



Integrating Artificial Intelligence in Home Economics Technology Education

Teacher Strategies for Digital Innovation

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ABSTRACT

This study investigated the integration of Artificial Intelligence (AI) in Home Economics instruction to foster digital innovation, efficiency, and sustainability. It specifically assessed the levels of AI literacy, self-efficacy, and self-management among 78 postgraduate students from one of the state universities in Cebu, Philippines, during the 2025–2026 academic year. Utilizing a descriptive-survey design, data were gathered via adapted Google Forms and analyzed using frequency, weighted mean, and Pearson r. Results indicated that respondents possessed a high level of AI literacy, particularly regarding ethical considerations and basic applications, though detection skills were lower. In contrast, self-efficacy and self-management were rated as moderate. This disparity suggests that while educators understand AI concepts, they lack the requisite confidence and regulatory skills to implement these tools effectively in classroom instruction. Statistical analysis revealed no significant relationship between AI literacy and either self-efficacy or self-management, implying that theoretical knowledge does not automatically translate into instructional confidence or pedagogical usage. The study concludes that technological awareness is insufficient for transformative digital innovation without corresponding psychological and managerial readiness. While literacy is established, the lack of correlation with confidence highlights a critical gap in professional application. Consequently, there is an urgent need for targeted professional development programs that move beyond basic literacy to foster practical competence. This research accentuates that institutional support must prioritize bridging the gap between understanding and the self-regulated execution of AI-driven strategies.

Keywords

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Introduction

The rapid growth of artificial intelligence (AI) is reshaping teaching and learning, prompting educators to rethink how knowledge, skills, and human judgment evolve in technology-rich environments. Scholars emphasize that AI can support teachers, personalize learning, and transform instructional practice, while also raising important social and ethical questions about its use in education [1]. In higher education, however, many instructors continue to navigate AI with limited guidance and uneven institutional support, making teacher competence, confidence, and ethical awareness critical to meaningful integration [2].

Research in precision education further shows how AI-enabled tools can create adaptive and human-centered learning experiences [3], while innovation-oriented contexts reveal that engagement with AI remains modest and often fragmented, signaling the need for clearer pedagogical models [4]. At the policy level, global reviews highlight AI's potential benefits but also persistent inequalities in access and implementation across regions [5]. In classroom practice, teachers frequently integrate AI within existing subjects rather than treat it as a standalone topic, helping students connect technology to authentic learning experiences [6].

These insights strongly resonate with Home Economics Technology Education (HETE) — a discipline grounded in everyday life, care, and practical decision-making. Yet, despite AI's expanding role in other fields, little empirical evidence exists on how AI is understood, adopted, or meaningfully integrated within HETE. Current studies illuminate teacher readiness, innovation, and implementation challenges in broader higher-education and entrepreneurial contexts [2, 4] and the promise of AI-supported precision learning [3], but they offer a limited understanding of how HETE educators experience and manage AI in practice-based learning environments. This reveals a clear research gap concerning teacher readiness, pedagogical approaches, and contextual strategies for AI integration in a human-centered and vocationally oriented field such as HETE — a gap this study seeks to address.

Addressing this gap is essential for designing professional development programs that promote digital innovation in the technical-vocational field [5]. Hence, this study examines AI integration in HETE by identifying levels of AI literacy, self-efficacy, and self-management among postgraduate students from one of the state universities in Cebu, Philippines, for the 2025-2026 academic year. Somehow, international studies have explored teacher attitudes, yet limited

Philippine research investigates these specific management strategies [6]. As such, the study's findings provide a basis for a proposed learning and development program design, ensuring that vocational curriculum enhancement aligns with global AI-driven educational standards.

Literature Review

A. Self-Efficacy, TPACK, and Technology Acceptance

To complement psychological factors, the Technological Pedagogical Content Knowledge (TPACK) framework provides a structural roadmap for effective classroom technology use. Mishra and Koehler [7] expanded upon Shulman's pedagogical content knowledge by adding a vital technological dimension. This framework suggests that Home Economics teachers must synthesize content knowledge, pedagogical strategies, and technological proficiency to achieve digital innovation. Specifically, understanding how AI tools (Technological Knowledge) can represent complex subject matter (Technological Content Knowledge) allows for more dynamic instructional strategies. Ultimately, TPACK enables educators to discern the most appropriate pedagogical approaches for teaching specific vocational skills while utilizing modern artificial intelligence applications.

