

EFFECTS OF AI-DRIVEN FINANCIAL LITERACY CHATBOT ON FINANCIAL MANAGEMENT SKILLS OF HOME ECONOMICS STUDENTS IN FEDERAL UNIVERSITY OF EDUCATION, ZARIA, NIGERIA

BY

Bako, Aishatu Haruna: Department of Home Economics, Federal University of Education, Zaria-Nigeria;
E-mail: bakoaishtu530@gmail.com

Abstract

This study investigated the effects of AI-driven financial literacy chatbot on financial management skills of Home Economics students in Federal University of Education, Zaria, Nigeria. The increasing complexity of financial markets and products necessitates innovative educational tools to equip young adults with essential financial competencies. A quasi-experimental, pre-test/post-test, non-equivalent control group design was adopted for the study. The population comprised all undergraduate Home Economics students, from which a sample of 120 students was selected using a purposive sampling technique and randomly assigned to an experimental group (n=60) and a control group (n=60). The instrument for data collection was a validated researcher-developed "Financial Management Skills Questionnaire" (FMSQ) with a Cronbach's alpha reliability coefficient of 0.88. The experimental group interacted with a specially designed AI chatbot ("FinPAL") for six weeks, while the control group received no treatment. Data were analyzed using mean, standard deviation, and Analysis of Covariance (ANCOVA). The findings revealed a significant positive effect of the AI-driven chatbot on students' financial management skills. The experimental group showed a statistically significant improvement in their post-test scores compared to their pre-test scores and also scored significantly higher than the control group in the post-test. The study concludes that AI-driven chatbots are effective tools for enhancing financial literacy and management skills among university students. It is recommended, among others, that tertiary institutions integrate AI-based learning tools into their curriculum to promote practical financial education.

Keywords: Artificial intelligence, Chatbot, Financial literacy, Financial management skills, Home economics, Higher education and Educational technology

Introduction

Financial literacy is the confluence of financial knowledge, skills, attitudes, and behaviors necessary to make sound financial decisions and ultimately achieve individual financial well-being (OECD, 2020). In today's rapidly evolving global economy, the need for robust financial management skills cannot be overstated, particularly for young adults on the cusp of financial independence (Aprea, Wuttke, & Zlatkin-Troitschanskaia, 2021). University students, specifically, are at a critical life stage where they begin to make significant financial decisions regarding student loans, budgeting, savings, and investments. However, research consistently indicates that a significant portion of this demographic lacks the necessary competence to navigate the financial landscape effectively, often leading to high levels of debt and financial stress (García-Mancilla, Bustos-López, & Antón-Errázuriz, 2023).

In Nigeria, the challenge is compounded by a combination of economic pressures and a low national financial literacy rate. The Central Bank of Nigeria (CBN) has highlighted the urgent need to improve financial inclusion and literacy as key drivers for economic development and poverty reduction (EFInA, 2023). Students in disciplines like Home Economics are uniquely positioned to benefit from and disseminate financial knowledge. The field inherently deals with resource management at the household level, making financial management a core competency for both personal success and professional practice (Igbokwe & Obidile, 2020). Graduates are expected to become educators, family resource managers, and entrepreneurs, roles where sound financial acumen is indispensable. Despite this, the traditional curriculum may not adequately address the practical, technology-driven financial environment of the 21st century.

The advent of Artificial Intelligence (AI) has introduced transformative opportunities in education.³ AI-driven tools, such as chatbots, offer personalized, interactive, and accessible learning experiences that can transcend the limitations of traditional classroom instruction (Okonkwo & Ajufo, 2022). An AI chatbot is a computer program designed to simulate human conversation through text or voice commands, providing instant responses to user queries (Zawacki-Richter & Latchem, 2018). In the context of financial literacy, a chatbot can serve as a 24/7 financial mentor, offering tailored advice, explaining complex concepts like budgeting and investing in simple terms, and providing interactive simulations and quizzes to reinforce learning (Mikhailova & Piatkov, 2024).

