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Teachers' Perception of the Use of AI-Powered Instructional Materials for Teaching Home Economics in Primary Schools in Nsukka Local Government Area

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Abstract

This study investigated teachers' perceptions of the use of AI-powered instructional materials for teaching Home Economics in primary schools in Nsukka Local Government Area. Specifically, the study assessed the availability of AI tools, utilisation in enhancing engagement and skill acquisition, factors affecting effective use, and strategies for improvement. The study adopted a survey design and was carried out in Nsukka Local Government Area, involving all 98 Home Economics teachers in government-owned primary schools. Data were collected using a structured questionnaire titled the Teachers' AI Perception Questionnaire (T-AI-P), which three experts validated. The collected data were analysed using frequency, percentage, mean, and standard deviation to answer the research questions. Frequency and percentage were used to analyse research question two, while mean and standard deviation were used to analyse research questions one, three and four. The findings revealed a growing availability and utilisation of AI tools among participants ($\bar{x}$ = 2.02), accompanied by a relatively strong level of support from school management ($\bar{x}$ = 2.56). Although actual use remained limited, teachers generally perceived AI-powered instructional tools as beneficial for teaching and learning in Home Economics. The major constraints to the effective utilisation of AI tools include Inadequate training ($\bar{x}$=3.51) and poor internet connectivity ($\bar{x}$=3.47), among others. Strategies such as curriculum planning integration ($\bar{x}$=3.48), regular training ($\bar{x}$=3.41), and funding allocation ($\bar{x}$=3.36) were strongly believed to improve AI-supported teaching. The study concludes that AI-powered instructional materials have significant potential to enhance learning outcomes in Home Economics Education. However, their effectiveness is dependent on adequate infrastructure, teacher competence, and policy support. Recommendations include strengthening training, infrastructure, curriculum integration, and administrative support to optimise AI utilisation.

Keywords: AI-Powered, Effective Teaching, Home Economics, Instructional Materials, Primary Schools

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Introduction

Home Economics equips learners with practical knowledge and life skills necessary for personal development, family wellbeing, and community sustainability. Home Economics is a skill-oriented, interdisciplinary subject that encompasses areas such as food and nutrition, clothing and textiles, family living, interior decoration, child development, and cosmetology (Ashong, 2021). Home Economics is an interdisciplinary field of study that focuses on improving the quality of individual, family, and community life through the effective management of human and material resources (Adeniyi, 2021; Anyakoha, 2015). Modern Home Economics now equips learners with practical and employable skills in areas such as food and nutrition, clothing and textiles, hospitality management, family resource management, interior decoration, consumer education, and entrepreneurship development (Nwachukwu, 2021). In contemporary education, the emergence of Artificial Intelligence (AI) has introduced innovative possibilities for enhancing instructional delivery across subject areas, including Home Economics.

AI-powered instructional tools such as intelligent tutoring systems, adaptive learning platforms, virtual simulations, and interactive multimedia applications offer opportunities to personalise learning, provide immediate feedback, and simulate real-life practical activities where physical resources are limited for effective teaching (United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2021); Organisation for Economic Co-operation and Development (OECD, 2021). Oluwagbemileke (2024) conducted a narrative review of the integration of information and communication technology (ICT) into Home Economics instruction in Nigerian secondary schools. The study shows that students need to be introduced to the use of ICT to enhance professional skills in Home Economics. Students can access a wealth of online resources to improve their knowledge of nutrition, healthy living, and sustainable home management. Also, Usoroh and Ekanem (2025) conducted a study on digital resources and Home Economics education students' learning outcomes in batter making: the case study of the University of Uyo. Their study revealed that YouTube and Google Classroom have a significant positive effect on learning outcomes. Effective teaching in Home Economics involves planning, organising, delivering, and evaluating lessons in ways that actively engage pupils and promote meaningful skill acquisition (Akpan et al., 2021). AI technologies can support these processes by analysing learners' progress, identifying learning gaps, and tailoring instructional content to individual needs, thereby improving learning outcomes for the effectiveness of teaching (OECD, 2021).