The Technology Acceptance Model (TAM) serves as a critical lens for evaluating why Home Economics educators choose to adopt or reject artificial intelligence. Davis [8] posits that perceived usefulness and perceived ease of use are the primary drivers of technological integration. If teachers believe that AI tools significantly enhance instructional performance without requiring excessive effort, they develop a positive attitude toward usage. This attitude fosters a behavioral intention to utilize these systems regularly in practical teaching scenarios. Synthesizing these theoretical perspectives reveals a multifaceted approach to digital innovation in technology education. Self-efficacy reflects the internal confidence of teachers, while TPACK offers the necessary structural knowledge for blending AI with pedagogy, and TAM explains the external factors influencing adoption. Home Economics educators who perceive AI as both useful and accessible are more likely to integrate these tools effectively into their specialized curricula. By understanding these constructs, researchers can better analyze how teachers navigate the complexities of digital shifts. These theories collectively provide a comprehensive foundation for examining the professional evolution required for successful AI integration.

B. Legislative Mandates and Policy Framework for Digital Innovation

Educational innovation is supported by the 1987 Philippine Constitution, which mandates the state to protect the right to quality education at all levels. Article XIV specifies that the government must encourage vocational efficiency and foster scientific and technological knowledge [9]. This legal foundation is essential for Home Economics Technology Education as it justifies the integration of modern AI tools to enhance student learning. By prioritizing research,

development, and innovation, the state ensures that vocational training remains relevant to national progress. Consequently, teachers are empowered to adopt digital strategies that align with constitutional goals.

Modern legislative acts further reinforce the digital transformation of the teaching workforce. The Digital Workforce Competitiveness Act encourages the development of AI literacy through specialized training and learning hubs [10]. Simultaneously, the Data Privacy Act of 2012 ensures that the use of information technology remains ethical and protects the fundamental rights of individuals [11]. These laws create a balanced environment where Home Economics teachers can innovate with AI while maintaining strict adherence to data security. Such regulations provide the necessary safeguards and incentives for educators to pursue digital competency.

Specific agency orders provide direct support for AI research and capacity building among educators. DepEd Order No. 013 established the Education Center for AI Research to promote ethical and strategic technology use in schools [12]. This initiative focuses on skilling teachers to handle AI-driven shifts in the classroom. Similarly, the CHED HUSAY and SIKAP programs offer postgraduate scholarships and international training opportunities to enhance faculty capacity in advanced leadership and AI [13, 14]. These systemic reforms ensure that teachers possess the professional expertise required to lead digital innovation in vocational education.

The alignment of these policies demonstrates a cohesive national strategy to modernize the educational landscape through technology. By providing legal mandates for vocational efficiency and institutional support for teacher upskilling, the government legitimizes the use of AI in specialized fields like Home Economics. These frameworks not only encourage technical proficiency but also emphasize the ethical responsibility of educators in a digital-first society. Consequently, the transition toward AI-enhanced teaching is grounded in both administrative authority and ethical guidelines. This policy-driven approach facilitates a sustainable environment for long-term digital innovation and improved educational outcomes for all students.

C. Utility of AI in Vocational and Home Economics Education

Artificial intelligence has been widely recognized as a technological field that seeks not only to understand intelligence, but also to build systems capable of performing complex reasoning tasks traditionally associated with human thinking. Russell and Norvig [15] emphasize that the development of intelligent systems has the potential to significantly influence everyday life and future social structures, including education. More recent work highlights how AI has become increasingly embedded in the learning environment, where it supports access to information, modifies teaching processes, and reshapes how learners and educators interact with technology [16]. Together, these perspectives position AI as both a technological innovation and a catalyst

for pedagogical change, making its integration in education an important area for empirical inquiry.

Within Home Economics education, technology integration has long been associated with curriculum modernization and professional skill development. ICT initiatives are viewed as a pathway for enhancing instructional relevance and supporting national goals related to technological competence and workforce preparation [17]. Earlier work on teacher capacity building also shows that Home Economics teachers operate within a distinctive subject culture that spans food and nutrition, clothing and design, and family studies [18]. This suggests that technology adoption in the field is shaped not only by access to tools, but also by teachers' professional identity, subject orientation, and everyday instructional realities — factors that are essential to examine when investigating readiness for emerging technologies such as AI.

At the same time, digital transformation has broadened the scope of Home Economics beyond classroom instruction. Obunadike [19] explains that digital resources and online platforms have supported innovation in areas such as home management, fashion, enterprise activities, and sustainable production, allowing the discipline to contribute to economic participation and national development. These developments indicate that technology in Home Economics is experienced not merely as a teaching aid, but as a tool that intersects with livelihood, creativity, and community well-being.