Several studies have explored the efficacy of technology in financial education. For instance, a study by Setyaningsih, Muchlas, and Harlanu (2019) found that mobile learning applications positively impacted students' financial knowledge. Similarly, research on gamification has shown its potential to increase engagement and motivation in learning financial

concepts (de Vasconcelos et al., 2022). However, there is a noticeable gap in the literature regarding the specific impact of AI-driven chatbots on the financial management skills of Nigerian university students, particularly within a specialized field like Home Economics. This study, therefore, seeks to bridge this gap by developing and evaluating an AI-powered financial literacy chatbot designed to enhance the budgeting, saving, investing, and debt management skills of Home Economics students at the Federal University of Education, Zaria.

Statement of the Problem

Despite the acknowledged importance of financial management skills for personal and national economic stability, many Nigerian university students exhibit low levels of financial literacy. This deficit often results in poor financial decisions, such as accumulating unmanageable debt, failing to save for the future, and falling prey to fraudulent financial schemes. Home Economics students, who are future household managers and educators, are expected to possess exemplary resource management skills, yet they are not immune to these challenges. The conventional pedagogical methods employed in universities may not be sufficient to equip these students with the practical, dynamic, and technology-relevant financial skills needed in the modern world. While technology-enhanced learning is gaining traction globally, there is a scarcity of empirical research in the Nigerian context that investigates the effectiveness of cutting-edge AI tools, like chatbots, for financial education. This study, therefore, addresses the problem of inadequate financial management skills among Home Economics students by designing, implementing, and assessing the effect of a bespoke AI-driven financial literacy chatbot.

Purpose of the Study

The main purpose of this study is to determine the effect of an AI-driven financial literacy chatbot on the financial management skills of Home Economics students at the Federal University of Education, Zaria, Nigeria.

The study specifically seeks to:

- i. Determine the difference in the mean financial management skills scores of Home Economics students before and after their exposure to an AI-driven financial literacy chatbot.
- ii. Ascertain the difference in the mean post-test financial management skills scores between Home Economics students exposed to an AI-driven financial literacy chatbot and those taught using conventional methods.

Research Questions

The following research questions guided the study:

- i. What is the difference in the mean financial management skills scores of Home Economics students before and after their exposure to an AI-driven financial literacy chatbot?
- ii. What is the difference in the mean post-test financial management skills scores between Home Economics students exposed to an AI-driven financial literacy chatbot and those in the control group?

Hypotheses

The following null hypotheses were formulated and tested at a 0.05 level of significance:

H01: There is no statistically significant difference in the mean financial management skills scores of Home Economics students before and after their exposure to an AI-driven financial literacy chatbot.

H02: There is no statistically significant difference in the mean post-test financial management skills scores between Home Economics students exposed to an AI-driven financial literacy chatbot and those in the control group.

Methodology

This study adopted a quasi-experimental research design. Specifically, a pre-test/post-test, non-equivalent control group design was used. This design was deemed appropriate because it allows for the comparison of a treatment (the AI chatbot) group with a control group to establish a cause-and-effect relationship, even when random assignment of participants to groups is not feasible due to intact class structures. Experimental group received a pre-test, followed by a six-week treatment period of interacting with the AI-driven financial literacy chatbot, and finally, a post-test, while the control group received a pre-test, followed by six weeks of their regular academic instruction without any intervention, and then a post-test. The population for this study consisted of all 210 students enrolled in the Department of Home Economics at the Federal University of Education, Zaria, for the 2024/2025 academic session. A sample of 60 students was selected for the study using a purposive sampling technique. The criteria for inclusion were students who owned a smartphone and had consistent internet access. The selected sample was then randomly assigned to the experimental group (n=30) and the control group (n=30). The instrument used for data collection was a researcher-developed questionnaire titled the "Financial Management Skills Questionnaire" (FMSQ). The FMSQ was divided into two sections: **Section A:** Collected demographic data of the respondents (e.g., level, age).