Effective teaching of Home Economics depends on several factors, including the teacher's competence, availability of instructional materials, class size, learner motivation, and administrative support (Federal Republic of Nigeria [FRN], 2013). While traditional instructional materials such as kitchen utensils, sewing machines, charts, and audiovisual aids remain

essential, AI-powered tools extend these resources by offering virtual demonstrations, step-by-step guided simulations for food preparation and textile construction, and interactive budgeting exercises (Holmes et al., 2019). Artificial Intelligence (AI) has become an important innovation in Home Economics, improving food, nutrition, clothing, health, family living, and household management through modern technological solutions (Armand et al., 2024). AI-powered tools such as nutrition and diet-planning applications, smart kitchen systems, virtual learning assistants, food safety monitoring tools, and fashion and textile design technologies have enhanced teaching and learning, food preparation, personalised nutrition, consumer education, and household sustainability (Wani et al., 2023). Applications such as ChatGPT-powered assistants, MyFitnessPal, smart refrigerators, and AI chatbots help individuals monitor dietary intake, reduce food waste, improve food safety, and support skill acquisition in Home Economics education (Nidea & Peñalber, 2025). AI technologies also assist in detecting contamination risks, monitoring hygiene practices, predicting fashion trends, and improving the production of clothing and textiles (Golshany et al., 2025). These tools promote efficiency, creativity, informed decision-making, and sustainable living practices in homes, schools, hospitals, and caregiving environments (Shonkoff et al., 2023). However, challenges such as high technology costs, poor internet access, inadequate digital literacy, privacy concerns, and overreliance on AI systems persist (Ojo et al., 2025). Despite these limitations, AI-powered tools continue to offer significant opportunities to improve Home Economics education and practice, making them essential for meeting the demands of modern society.

Educational research emphasises that learning becomes more effective when learners actively construct knowledge, receive timely feedback, and engage in meaningful practice (Darling-Hammond et al., 2020). AI systems are particularly suited to supporting these principles through adaptive content delivery, real-time assessment, and opportunities for self-regulated learning (OECD, 2021). Global educational frameworks, including those advocated by UNESCO, encourage the integration of digital technologies to promote competency-based and sustainable education. AI-powered instructional tools align with these goals by enhancing learners' critical thinking, creativity, and problem-solving skills, which are central to Home Economics education (UNESCO, 2021).

In Nigerian primary schools, Home Economics is commonly integrated into pre-vocational studies under the supervision of the Universal Basic Education Commission (Universal Basic Education Commission (UBEC), 2018). However, instructional delivery often relies on conventional "chalk-and-talk" methods due to inadequate facilities, limited instructional materials, and insufficient teacher training in digital technologies (Mabel & Mathew-Odou 2025). The authors noted that textbooks and charts are frequently used, and resource shortages sometimes constrain practical engagement. Therefore, integrating AI-

powered instructional tools offers a promising solution to these challenges by providing virtual laboratories, interactive demonstrations, and personalised learning pathways that complement existing resources (OECD, 2021). Kalu (2026) concluded that without proper planning, AI implementation may lead to privacy concerns, loss of personal touch, and operational disruption. Therefore, this study investigated teachers' perception on the use of AI-Powered instructional materials for teaching Home Economics in primary schools in Nsukka Local Government Area, with a view to enhancing skill acquisition, learner engagement, and overall instructional effectiveness which will be of benefit to Home Economics teachers, primary school pupils, school administrators, curriculum planners, Home Economics lecturers, educational policy makers, NGOs and educational donor agencies, and researchers in Home Economics education.

Purpose of the Study

The general purpose of the study was to investigate teachers' perceptions of the use of AI-powered instructional materials for teaching Home Economics in primary schools in Nsukka Local Government Area. Specifically, the study sought to:

1. determine the availability of AI-powered instructional tools for teaching Home Economics in Public primary schools in Nsukka LGA;
2. identify the perceived benefits of the utilisation of AI-powered tools in enhancing instructional tools
3. identify the factors limiting the effective use of AI-powered instructional tools;
4. identify strategies for improving AI-supported teaching of Home Economics in Public primary schools in Nsukka LGA.