The literature also consistently frames Home Economics as a human-centered and life-skills-oriented discipline. Eze [20] describes its role in fostering values, emotional resilience, personal adaptability, and self-reliance, particularly in periods of social change. Likewise, Kuusisaari [21] emphasizes that Home Economics education must remain responsive to 21st-century competencies while supporting the well-being of individuals, families, and communities. These perspectives highlight that instructional decisions in the discipline often extend beyond technical skill development and are grounded in care, responsibility, and lived human experience.

The practical nature of the subject further distinguishes it from many other learning areas. Camilleri [22] notes that Home Economics relies heavily on performance-based and hands-on learning, where students plan, prepare, and evaluate authentic tasks such as food preparation and resource management. Such learning environments require teachers to balance practical demonstration, safety considerations, and reflective learning — raising important questions about how emerging technologies like AI can be meaningfully incorporated without undermining the experiential nature of the subject.

In vocational and skills-based education more broadly, AI has been shown to support adaptive learning systems, automated feedback, and performance monitoring, thereby enhancing instructional efficiency and giving teachers more opportunities to focus on mentoring and learner

development [23]. These insights position AI not as a replacement for teachers, but as a complementary tool that may reshape their instructional roles and professional responsibilities.

Across these studies, several key constructs emerge that are important for methodological consideration — including teacher readiness, perceived usefulness of technology, instructional adaptation, and technology-supported learning practices. However, despite increasing digitalization in Home Economics education, there remains limited empirical evidence on how AI is specifically understood, experienced, or integrated within the practical and human-centered context of the discipline.

D. AI Literacy, Ethical Competencies, and Social Responsibilities

As artificial intelligence becomes more present in educational practice, the focus of teacher preparation has expanded from technical familiarity to the development of AI literacy, ethical competence, and social responsibility. AI literacy is increasingly understood as the capacity not only to use AI tools but to engage with them critically, reflectively, and in ways that support meaningful learning.

Younis [24] demonstrates that AI literacy can be intentionally developed through structured professional learning. A professional development program grounded in instructional design significantly improved preservice teachers' AI literacy skills, indicating that readiness for AI use is a trainable professional competency rather than a fixed attribute. Similarly, Bautista et al. [25], using the TPACK framework, found that preservice teachers' technological and pedagogical competencies were positively associated with their ethical readiness. As teachers became more confident in using AI tools, their ethical awareness also strengthened — suggesting that technical competence and ethical responsibility evolve together rather than independently.

At the institutional level, Ren and Wu [2] identify gaps in policies and support structures that guide ethical and responsible AI integration in higher education, leaving teachers to mediate innovation and risk largely on their own. From a broader policy perspective, Li et al. [5] emphasize global inequities in AI implementation and call for human-centered governance to ensure that AI adoption supports inclusion rather than widens disparities. [26] further caution that while AI may enhance learning and workforce preparation, unbalanced reliance may compromise critical thinking, underscoring the need to balance AI proficiency with intellectual independence.

Taken together, the literature positions AI literacy as a holistic construct that integrates technical competence, ethical judgment, and social awareness. These insights provide methodological grounding for examining how educators develop AI-related skills and responsibilities, and how their readiness, ethical orientation, and reflective practice shape the ways AI is integrated into teaching and learning contexts.

E. Instructional Strategies and Professional Development

As AI and digital technologies increasingly shape learning environments, the literature highlights that meaningful integration depends less on the tools themselves and more on how teachers design instruction and engage in ongoing professional development. Instructional strategies influence not only how students interact with technology, but also how they construct understanding and develop learner agency.

Güner and Er [27] show that students' engagement with ChatGPT in programming classes is mediated by teacher guidance and task design. When instructional scaffolding is present, students use AI more purposefully, reflect more critically on responses, and treat AI as a learning partner rather than a substitute for thinking. These findings reinforce the continuing importance of teacher mediation and intentional learning design in AI-supported environments.

Professional development serves as a foundation for these instructional roles. [28] emphasize that sustained digital literacy development enables teachers to adapt confidently to technological change and create responsive learning environments. At the systems level, [29] argue that professional preparation must align with Industry 4.0 demands, positioning teacher development as essential to both educational quality and workforce readiness.

Within Home Economics education, instructional strategies and teacher competence are closely tied to student growth and well-being. Kuusisaari et al. [21] report that teachers increasingly value student-centred, reflective, and skills-integrated pedagogies that promote confidence, life skills, and digital awareness. [30] further shows that strong teacher competencies in classroom management and lesson delivery are associated with students' development of critical thinking, collaboration, creativity, and communication skills.