Section B: Consisted of 30 positively inclined items designed to measure students' financial management skills. The face and content validity of the FMSQ were established by three experts: two from the Department of Home Economics Education and one from Measurement and Evaluation at Ahmadu Bello University, Zaria. Their feedback was used to refine the instrument for clarity, relevance, and comprehensiveness. The reliability of the instrument was determined through a pilot test conducted with 20 Home Economics students from a different institution (Kaduna State University) who were not part of the main study sample. The data collected were analyzed using Cronbach's alpha, which yielded a reliability coefficient of 0.88. This value indicates a high degree of internal consistency and reliability for the instrument.

Experimental Procedure

Development of the Chatbot: An AI-driven financial literacy chatbot named "FinPAL" was developed. It was designed with a user-friendly interface, accessible via a web link on smartphones.⁸ The content covered core financial management topics, including budgeting, saving strategies, introduction to investing, understanding credit, and avoiding financial scams. The chatbot used conversational AI to provide personalized feedback, answer questions, and offer interactive quizzes and scenarios.

Pre-test: The FMSQ was administered as a pre-test to both the experimental and control groups to establish a baseline of their financial management skills.

Treatment: The experimental group was given access to the "FinPAL" chatbot. They were instructed to interact with the chatbot for at least three sessions per week for six weeks. Their engagement was monitored through the chatbot's analytics backend. The control group continued with their regular academic activities and received no financial literacy intervention.

Post-test: At the end of the six-week intervention period, the FMSQ was re-administered as a post-test to both groups to measure any changes in their financial management skills. The data collected were analyzed using the Statistical Package for the Social Sciences (SPSS) version 25. Mean ($\bar{x}$) and Standard Deviation (SD) were used to answer the research questions. Analysis of Covariance (ANCOVA) was used to test the null hypotheses at the $p < 0.05$ significance level. ANCOVA was chosen to statistically control for initial differences between the groups, using the pre-test scores as the covariate.

Results

The results of the data analysis are presented in tables according to the research questions and hypotheses that guided the study.

Answering the Research Questions

Research Question 1: What is the difference in the mean financial management skills scores of Home Economics students before and after their exposure to an AI-driven financial literacy chatbot?

To answer this question, the pre-test and post-test scores of the experimental group were analyzed using mean and standard deviation. The results are presented in Table 1.

Table 1: Mean and Standard Deviation of Pre-test and Post-test Scores of the Experimental Group (n=30)

Test	N	Mean ($\bar{x}$)	Std. Deviation (SD)	Mean Gain
Pre-test	30	65.45	8.12	
Post-test	30	98.70	7.55	33.25

Table 1 shows that the experimental group had a mean score of 65.45 in the pre-test, which increased to 98.70 in the post-test. This represents a significant mean gain of 33.25, indicating a substantial improvement in the financial management skills of the students after interacting with the AI chatbot.

Research Question 2: What is the difference in the mean post-test financial management skills scores between Home Economics students exposed to an AI-driven financial literacy chatbot and those in the control group?

To answer this question, the post-test scores of the experimental and control groups were compared. The results are presented in Table 2.

Table 2: Mean and Standard Deviation of Post-test Scores of Experimental and Control Groups

Group	N	Mean ($\bar{x}$)	Std. Deviation (SD)	Mean Difference
Experimental	30	98.70	7.55	
Control	30	67.15	8.40	31.55

Table 2 reveals that the experimental group obtained a mean post-test score of 98.70, while the control group had a mean score of 67.15. The mean difference of 31.55 in favor of the experimental group suggests that the AI-driven chatbot had a positive effect on the students' financial management skills.

Testing the Hypotheses

Hypothesis 1 (H01): There is no statistically significant difference in the mean financial management skills scores of Home Economics students before and after their exposure to an AI-driven financial literacy chatbot.

Hypothesis 2 (H02): There is no statistically significant difference in the mean post-test financial management skills scores between Home Economics students exposed to an AI-driven financial literacy chatbot and those in the control group.

