JOURNAL OF MARKETING & SOCIAL RESEARCH
ISSN (Online): 3008-0711
Volume 03 | Issue 08 | 2026
Journal homepage: https://jmsr-online.com/
Research Article

Impact of Artificial Intelligence and Digital Technologies on Home Science Education

Dr. Seema Kumari[1]
[1]Head of Department, Department of Home Science Phool Singh Bisht Government College, Naugaon, Lambgaon, Tehri Garhwal, Uttarakhand, India

Received	18/05/2026	Revision	02/07/2026	Accepted	11/07/2026	Published	05/08/2026

*Corresponding author
Dr. Seema Kumari
Email: shyamakumari1631975@gmail.com

Abstract: Home Science, as a discipline oriented toward the holistic wellbeing of the individual, family, and community, is undergoing a significant transformation under the influence of Artificial Intelligence (AI) and digital technologies. This paper presents a conceptual and descriptive examination of how AI-enabled tools, digital platforms, and Internet-of-Things (IoT) applications are reshaping teaching–learning processes, skill development, collaboration, and real-world application within Home Science education. Drawing upon secondary literature and an integrative conceptual framework, the study organizes the impact of these technologies into five interrelated dimensions: enhanced learning experience, improved teaching and assessment, skill development and practical learning, collaboration and accessibility, and real-world application and life impact. The paper further identifies key challenges confronting the adoption of AI in Home Science education, including cost, digital divide, teacher preparedness, data privacy, and the risk of over-reliance on technology, and proposes a way-forward framework anchored in infrastructure investment, capacity building, quality digital content, ethical use, and industry–academia partnerships. The paper argues that a judicious, learner-centred integration of AI and digital technologies can make Home Science education more personalized, inclusive, and future-ready while continuing to nurture the discipline's core values of competence, creativity, and compassion.

Keywords: Artificial Intelligence; Digital Technologies; Home Science Education; Personalized Learning; Skill Development; Educational Technology

INTRODUCTION

Home Science is a multidisciplinary field of study concerned with the scientific and applied understanding of food and nutrition, textiles and clothing, human development and family studies, resource management, and extension education. Historically taught through demonstration-based pedagogy, laboratory practice, and community extension work, the discipline has long emphasized the translation of scientific knowledge into practical, everyday competence for individuals and families. In the last decade, however, the rapid diffusion of Artificial Intelligence (AI), the Internet of Things (IoT), and digital learning platforms has begun to alter the manner in which Home Science is taught, learned, assessed, and applied.

Artificial Intelligence refers broadly to computational systems capable of performing tasks that typically require human intelligence, such as pattern recognition, natural language processing, and adaptive decision-making. When embedded in educational contexts, AI manifests as adaptive learning platforms, intelligent tutoring systems, automated assessment engines, and learning-analytics dashboards. Digital technologies, more broadly, include e-learning platforms, mobile applications, smart and connected appliances, augmented and virtual reality (AR/VR) tools, and online collaboration systems. Together, these technologies are reconfiguring the teaching-learning ecosystem of Home Science education, extending it beyond the physical classroom and laboratory into digitally mediated, data-informed, and globally networked spaces.

This transformation carries particular significance for Home Science because the discipline straddles theoretical knowledge and applied, hands-on skill. Nutrition science, textile technology, interior design, child development, and family resource management all depend on experiential learning that AI and digital tools can now simulate, personalize, and extend, through virtual laboratories, smart appliances, and AI-enabled design tools. At the same time, the discipline's practice-oriented and community-facing character raises distinct questions about the appropriate scope, pace, and ethics of digital integration. This paper undertakes a conceptual analysis of these developments, structured around five thematic dimensions of impact, and offers a set of

recommendations to guide the responsible integration of AI and digital technologies into Home Science curricula

REVIEW OF LITERATURE

A growing body of literature documents the expanding role of AI and digital technologies in higher education generally, and in applied and vocational disciplines in particular. Studies on adaptive learning systems highlight their capacity to adjust content difficulty and pacing to individual learner profiles, thereby supporting differentiated instruction at scale. Research on intelligent tutoring systems and educational chatbots similarly points to gains in learner engagement and the availability of round-the-clock academic support, particularly valuable in resource-constrained institutional settings.