Across these studies, instructional strategies and professional development emerge as interdependent drivers of effective technology-enhanced learning: teachers require structured opportunities to strengthen digital and pedagogical competence, while students benefit most when technology use is guided, reflective, and grounded in human-centred teaching practice.

Methodology

This research utilized a descriptive-correlational design to investigate the associations between specific variables within a vocational context. The study established the relationship between artificial intelligence literacy levels and the corresponding self-efficacy and self-management strategies of 78 educators. These participants were enrolled in a Master of Technology and Vocational Education program at a prominent state university in Cebu, Philippines, during the 2025–2026 academic year. The cohort represented a diverse professional range, including elementary, secondary, tertiary, and ESL instructors. Every respondent

underwent a comprehensive orientation regarding the specific objectives and procedures of the research before their actual participation.

Verily, strict adherence to ethical standards and the Data Privacy Act of 2012 was maintained to ensure the protection of all human participants. This study underwent rigorous ethical reviews and obtained formal approval from the College Ethics Committee before any data collection commenced. Participants were provided informed consent, acknowledging their rights to anonymity, confidentiality, and voluntary withdrawal at any stage without penalty. In fact, all personal information and survey responses were handled through secure digital protocols to prevent unauthorized access. Indeed, these measures align with Philippine national policies, ensuring that the pursuit of digital innovation remains ethically grounded and legally compliant.

Moreover, data collection employed the Meta AI Literacy Scale (MAILS) by Carolus et al. [31], a 5-point Likert scale measuring application, understanding, detection, ethics, self-efficacy, and self-management. After securing institutional approval from the Campus Director and Deans, the validated instrument was distributed via Google Forms. Following tabulation, statistical treatments included frequency counts and percentages for demographic profiling, while weighted means assessed literacy and management levels. Finally, Pearson r was utilized to identify significant relationships between the respondents' technical literacy and their internal confidence and management strategies when teaching Home Economics Technology.

Discussion

In this section, five tables exhibit the statistically-computed dataset. From such empirical inferences, the following scientific results were obtained and correspondingly expounded to answer the study's main and sub-problems.

Table 1. Level of Respondents' Literacy in Using Artificial Intelligence in Teaching Home Economics Technology

Components	WM	SD	Verbal Description
Application	3.57	1.11	High
Understanding	3.79	0.95	High
Detection	3.50	1.01	High
Ethics	3.62	0.98	High
Overall	3.62	1.01	High

Legend: 4.21-5.00- Very High; 3.41-4.20 - High; 2.61-3.40 - Moderate; 1.81-2.60 - Low; 1.00-1.80 - Very Low

Table 1 reveals that respondents demonstrate a high overall level of literacy in using artificial intelligence for teaching Home Economics Technology, with an overall weighted mean of 3.62 and a standard deviation of 1.01. Among the four key components examined, understanding artificial intelligence emerged as the strongest dimension with the highest weighted mean of 3.79 and the lowest variability indicated by a standard deviation of 0.95. This

finding is consistent with [32], who emphasized that a deep understanding of AI mechanisms, applications, and ethical implications among educators is essential for effective technology integration and for fostering AI literacy among students. The findings relate to Ng [33], who emphasized that understanding is a core component of digital literacy that enables educators to make informed and critical use of technology. The relatively low standard deviation indicates considerable consensus among respondents regarding their understanding capabilities, while Application of AI followed closely with a weighted mean of 3.57 and a standard deviation of 1.11. According to Zawacki-Richter et al. [34], AI applications in education allow teachers to personalize learning, manage workloads, and improve student outcomes when used effectively.

Clearly, ethics competency registered a weighted mean of 3.62 with a standard deviation of 0.98, indicating that respondents possess high capability in weighing societal consequences, incorporating ethical considerations when using AI-provided data, and analyzing AI applications for ethical implications. Moreover, Zawacki-Richter et al. [34] emphasize that educators must balance technological innovation with ethical accountability to maintain trust in AI-assisted teaching and learning. Detection abilities scored the lowest among all components with a weighted mean of 3.50 and standard deviation of 1.01, though still falling within the high proficiency range according to the established legend scale. This result mirrors the study of [35], who found that many educators possess functional knowledge of AI but need more training in recognizing the extent and nature of AI features embedded in educational technologies. Likewise, [36] also identifies future research directions and policy implications necessary for harmonizing AI innovation with ethical standards and its intersection with sustainable development goals.