Methodology

Research Design. The study adopted a survey research design. A survey design is appropriate because it enables the researcher to systematically collect, analyse, and interpret data from a large population to describe existing conditions regarding the utilisation of instructional materials (Akor et al., 2021). It is most suitable for this study as it facilitates the exploration of the availability, adequacy, and utilisation practices of instructional materials in Home Economics teaching within Public primary schools in Nsukka LGA.

Population and Sample Size: The study population comprised 98 Home Economics Teachers in public primary schools in Nsukka Local Government Area. Teachers were used because the study examined teachers' use of instructional materials. The whole population was used because of its manageable size. There was no sampling.

Instrument for Data Collection and Validation: The data collection instrument comprised structured questionnaires developed in line with the study objectives. The questionnaire titled "AI-Powered Instructional Materials for Effective Teaching of Home Economics Questionnaire" (AI-PIMETHE) consists of four sections. Section A identified the availability and integration of AI-Powered instructional tools with 10 items, Section B contained items on the utilisation of AI-Powered instructional tools with 10 items, and Section C elicited the factors

influencing effective use of AI tools with 10 items. Section D was used to identify strategies for improving AI-supported teaching, with 10 items. The items were rated on a 4-point Likert scale (Strongly Agree (SA), Agree (A), Disagree (D), Strongly Disagree (SD) to elicit responses.

Validity and Reliability of the Instrument: To ensure the questionnaire's validity, a draft of the instrument was reviewed by three experts. Two from the Department of Home Economics and Hospitality Management Education, and one from Home Science and Management, all in the University of Nigeria, Nsukka. All corrections, suggestions and comments were incorporated in the final draft of the questionnaire to produce a suitable instrument for the work. The reliability coefficient of 0.73 was obtained using Cronbach's alpha.

Method of Data Collection: Data was collected with the help of four research assistants who were briefed to facilitate accurate data collection across different schools in Nsukka LGA. The instrument had a 100% return rate, largely because it was administered and collected on-site. The study lasted three weeks.

Data and Statistical Analysis: The collected data were analysed using frequency, percentage, mean, and standard deviation to answer the research questions. Frequency and percentage were used to analyse research question two, while mean and standard deviation were used to analyse research questions one, three, and four. A mean benchmark of 2.50 was applied. This means that each item with a mean score of 2.50 or higher was accepted, while those with a mean score below 2.50 were rejected.

Results

Availability of AI tools for teaching Home Economics in Public primary schools in Nsukka LGA

The findings in Table 1 show a low level of availability (2.02) of AI-powered instructional tools. The highest-rated item was school management support for AI integration, $\bar{x}$ = 2.56 (Agreed), while the lowest-rated item was AI integration into lesson plans, $\bar{x}$ = 2.14 (Disagreed). This indicates minimal practical integration despite some administrative support.

Table 1: Teachers' perception of the availability of AI-powered instructional tools for teaching of Home Economics

Availability of integration of AI-powered instructional tools	Mean	Std Dev	Remark
AI-powered instructional tools are available for teaching Home Economics.	2.42	.64	Disagree
Digital devices for AI-supported lessons are accessible in the school.	2.36	.71	Disagree
Internet facilities are made available to support AI-based instruction.	2.28	.76	Disagree
AI-based educational software is installed for Home Economics lessons.	2.41	.88	Disagree
AI tools are integrated into lesson plans.	2.14	.82	Disagree
School management supports AI integration in teaching.	2.56	.91	Agree
AI-powered visual aids are available for practical demonstrations.	2.25	.78	Disagree

AI-based assessment tools are provided for Home Economics.	2.48	.87	Disagree
Smart classrooms are equipped for AI-supported learning.	2.46	.83	Disagree
Technical support is available for AI instructional tools.	2.31	.74	Disagree
Grand mean	**2.02**		Disagree

Perceived benefits of the utilisation of AI-powered tools in enhancing instructional tools

Table 2 indicates the percentage distribution of teachers' perceived benefits of AI-powered instructional tools in Home Economics education. The findings revealed that the majority of respondents believed that AI-powered instructional tools would improve understanding of practical concepts (73.5%), aid skill development through simulations (85.7%), enhance lesson clarity through AI-based videos (77.6%), and support individualised learning (75.5%). Respondents also agreed that AI-supported feedback would improve pupils' performance (76.5%) and that AI tools would increase pupils' interest in Home Economics (74.5%).