Within teacher-facing applications, the literature on learning analytics emphasizes the diagnostic value of data generated through digital platforms, which can reveal learning gaps, predict at-risk learners, and inform timely pedagogical intervention. Automated assessment tools, meanwhile, are reported to reduce the workload associated with routine evaluation while enabling more frequent, formative feedback cycles. In applied and laboratory-based disciplines, virtual and augmented reality simulations have been shown to extend practical training beyond the constraints of physical infrastructure, offering repeatable, low-risk practice environments for skills such as food production, textile processing, and interior space planning.

Literature on digital inclusion and open educational resources underscores the potential of Massive Open Online Courses (MOOCs) and online platforms to widen access to quality instruction, connecting learners in remote or under-resourced regions with expert instruction and global peer networks. At the same time, a parallel body of scholarship on the digital divide, data privacy, and algorithmic bias cautions that the benefits of educational technology are not uniformly distributed, and that infrastructural, financial, and skill-related barriers can reproduce or deepen existing inequities if adoption is not accompanied by deliberate capacity-building and equity-oriented policy. This paper builds on these strands of literature, situating them specifically within the context of Home Science education, a discipline whose applied, home- and family-centred character has received comparatively limited attention in the educational technology literature.

Objectives of the Study

- To examine the role of Artificial Intelligence and digital technologies in enhancing the learning experience in Home Science education.
- To analyze the contribution of AI-enabled tools to teaching effectiveness and assessment practices in the discipline.
- To explore the use of digital simulations, smart appliances, and creative digital tools in skill development and practical learning within Home Science.
- To assess how digital platforms foster collaboration, accessibility, and inclusion in Home Science education.
- To identify the real-world and life-impact applications of AI-enabled Home Science learning, along with the associated challenges and a way forward for policy and practice.

RESEARCH METHODOLOGY

This paper adopts a descriptive-analytical and conceptual research design, appropriate for synthesizing an emerging and cross-cutting area of study. Data were drawn from secondary sources, including peer-reviewed literature on educational technology, institutional and policy documents on digital education in India, and documented practices of AI and digital-tool adoption in applied and vocational education. The material was thematically organized into an integrative five-dimension conceptual framework, encompassing enhanced learning experience, improved teaching and assessment, skill development and practical learning, collaboration and accessibility, and real-world application and life impact, which forms the analytical structure for the discussion that follows. As a conceptual and descriptive study, the paper does not report primary empirical data; rather, it offers a structured synthesis intended to inform curriculum planning, faculty development, and future empirical inquiry in Home Science education.

Table 1: Dimensions of AI and Digital Technology Integration in Home Science Education

Enhanced Learning Experience	Personalized learning; smart content and resources; AI tutors and chatbots	Adaptive lesson pacing, AR/VR simulations, e-books, instant doubt-resolution chatbots
Improved Teaching and Assessment	Intelligent teaching tools; automated assessment; learning analytics	AI-assisted lesson planning, automated grading and feedback, data-driven identification of learning gaps
Skill Development and Practical Learning	Virtual simulations; smart appliances and IoT; digital creativity tools	Virtual labs in nutrition, textiles, interior design, food production and child development; exposure to IoT-enabled home appliances; digital design and multimedia presentation tools
Collaboration and Accessibility	Global collaboration; online courses and MOOCs; inclusive education	Cross-institutional expert connect, access to certified online courses, anytime-anywhere learning for diverse learners
Real-World Application and Life Impact	Health and wellness; sustainable living; entrepreneurship; family management; graduate readiness	Nutrition and wellbeing apps, eco-friendly practice promotion, digitally enabled entrepreneurship, smart home and family management, industry-ready graduates

How to Cite: Seema Kumari. "Impact of Artificial Intelligence and Digital Technologies on Home Science Education ". *Journal of Marketing & Social Research*, vol. 3, no. 08, Month 2026, pp. 13–16.