Nonetheless, the consistently high ratings across all four AI literacy components demonstrate that Home Economics Technology educators possess comprehensive competencies spanning practical application, theoretical understanding, identification skills, and ethical awareness regarding artificial intelligence integration in their teaching practice. A study by Tondeur et al. [37] highlighted that to utilize technology in education effectively, appropriate conceptual understandings are necessary to guide the integration process. The narrow range of weighted means spanning from 3.50 to 3.79 reflects balanced development across multiple AI literacy dimensions rather than specialized expertise in isolated areas. Notably, the similar standard deviation values hovering around 1.0 across all components suggest relatively uniform variability patterns, indicating that individual differences in AI literacy levels are consistently distributed across different competency domains. These findings suggest that professional development initiatives have successfully cultivated holistic AI literacy among respondents, though opportunities remain for strengthening detection capabilities and reducing performance

variability, particularly in Application where the standard deviation of 1.11 indicates the greatest dispersion of competency levels among participants.

Table 2. Level of Respondents' Self-Efficacy in Using Artificial Intelligence in Teaching Home Economics Technology

S/N	Indicators	WM	SD	Verbal Description
1	I can rely on my skills in difficult situations when using AI.	3.14	1.00	Moderate
2	I can handle most problems in dealing with artificial intelligence well on my own.	2.96	1.12	Moderate
3	I can also usually solve strenuous and complicated tasks when working with artificial intelligence well.	3.44	1.10	High
4	I can keep up with the latest innovations in AI applications.	3.40	1.01	Moderate
5	Despite the rapid changes in the field of artificial intelligence, I can always keep up to date.	3.37	0.90	Moderate
6	Although there are often new AI applications, I manage to always be "up-to-date".	3.33	1.09	Moderate
Overall		3.27	1.04	Moderate

Legend: 4.21-5.00- Very High; 3.41-4.20 - High; 2.61-3.40 - Moderate; 1.81-2.60 - Low; 1.00-1.80 - Very Low

For this table, such empirical results disclosed that respondents demonstrate a moderate overall level of self-efficacy in using artificial intelligence for teaching Home Economics Technology, with an overall weighted mean of 3.27 and a standard deviation of 1.04. Among the six indicators examined, solving strenuous and complicated tasks when working with AI emerged as the strongest dimension with the highest weighted mean of 3.44, representing the only indicator achieving a high proficiency level. Furthermore, Mannila et al. [38] underline that teacher self-efficacy in their digital competence is critical in the context of technology-enabled teaching-learning; that technology competence, performance, and social outcome expectations, and IT support influence teacher self-efficacy; and, therefore, continuing professional development is essential to keep pace with this changing technological world and teaching contexts. In contrast, handling most problems in dealing with artificial intelligence independently recorded the lowest weighted mean of 2.96 with the highest standard deviation of 1.12, suggesting considerable variability and uncertainty among respondents regarding their autonomous problem-solving capabilities with AI systems.

However, the remaining four indicators consistently fell within the moderate proficiency range, with weighted means spanning from 3.14 to 3.40 and standard deviations ranging between 0.90 and 1.09. Similarly, Tabares et al. [39] found that while teachers recognize the potential of AI in education, many still feel uncertain about their ability to use it effectively due to limited training and exposure. Keeping up with the latest AI innovations registered a weighted mean of 3.40 with a standard deviation of 1.01, while maintaining currency despite rapid changes scored 3.37 with the lowest standard deviation of 0.90, indicating greater consensus among respondents.

Additionally, [40] highlighted that Teachers' self-efficacy (TSE) beliefs affect not just their performance and motivation, but also the academic success of their pupils. As a result, researchers focused on the crucial self-beliefs of educators and their origins. Managing to stay updated with frequent new AI applications obtained a weighted mean of 3.33 and a standard deviation of 1.09. As can be observed, the predominantly moderate self-efficacy levels across most indicators, contrasted with the single high-rated problem-solving capability at 3.44, reveal an inconsistent confidence pattern among Home Economics Technology educators when engaging with artificial intelligence systems. The standard deviation values consistently hover around 1.0 across all indicators suggest uniform variability patterns, indicating that competency gaps are distributed similarly across different self-efficacy dimensions. Conversely, insufficient technical support and training can lead to hesitation and reduced motivation to adopt AI technologies [41]. These findings underscore the critical need for comprehensive capacity-building initiatives that specifically target autonomous problem-solving skills, continuous professional updating mechanisms, and a sustained technical support system.