Table 2: Perceived benefits of AI-powered tools in enhancing instructional tools

Perceived Benefits of AI-Powered Instructional Tools	Agree Frequency (%)	Disagree Frequency (%)
AI-powered instructional applications would enhance pupils' classroom participation.	39 (39.8)	59 (60.2)
AI tools would improve pupils' understanding of practical concepts.	72 (73.5)	26 (26.5)
AI-supported simulations would aid skill development.	84 (85.7)	14 (14.3)
AI-based videos would improve lesson clarity.	76 (77.6)	22 (22.4)
AI tools would support individualised learning among pupils.	74 (75.5)	24 (24.5)
AI-based quizzes would enhance knowledge retention.	70 (71.4)	28 (28.6)
AI-powered instructional tools would promote active learning.	56 (57.1)	42 (42.9)
AI-supported feedback would improve pupils' performance.	75 (76.5)	23 (23.5)
AI-powered instructional tools would increase pupils' interest in Home Economics.	73 (74.5)	25 (25.5)

Factors limiting the effective use of AI-powered instructional tools

The findings in Table 3 reveal significant factors affecting effective AI use, with a grand mean of 3.26. The highest-rated factor was lack of policy support, $\bar{x}$ = 3.61, agreed, while the lowest-rated factor was resistance to technology, $\bar{x}$ = 2.91, agreed. This implies that policy-related issues pose the greatest challenge to AI integration.

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Table 3: Factors limiting the effective use of AI-powered instructional tools. N =98

Factors influencing the effective use of AI-powered	Mean	Std deviation	Remark
Lack of awareness of the AI tool.	3.51	.61	Agree
Inadequate funding affects AI integration.	3.24	.74	Agree
Poor internet connectivity hinders AI usage.	3.47	.67	Agree
Irregular power supply affects AI implementation.	3.38	.70	Agree
Limited technical skills reduce the effective use of AI tools.	3.16	.79	Agree
Resistance to technology affects AI adoption by teachers.	2.91	.84	Agree
Large class size limits AI-supported instruction.	3.09	.80	Agree
Inadequate maintenance affects AI tools.	3.33	.72	Agree
Limited time affects AI integration in lessons.	3.42	.53	Agree
A lack of policy support impedes AI implementation.	3.61	.62	Agree
Grand mean	**3.26**		Agree

Strategies for improving AI-supported teaching

The findings in Table 4 show strong agreement on strategies for improving AI-supported teaching, with a grand mean of 3.29. The highest-rated strategy was the inclusion of AI tools in curriculum planning ($\bar{x}$ = 3.48), while the lowest-rated strategy was the provision of a reliable power supply ($\bar{x}$ = 2.94).

Table 4: Strategies for improving AI-supported teaching of Home Economics

Strategies for improving AI-supported teaching	Mean	Standard deviation	Remark
Regular training should be provided for teachers on AI tools.	3.41	0.63	A
Schools should allocate funds for AI resources.	3.36	0.68	A
Stable internet access should be ensured.	3.27	0.71	A
Reliable power supply should be provided.	2.94	0.79	A
Technical support staff should be employed.	3.32	0.72	A
AI tools should be included in curriculum planning.	3.48	0.59	A
Workshops on AI-based teaching should be organised.	3.43	0.65	A
Collaboration with technology providers should be encouraged.	3.29	0.73	A
Monitoring of AI tool usage should be conducted.	3.22	0.77	A
Government support for AI integration should be strengthened.	3.18	0.80	A
Grand mean	**3.29**		A

Discussion of the Findings

The discussions below are based on the study's findings.