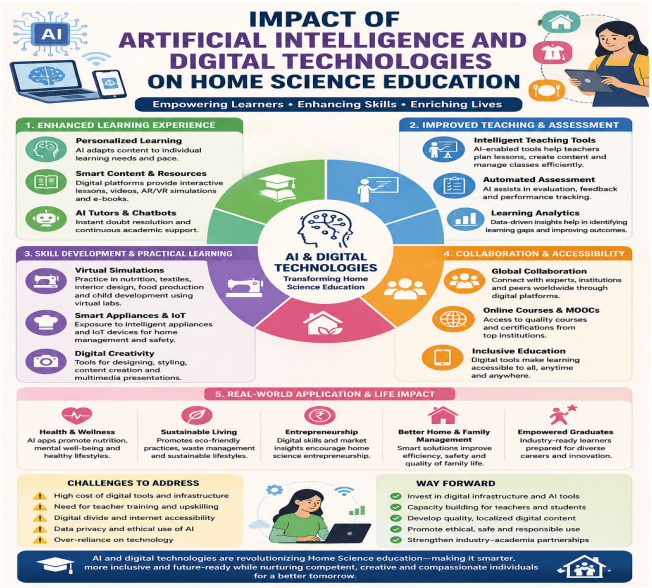

Figure 1: Impact of Artificial Intelligence and Digital Technologies on Home Science Education

AI and Digital Technologies in Home Science Education: A Conceptual Framework

The influence of AI and digital technologies on Home Science education can be understood through five interrelated dimensions, summarized in Table 1 and discussed in the sections that follow.

Enhanced Learning Experience

AI-driven personalization is among the most significant contributions of digital technology to Home Science pedagogy. Adaptive learning platforms can adjust the sequencing, pace, and difficulty of content to match individual learner needs, allowing students with varying prior knowledge of nutrition science, textile technology, or human development to progress at an appropriate pace. Smart content delivery, through interactive lessons, instructional videos, AR/VR-based simulations, and digital textbooks, supplements traditional classroom instruction with multimodal, self-paced resources. AI tutors and chatbots extend this personalization further by providing instant clarification of doubts and continuous academic support outside scheduled class hours, which is particularly valuable for learners balancing academic study with domestic or occupational responsibilities.

Improved Teaching and Assessment

AI-enabled tools also support faculty in lesson planning, content development, and classroom management, reducing administrative burden and allowing greater focus on mentorship and applied instruction. Automated assessment systems assist in evaluating student work, generating timely feedback, and tracking performance trends over time, supporting more frequent and formative assessment practices than manual grading typically allows. Learning analytics dashboards translate data generated through digital platforms into actionable insight, helping faculty identify specific learning gaps, at scale and in real time, and target instructional interventions accordingly.

Skill Development and Practical Learning

Given the applied and laboratory-intensive character of Home Science, virtual simulations hold particular promise. Virtual laboratories enable learners to practice procedures in nutrition and food science, textile processing, interior design, food production, and child development in a repeatable, low-risk digital environment, complementing physical laboratory access, which is often constrained by infrastructure and material costs. Exposure to smart appliances and IoT-enabled devices familiarizes students with the technologies increasingly used in home management, food safety, and household energy efficiency. Digital creativity tools, spanning design software, styling and presentation applications, and multimedia content creation platforms, further extend students' capacity to translate applied knowledge into professional-quality outputs, relevant to careers in design, food styling, nutrition communication, and extension education.

Collaboration and Accessibility

Digital platforms substantially widen the collaborative and geographic reach of Home Science education. Global collaboration tools connect students and faculty with subject experts, institutions, and peer networks beyond their immediate locality, enriching exposure to diverse practices and perspectives. Online courses and Massive Open Online Courses (MOOCs) provide access to specialized content and certifications from leading institutions, supplementing formal curricula with contemporary, industry-relevant knowledge. Perhaps most significantly, digital tools support inclusive education by enabling anytime, anywhere access to learning materials, which can be particularly valuable for learners in remote or under-resourced areas, including many of the rural and hill regions of states such as Uttarakhand, as well as for learners managing competing family or work responsibilities.

Real-World Application and Life Impact

Ultimately, the value of AI and digital integration in Home Science education is measured by its translation into real-world outcomes. AI-enabled applications in nutrition tracking and wellbeing support contribute to healthier lifestyles among learners and the communities they serve. Digital platforms promoting sustainable living encourage eco-friendly practices and responsible waste and resource management, consistent with the discipline's longstanding emphasis on sustainable family and community living. Digital literacy and market-insight tools support the growth of home science-based

entrepreneurship, including ventures in food processing, textile design, and nutrition consulting. Within the household itself, smart, technology-enabled solutions improve the efficiency, safety, and quality of family management. Collectively, these outcomes contribute to producing industry-ready graduates equipped for diverse and evolving career pathways.