Table 3. Level of Respondents' Self-Management in Using Artificial Intelligence in Teaching Home Economics Technology

S/N	Indicators	WM	SD	Verbal Description
1	I don't let AI influence me in my everyday decisions.	3.69	1.14	High
2	I can prevent an AI from influencing me in my everyday decisions.	3.60	1.09	High
3	I realize that artificial intelligence is influencing me in my everyday decisions.	3.41	1.10	High
4	I keep control over feelings like frustration and anxiety while doing everyday things with AI.	3.17	1.12	Moderate
5	I can handle it when everyday interactions with AI frustrate or frighten me.	3.06	1.22	Moderate
6	I can control my euphoria that arises when I use artificial intelligence for everyday purposes.	3.12	1.17	Moderate
Overall		3.34	1.14	Moderate

Legend: 4.21-5.00-Excellent; 3.41-4.20- Good; 2.61-3.40-Average; 1.81-2.60-Poor; 1.00-1.80-Very Poor

Noticeably, the scientific results reveal that respondents demonstrate a moderate overall level of self-management in using artificial intelligence for teaching Home Economics Technology, with an overall weighted mean of 3.34 and a standard deviation of 1.14. Among the six indicators examined, resistance to AI influence in everyday decisions emerged as the strongest dimension with the highest weighted mean of 3.69 and standard deviation of 1.14, achieving a high proficiency level. Prevention of AI influence followed closely with a weighted mean of 3.60 and standard deviation of 1.09, while realization of AI influence registered 3.41 with standard deviation of 1.10, all three indicators falling within the high proficiency range and reflecting

respondents' cognitive awareness regarding AI's potential impact on their decision-making processes.

Yet, the remaining three indicators, all focusing on emotional regulation dimensions, consistently demonstrated moderate proficiency levels with notably lower weighted means ranging from 3.06 to 3.17 and higher standard deviations spanning 1.12 to 1.22. Controlling feelings like frustration and anxiety while doing everyday tasks with AI recorded a weighted mean of 3.17 with a standard deviation of 1.12, while controlling euphoria arising from AI use obtained 3.12 with a standard deviation of 1.17. Handling frustration or fear from everyday AI interactions scored the lowest at 3.06 with the highest standard deviation of 1.22, indicating substantial variability and suggesting that respondents experience considerable difficulty managing negative emotional responses when confronting challenging AI-related situations in their teaching practice.

Additionally, the divergent performance between cognitive awareness indicators achieving high ratings and emotional regulation indicators remaining at moderate levels reveals a critical gap in Home Economics Technology educators' self-management capabilities when engaging with artificial intelligence systems. The weighted means demonstrate a clear descending pattern from cognitive dimensions, ranging from 3.41 to 3.69, to emotional dimensions spanning 3.06 to 3.17, indicating that while respondents possess strong intellectual recognition of AI influence, they struggle significantly more with managing emotional responses during practical AI interactions. The consistently elevated standard deviations across all indicators, particularly the 1.22 value for handling frustration and fear, suggest considerable individual variability in self-management competencies and highlight diverse experience levels among respondents. These findings underscore the necessity for targeted professional development programs that specifically address emotional intelligence, stress management techniques, and psychological resilience-building strategies to complement existing cognitive skills and foster holistic self-management capabilities essential for sustainable AI integration in educational contexts.

Table 4. Test of Relationship between the Respondents' Literacy and Self-Efficacy in using Artificial Intelligence

Variables	r-value	Strength of Correlation	p - value	Decision	Remarks
Literacy and Self-efficacy	-0.038	Negligible Negative	0.744	Failed to reject Ho	Not Significant

*significant at $p < 0.05$ (two-tailed)

Here, Table 4 presents the test of the relationship between respondents' literacy and self-efficacy in using artificial intelligence for teaching Home Economics Technology, revealing a

negligible negative correlation with an r -value of -0.038 and a p -value of 0.744. The statistical analysis failed to reject the null hypothesis at the 0.05 significance level, indicating no significant relationship between the two variables. This finding suggests that respondents' competencies in the four literacy components—Application, Understanding, Detection, and Ethics of AI—as measured in the survey questionnaire, do not significantly predict their self-efficacy levels regarding relying on skills in difficult situations, handling problems independently, solving strenuous tasks, and keeping up with AI innovations. The negligible negative correlation coefficient approaching zero demonstrates that higher literacy scores measuring conceptual knowledge, operational capability, identification skills, and ethical awareness essentially have no meaningful association with confidence levels in AI learning and problem-solving dimensions among Home Economics Technology educators.