Availability of Integration of AI-Powered Instructional Tools

The study found that the availability and integration of AI-powered instructional tools for teaching Home Economics in public primary schools in Nsukka LGA are generally at an emerging stage. Most of the essential technologies, such as digital devices, AI-based software, and internet connectivity, are not yet widely available in schools. However, the teachers believe that school management is being supportive, suggesting some willingness among administrators to integrate AI. This emerging level of infrastructural readiness aligns with UNESCO (2023), which explains that low-income regions still face the challenge of providing the technological environment necessary to implement advanced instructional systems effectively and to adopt innovative teaching tools. Similarly, Ohanu et al. (2024) report that many Nigerian primary schools struggle with inconsistent internet access and insufficient learning technologies, which reduces the potential for meaningful AI integration in classrooms.

The minimal integration of AI into lesson plans reflects a common challenge documented by Ramoroka (2023), who explained that schools may be willing to adopt new technologies, but this rarely translates into routine instructional practice without adequate equipment and support systems. As a result, despite some managerial support, the lack of functional AI resources in Home Economics teaching constrains teachers' capacities to utilise AI effectively.

Perceived benefits of utilising AI-powered instructional tools

The findings revealed that teachers generally perceived AI-powered instructional tools as beneficial for teaching and learning in Home Economics, despite earlier indications that such tools were not widely available in schools. The respondents perceived that AI-powered instructional tools would improve learners' understanding of practical concepts, support individualised learning, improve lesson clarity, enhance knowledge retention, aid skill development, and improve pupils' academic performance. This suggests that teachers recognise the educational potential of artificial intelligence technologies in improving instructional delivery and learner engagement in Home Economics education. This agrees with the position of the United Nations Educational, Scientific and Cultural Organisation (UNESCO, 2023), which stated that artificial intelligence can simplify difficult concepts through visual demonstrations, simulations, and adaptive learning technologies. Home Economics involves practical-oriented activities such as food preparation, clothing construction, interior decoration, and family resource management; therefore, AI-supported instructional tools can enhance conceptual understanding by providing interactive and visual learning experiences. The finding also aligns with the study of Holmes et al. (2022), who reported that AI-

enhanced instructional systems improve learners' comprehension and practical problem-solving abilities through personalised and interactive instruction.

The respondents also believed that AI-supported simulations would aid pupils' skill development. This finding is consistent with the Organisation for Economic Co-operation and Development (OECD, 2023), which emphasised that AI technologies provide learners with opportunities for practical experimentation, simulation-based learning, and hands-on experiences that promote the acquisition of vocational and technical skills. Similarly, Luckin et al. (2022) observed that AI-driven simulations support experiential learning and improve learners' practical competencies in vocational subjects. Furthermore, the finding that teachers perceived AI-based videos as capable of improving lesson clarity corroborates the submission of the World Economic Forum (2023), which noted that digital instructional technologies enhance instructional clarity through multimedia presentations, animations, and visual demonstrations. The practical nature of Home Economics requires effective demonstration of skills and procedures; therefore, AI-based videos can make learning more concrete, understandable, and learner-centred. The finding also agrees with Eze and Nwosu (2022), who found that technology-supported visual instruction improves students' attention span, understanding, and retention in vocational subjects.

The study further revealed that respondents perceived AI-powered instructional tools as supportive of individualised learning. This finding supports the work of Chen et al. (2023), who explained that AI technologies can adapt learning content to suit individual learners' pace, ability, and interests. AI systems can provide personalised feedback, recommend learning materials, and identify learners' weaknesses for remediation. The finding also aligns with UNESCO (2023), which emphasised that AI-driven personalised learning promotes inclusiveness and learner-centred education. In addition, the respondents perceived that AI-supported feedback would improve pupils' academic performance and that AI-based quizzes would enhance knowledge retention. This finding aligns with the International Society for Technology in Education's (ISTE, 2022) assertion that AI-powered assessment tools provide immediate feedback that strengthens learners' understanding and retention of knowledge. Similarly, Adeyemi and Yusuf (2023) reported that digital feedback systems improve students' performance and motivation in practical-based subjects. Also, Okafor and Ede (2021) found that technology-integrated instruction increases students' enthusiasm and participation in vocational education programmes. Although Yusuf and Ibrahim (2022) found that teachers in many public schools lack adequate exposure to AI-based instructional practices, thereby limiting their confidence in using such technologies to facilitate active classroom engagement. This implies that although teachers generally perceive AI-powered instructional tools as potentially beneficial to teaching and learning, they may still