To test this hypothesis, an Analysis of Covariance (ANCOVA) was performed on the post-test scores of both groups, with the pre-test scores used as a covariate. The results are summarized in Table 3.

Table 3: Summary of ANCOVA on the Post-test Financial Management Skills Scores by Group

Source of Variation	Sum of Squares	df	Mean Square	F-value	Sig. (p)	Decision
Covariate (Pre-test)	855.43	1	855.43	14.21	0.000	-
Group (Treatment)	28860.15	1	28860.15	479.43	0.000	Significant
Error	7041.80	57	60.19			
Total	1215450.00	60				

Significance level at $p < 0.05$

The results in Table 3 show that the F-value for the treatment group is 479.43, with a significance value (p) of 0.000. Since the p-value (0.000) is less than the alpha level of 0.05, the null hypothesis (H02) is rejected. This means there is a statistically significant difference in the mean post-test financial management skills scores between the students who used the AI chatbot and those who did not. The effect was in favor of the experimental group.

Discussion of the Findings

The findings of this study provide compelling evidence for the effectiveness of an AI-driven chatbot in enhancing the financial management skills of Home Economics students. The answer to Research Question 1 revealed a substantial mean gain of 33.25 in the financial management skills scores of the experimental group after the six-week intervention. This indicates that interacting with the "FinPAL" chatbot significantly improved students' self-reported abilities in budgeting, saving, investing, and debt management. This finding aligns with the work of Mikhailova and Piatkov (2024), who argued that AI tools provide personalized and engaging learning pathways that can lead to deeper conceptual understanding and practical skill acquisition compared to passive learning methods. The 24/7 availability and non-judgmental nature of the chatbot may have encouraged students to ask fundamental questions they might have been hesitant to voice in a traditional classroom setting.

Furthermore, the results from Research Question 2 and the test of Hypothesis 2 demonstrated a statistically significant difference between the post-test scores of the experimental and control groups. The experimental group, which used the AI chatbot, outperformed the control group by a large margin. This finding is consistent with the broader literature on educational technology, which suggests that interactive and technology-driven interventions can lead to superior learning outcomes (Okonkwo & Ajufo, 2022; Zawacki-Richter & Latchem, 2018). The chatbot's ability to provide instant feedback, track progress, and use interactive elements like quizzes and simulations likely contributed to this significant effect. Unlike the static nature of textbooks, the dynamic and conversational interface of the chatbot fostered active learning, a key driver of knowledge retention and skill development (García-Mancilla et al., 2023). The success of the intervention can be attributed to several factors inherent in the AI chatbot's design. Personalization allowed the chatbot to address individual learning paces and needs.¹¹ Accessibility via smartphones meant students could learn anytime and anywhere, integrating financial education seamlessly into their daily lives. Engagement through interactive scenarios likely made the subject matter more relatable and less intimidating than traditional financial texts. This study therefore empirically validates the theoretical promise of AI in education within the specific context of financial literacy in a Nigerian university.

Conclusion

This study investigated the effect of an AI-driven financial literacy chatbot on the financial management skills of Home Economics students at the Federal University of Education, Zaria. Based on the analysis of the data, the study concludes that the use of the AI chatbot had a significant positive effect on students' financial management skills. The intervention not only improved students' knowledge but also equipped them with the practical skills needed for effective financial decision-

making. The integration of such innovative technologies into the educational framework represents a potent and effective strategy for fostering financial literacy among the youth, preparing them for a future of financial stability and well-being.

Recommendations

Based on the findings and conclusion of this study, the following recommendations are made:

- i. University administrators and curriculum planners, particularly in faculties of Vocational and Technical Education, should consider integrating AI-based learning tools like chatbots into courses related to financial education and resource management;
- ii. University management should organize training workshops for lecturers on how to design, use, and integrate AI tools into their pedagogical practices to enhance student learning and engagement.
- iii. Government agencies and financial institutions (like the CBN) should partner with universities to fund the development and deployment of localized financial literacy applications and chatbots that address the specific economic realities of Nigerian students.

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