The absence of a significant relationship between AI literacy and self-efficacy appears counterintuitive, considering that theoretical understanding and practical application skills would logically strengthen educators' confidence in using artificial intelligence systems. The disconnect between knowing how to operate AI applications, understanding AI concepts, detecting AI-based systems, and evaluating ethical implications, versus feeling confident about handling AI-related challenges independently, suggests that literacy alone provides an insufficient foundation for building self-assurance. Similarly, Rahman and Hamid [42] emphasized that effective digital leadership practices can drive a culture of innovation and collaboration in schools, ensuring that teachers integrate digital technology into the teaching process and enhance their self-efficacy. The p -value of 0.744, substantially exceeding the 0.05 threshold, reinforces that this lack of correlation is statistically robust rather than attributable to sampling variability.

Nevertheless, the negligible correlation between literacy components measured through items assessing AI application, understanding, detection, and ethics capabilities and self-efficacy indicators evaluating problem-solving confidence, innovation tracking, and autonomous handling abilities reveals critical gaps in current professional development approaches for Home Economics Technology educators. This finding indicates that educators may possess adequate knowledge about operating AI meaningfully, understanding AI definitions and limitations, distinguishing AI applications, and weighing ethical consequences, yet simultaneously lack confidence in their skills during difficult situations, struggle with independent problem-solving, and feel inadequate in keeping pace with rapid AI innovations. The statistical independence between these constructs suggests that training programs focusing exclusively on knowledge transmission and technical skill development fail to cultivate the psychological confidence, emotional resilience, and experiential competence necessary for sustained AI integration. These

results underscore the imperative for holistic capacity-building initiatives that intentionally bridge the literacy-efficacy gap through structured mentoring, collaborative learning communities, incremental success experiences, and sustained institutional support mechanisms beyond traditional workshop-based literacy training.

Table 5. Test of the Relationship between the Respondents' Literacy and Self-Management in using Artificial Intelligence

Variables	r-value	Strength of Correlation	p - value	Decision	Remarks
Literacy and Self-management	-0.013	Negligible Negative	0.911	Failed to reject Ho	Not Significant

*significant at $p < 0.05$ (two-tailed)

Peeking into Table 5, it presents the test of the relationship between respondents' literacy and self-management in using artificial intelligence for teaching Home Economics Technology, revealing a negligible negative correlation with an r-value of -0.013 and a p-value of 0.911. The statistical analysis failed to reject the null hypothesis at the 0.05 significance level, indicating no significant relationship between the two variables. This finding demonstrates that respondents' competencies in the four literacy components—Application, Understanding, Detection, and Ethics of AI—as measured in the survey questionnaire, do not significantly predict their self-management levels regarding resisting AI influence in decisions, preventing AI manipulation, realizing AI influence, controlling frustration and anxiety, handling fear, and managing euphoria. The negligible negative correlation coefficient extremely close to zero suggests that higher literacy scores measuring knowledge of AI concepts, operational skills, identification capabilities, and ethical reasoning essentially have no meaningful association with self-management dimensions encompassing persuasion literacy and emotion regulation among Home Economics Technology educators.

In fact, the absence of a significant relationship between AI literacy and self-management appears paradoxical considering that a comprehensive understanding of AI systems—including their capabilities, limitations, advantages, disadvantages, and ethical implications—would theoretically enable educators to exercise greater autonomy and emotional control when interacting with these technologies. Supporting this finding, Alenezi and Alenezi [43] found that AI-based systems can be adopted to boost performance, yet they will also help them know about the challenges or issues arising while implementing AI-based systems. Therefore, detecting AI in education provides a comprehensive perspective of the positive impacts and the measures required to mitigate the negative impacts. The disconnect between knowing how to operate AI applications meaningfully, assess opportunities and limitations, distinguish AI-based systems, and analyze ethical implications versus maintaining psychological independence from AI

influence and regulating emotional responses suggests fundamental differences between cognitive competence and behavioral self-regulation. The p-value of 0.911, substantially exceeding the 0.05 threshold, provides robust statistical evidence.

Nevertheless, the negligible correlation between literacy components measured through items assessing AI application, understanding, detection, and ethics capabilities, and self-management indicators evaluating resistance to AI influence, awareness of manipulation, and emotional regulation reveals that Home Economics Technology educators may simultaneously possess strong technical knowledge while experiencing difficulty maintaining psychological autonomy and emotional equilibrium during AI interactions. This finding indicates that educators can successfully operate AI applications, understand definitions and concepts, distinguish AI devices, and weigh societal consequences, yet struggle with preventing AI from influencing everyday decisions, controlling frustration and anxiety, handling fear, and managing euphoria. The statistical independence between these constructs demonstrates that training programs emphasizing literacy development through knowledge acquisition and skill mastery fail to cultivate the psychological resilience, critical autonomy, emotional intelligence, and self-regulatory capacities necessary for balanced AI integration in educational practice, necessitating comprehensive interventions addressing both cognitive and affective dimensions.