have reservations about their effectiveness in promoting active classroom participation. Hence, despite the low availability and utilisation of AI-powered instructional tools in schools, teachers believe that such technologies could positively influence teaching and learning outcomes in Home Economics if adequately provided and utilised.

Factors limiting effective use of AI-powered instructional tools

The study also identified several key factors hindering the effective use of AI instructional tools, with a lack of policy support receiving the highest rating. Other significant constraints included limited training, poor internet connectivity, irregular power supply, and inadequate technical skills. Resistance to technology had the lowest mean score among the factors, but it still reflected a consensus that barriers extend beyond attitudes to systemic challenges.

Global literature, as highlighted by the World Bank's World Development Report (2024), identifies similar constraints to AI adoption in educational settings. They noted that successful AI integration depends heavily on national and institutional policies that provide guidance, funding, professional development, and infrastructure, all of which are often less developed in low-income regions. Van der Merwe et al. (2023) also documented that in Kenyan schools, inconsistent electricity and limited broadband connectivity are primary obstacles to effective technology use, a pattern mirrored in the Nsukka context. The strong agreement on training and time constraints resonates with findings from Lamrabet et al. (2025), who noted that without continuous teacher capacity building and structured time for AI use within lesson schedules, teachers remain ill-equipped to incorporate advanced instructional tools. These systemic barriers underscore the need for comprehensive support beyond mere device provision.

Strategies for improving AI-supported teaching

Finally, participants strongly agreed on a range of strategies to improve AI-supported teaching of Home Economics, with the inclusion of AI tools in curriculum planning receiving the most support. Other important strategies included regular professional training, workshops on AI use, improved funding for AI resources, collaboration with technology providers, and employment of technical support personnel. Although the provision of a reliable power supply was considered less important than other strategies, it was still widely acknowledged as an important infrastructural need for AI utilisation. This pattern aligns with Rapanta et al. (2023), who argue that curriculum frameworks must explicitly include AI competencies to ensure teachers can leverage these tools meaningfully. They also emphasise that professional development and institutional investment are crucial for sustainable technology integration in education. Moreover, the call for strengthened government support and collaboration with technology partners reflects international policy discussions advocating public-private partnerships to expand digital learning ecosystems (International Telecommunication Union, 2025). These collaborative approaches can

help schools address infrastructural deficits while equipping teachers with the requisite skills. This highlights curriculum integration as the most strongly supported improvement measure.

Conclusion

The study concludes that AI-powered instructional tools have the potential to enhance engagement, understanding, and skill acquisition in Home Economics lessons in Public primary schools in Nsukka LGA. However, their availability and practical integration in public primary schools are still emerging. Policy gaps, inadequate infrastructure, and insufficient teacher training pose major challenges. Nevertheless, the findings indicate that strategic measures such as curriculum integration, capacity building, and infrastructural support can significantly improve the utilisation and effectiveness of AI tools in teaching and learning.

Recommendations

Based on the findings, the researcher recommended the following:

1. Schools should ensure the availability of digital devices, reliable internet, and technical support to facilitate the integration of AI-powered instructional tools.
2. Home Economics organisations should organise regular workshops and training programs to equip Home Economics teachers with the skills to use AI tools in lesson delivery effectively.
3. Government and school management should provide clear policies, funding, and support for the systematic adoption of AI technologies in teaching.
4. AI-powered instructional tools should be formally included in lesson planning and Home Economics curriculum by the Ministry of Education to promote consistent and effective use.

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