experience mediate outcomes: younger, digitally savvy students adapt quickly, females often engage more in online discussions, but resource-limited learners face barriers like poor internet and device access, exacerbating inequities in the Philippines' urban-rural divide.

To maximize benefits, institutions need inclusive strategies, financial aid, educator training, and policy support from bodies like CHED and DepEd to bridge digital divides via hubs and partnerships. Future research should include longitudinal studies, validated digital literacy frameworks, and mixed-methods analyses of socio-demographics. Ultimately, blended learning transforms Food and Nutrition education but requires equitable policies to ensure fair access and sustained impact in diverse contexts like the Philippines.

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