Challenges to Address

Despite its considerable promise, the integration of AI and digital technologies into Home Science education is accompanied by several challenges that require deliberate institutional and policy attention.

- High cost of digital tools, devices, and supporting infrastructure, which can be prohibitive for public institutions and economically disadvantaged learners.
- The need for sustained teacher training and upskilling to enable effective and pedagogically sound use of AI-based tools.
- Persistent digital divide and unequal internet accessibility, particularly across rural and hill regions.
- Concerns regarding data privacy, algorithmic transparency, and the ethical use of AI in educational settings.
- The risk of over-reliance on technology, with potential implications for hands-on skill mastery, critical thinking, and interpersonal competencies central to Home Science practice.

Way Forward

Addressing these challenges requires a coordinated and phased approach that balances technological adoption with pedagogical integrity and equity of access.

- Invest strategically in digital infrastructure and AI-enabled tools across institutions, with priority attention to under-resourced and rural colleges.
- Undertake systematic capacity building for both teachers and students, through structured training in digital pedagogy and AI tool literacy.
- Develop quality, contextually and linguistically localized digital content aligned with Home Science curricula and regional needs.
- Promote the ethical, safe, and responsible use of AI, including attention to data privacy, algorithmic accountability, and balanced human-technology interaction.
- Strengthen industry–academia partnerships to keep curricula aligned with evolving technological and market demands, and to create pathways for applied learning and entrepreneurship.

CONCLUSION

Artificial Intelligence and digital technologies are progressively reshaping Home Science education across five interconnected dimensions: enhancing the learning experience, improving teaching and assessment, enabling skill development and practical learning, expanding collaboration and accessibility, and generating tangible real-world and life impact. These developments offer meaningful opportunities to personalize instruction, extend practical training beyond physical laboratory constraints, and connect learners with global knowledge networks and career pathways. At the same time, realizing these opportunities responsibly requires sustained investment in infrastructure, deliberate capacity building for faculty and students, ethically grounded and contextually appropriate digital content, and strong industry–academia collaboration. A thoughtful, learner-centred approach to AI and digital integration can help Home Science education become smarter, more inclusive, and more future-ready, while continuing to nurture graduates who are competent, creative, and compassionate contributors to individual, family, and community wellbeing.

REFERENCE

[1] Bates, A. W. (2019). Teaching in a digital age: Guidelines for designing teaching and learning (2nd ed.). Tony Bates Associates Ltd.
[2] Holmes, W., Bialik, M., & Fadel, C. (2019). Artificial intelligence in education: Promises and implications for teaching and learning. Center for Curriculum Redesign.
[3] Luckin, R., Holmes, W., Griffiths, M., & Forcier, L. B. (2016). Intelligence unleashed: An argument for AI in education. Pearson.
[4] Ministry of Education, Government of India. (2020). National Education Policy 2020. MHRD, Government of India.
[5] Selwyn, N. (2021). Education and technology: Key issues and debates (3rd ed.). Bloomsbury Academic.
[6] Siemens, G., & Long, P. (2011). Penetrating the fog: Analytics in learning and education. EDUCAUSE Review, 46(5), 30–40.
[7] UNESCO. (2021). AI and education: Guidance for policy-makers. United Nations Educational, Scientific and Cultural Organization.
[8] University Grants Commission (UGC). (2021). Guidelines for online and blended learning in higher education. UGC, New Delhi.
[9] Vinuesa, R., Azizpour, H., Leite, I., Balaam, M., Dignum, V., Domisch, S., Felländer, A., Langhans, S. D., Tegmark, M., & Fuso Nerini, F. (2020). The role of artificial intelligence in achieving the Sustainable Development Goals. Nature Communications, 11(1), 233.
[10] Zawacki-Richter, O., Marín, V. I., Bond, M., & Gouverneur, F. (2019). Systematic review of research on artificial intelligence applications in higher education. International Journal of Educational Technology in Higher Education, 16(1), 39.