Table 6. Type of Support that Helped the Respondents to Integrate A.I. in their Teaching Practices in Home Economics Technology

Type of Support	f	Rank
Specific AI tools for food and beverage education	54	1
Introduction to AI and its relevance to Education	51	2
AI for lesson planning and instructional design	50	3
Assessment strategies for AI-integrated lessons	48	4
Creating AI-based learning activities	47	5
Developing students' AI literacy	34	6
Troubleshooting AI tools in the classroom	32	7
Specific AI tools for entrepreneurship instruction	29	8
AI ethics and data privacy in teaching	27	9
Specific AI tools for cosmetology instruction	24	10
Specific AI tools for garments/fashion instruction	21	11

As to Table 6, it offers the types of support that helped respondents integrate artificial intelligence in their teaching practices for Home Economics Technology, revealing that specific AI tools for food and beverage education ranked highest, with a frequency of 54 respondents. Introduction to AI and its relevance to education followed closely as the second priority, with a frequency of 51, while AI for lesson planning and instructional design ranked third, with 50 respondents identifying this support type. This finding aligns with Rahman et al. [41], who emphasized that subject-specific AI tools enhance contextualized learning and enable teachers to connect technology directly to their field of expertise. Assessment strategies for AI-integrated

lessons registered a frequency of 48, ranking fourth, and creating AI-based learning activities obtained 47 responses, ranking fifth. These top five support types, spanning frequencies from 47 to 54, collectively demonstrate educators' prioritization of practical, pedagogically-oriented assistance that directly addresses curriculum delivery, instructional planning, and assessment development within their specialized teaching domains.

The middle-tier support types revealed moderate frequencies, with developing students' AI literacy ranking sixth at 34 responses, troubleshooting AI tools in the classroom ranking seventh with 32, and specific AI tools for entrepreneurship instruction ranking eighth at 29 respondents. These frequencies, ranging from 29 to 34, suggest secondary-level priorities that complement the primary instructional and planning functions identified in higher-ranked categories. The emphasis on developing students' AI literacy, as measured through survey items assessing educators' capacity to foster learner understanding of AI concepts, applications, and ethical considerations, indicates recognition that effective AI integration requires cultivating student competencies beyond teacher proficiency alone. Troubleshooting support addresses the practical problem-solving challenges educators encounter when implementing AI applications in classroom settings, corresponding to survey items measuring autonomous handling of AI-related difficulties and maintaining confidence during technical complications that may arise during instructional delivery.

Consequently, the lower-ranked support types demonstrated notably reduced frequencies, with AI ethics and data privacy in teaching ranking ninth at 27 responses, specific AI tools for cosmetology instruction ranking tenth with 24, and specific AI tools for garments/fashion instruction ranking lowest at eleventh with only 21 respondents. These frequencies, spanning from 21 to 27, represent approximately half or less of the top-ranked support category, suggesting that ethical considerations and specialized domain applications for cosmetology and fashion receive substantially less prioritization compared to food and beverage education. The lower ranking of AI ethics and data privacy support appears paradoxical considering that survey items measuring ethics literacy—including weighing societal consequences, incorporating ethical considerations when using AI-provided data, and analyzing ethical implications—constitute fundamental components of comprehensive AI integration. This pattern suggests that while respondents possess theoretical awareness of ethical dimensions through literacy competencies, they perceive domain-specific practical tools and pedagogical applications as more immediately beneficial for their instructional effectiveness than explicit ethics-focused professional development interventions.

Conclusion

Based on the results, it could be concluded that Home Economics Technology educators demonstrate high AI literacy levels, particularly in understanding AI concepts, yet exhibit only moderate self-efficacy and self-management capabilities. Notably, negligible correlations between literacy and both self-efficacy and self-management indicate that theoretical knowledge alone inadequately fosters psychological confidence and emotional regulation necessary for effective AI integration. Educators prioritize domain-specific tools, especially for food and beverage education, over ethical considerations. Future research should investigate longitudinal interventions combining hands-on AI training, mentorship programs, and institutional support systems to bridge the literacy-efficacy gap and enhance teachers' sustained AI integration capabilities in diverse Home Economics specializations.

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Conflict of Interest

The authors declare no conflict of interest.

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