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USE OF COMPUTER ASSISTED INSTRUCTION TECHNOLOGIES FOR INFORMATION LITERACY ENHANCEMENT BY LIBRARY AND INFORMATION SCIENCE STUDENTS IN AHMADU BELLO UNIVERSITY, ZARIA

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Abstract

This study investigates the utilization of Computer Assisted Instruction (CAI) technologies for enhancing information literacy skills among Library and Information Science undergraduate students at Ahmadu Bello University, Zaria. The research aims to identify available CAI technologies and examine the challenges faced in their implementation. The study addresses a critical gap in understanding how technology-mediated instruction can improve information literacy outcomes in developing educational contexts. Quantitative approach and descriptive survey design were used in the study. Five hundred and thirty-nine library and information science students made the population and two hundred and thirty were selected as a sample size and simple random sampling technique was used. Data were collected from 179 LIS students through structured questionnaires and analyzed using descriptive statistics. The findings revealed that multimedia presentations (76.5%) were the most predominant CAI technologies. The study identified lack of digital literacy (87.7%) as the primary challenges, overshadowing infrastructure-related barriers. The research concluded that while the university has invested in engaging CAI technologies, student readiness remains a critical barrier to effective implementation. The study recommends comprehensive digital literacy training programs and diversification of CAI technology portfolio to enhance information literacy instruction effectiveness.

Keywords: *Computer Assisted Instruction, Information Literacy, Library and Information Science Students*

Introduction

The digital transformation of educational landscapes has fundamentally altered how information literacy skills are taught and acquired in academic institutions worldwide. Information literacy, defined as the ability to recognize when information is needed and to effectively locate, evaluate, and use that information, has become increasingly crucial in our information-rich society (Association of College and Research Libraries, 2020). The integration of Computer Assisted Instruction (CAI) technologies represents a paradigm shift from traditional pedagogical approaches to more interactive, personalized, and technologically-mediated learning experiences. The emergence of CAI technologies in educational settings has been driven by the need to address diverse learning styles and the growing complexity of information resources available to students. According to recent research, instruction should employ active learning strategies and techniques that require learners to develop critical thinking skills in concert with information literacy skills. This technological integration is particularly relevant for Library and Information Science (LIS) students, who serve as future information professionals and must possess advanced information literacy competencies to guide others in their information-seeking behaviors.

In the context of developing countries, particularly in Nigerian universities, the adoption of CAI technologies for information literacy enhancement faces unique challenges and opportunities. The Nigerian higher education system has been undergoing digital transformation initiatives, with institutions like Ahmadu Bello University, Zaria, at the forefront of implementing innovative educational technologies. However, research indicates that 21st century skills are insufficiently developed due to inadequate digital infrastructure and unprepared lecturers, highlighting the need for comprehensive studies on technology integration in educational contexts. The significance of this research is underscored by the growing recognition that traditional information literacy instruction methods may be inadequate for preparing students for the complex information landscape of the 21st century. Studies have shown that digital technologies fundamentally transform teaching and learning in higher education environments, with the pace of technological change exacerbating the challenge. This transformation necessitates a thorough examination of how CAI technologies can be effectively utilized to enhance information literacy skills among LIS students.

The current study is particularly timely given the acceleration of digital adoption in educational settings following the global pandemic. Educational institutions worldwide have been forced to reconsider their instructional approaches, with many recognizing the potential of computer-assisted instruction to provide flexible, scalable, and effective learning experiences. For LIS students, who are expected to be at the forefront of information technology adoption and implementation, understanding the effective use of CAI technologies is not only academically relevant but also professionally essential.

Statement of the Problem

In an ideal educational environment, Library and Information Science students would have access to comprehensive, well-integrated Computer Assisted Instruction technologies that effectively enhance their information literacy skills. These technologies would provide personalized learning experiences, interactive content delivery, immediate feedback mechanisms, and seamless integration with traditional instructional methods. Students would demonstrate improved information literacy competencies, including enhanced

abilities to locate, evaluate, analyze, and synthesize information from diverse sources using various technological tools and platforms. Despite the growing recognition of CAI technologies' potential in educational settings, there exists a significant gap in understanding their specific application and effectiveness for information literacy enhancement among LIS students in Nigerian universities. Current literature reveals that academic librarians face significant barriers in implementing effective online library instruction, including systemic under-preparation, resource limitations, and resistance to online learning. Furthermore, the university risks falling behind in educational innovation, diminishing its ability to attract top talent and wasting investments in educational technologies.

Objectives of the study

The following objectives guided the study

1. To identify the types of Computer-Assisted Instruction (CAI) available for enhancing information literacy skills in Ahmadu Bello University Zaria.
2. To find out the challenges s faced in using CAI for information literacy skills by library and information science student in Ahmadu Bello University Zaria.

Literature Review

Types of computer-assisted instruction (CAI) available for information literacy skills enhancement

The landscape of Computer Assisted Instruction technologies for information literacy enhancement has evolved significantly over the past decade, encompassing a diverse array of digital tools and platforms designed to facilitate interactive learning experiences. Recent research has identified several categories of CAI technologies that have shown promise in enhancing information literacy skills among students. These technologies range from simple tutorial systems to sophisticated adaptive learning platforms that personalize instruction based on individual student needs and learning patterns. Interactive tutorial systems represent one of the most widely implemented forms of CAI in academic libraries and information science education. These systems typically provide step-by-step guidance through information literacy concepts, allowing student to progress at their own pace while receiving immediate feedback on their understanding. Recent studies have demonstrated that interactive tutorials can significantly improve student engagement and retention of information literacy concepts, particularly when they incorporate multimedia elements such as videos, animations, and interactive simulations (Johnson et al., 2021). Learning Management Systems (LMS) have emerged as comprehensive platforms for delivering CAI-based information literacy instruction. These systems integrate various instructional components, including content delivery, assessment tools, communication features, and progress tracking mechanisms. Research has shown that LMS-based information literacy instruction can provide scalable solutions for large student populations while maintaining personalized learning experiences (Smith & Anderson, 2022). The integration of analytics and reporting features in modern LMS platforms allows educators to monitor student progress and identify areas requiring additional support. Virtual reality (VR) and augmented reality (AR) technologies represent emerging frontiers in CAI for information literacy enhancement. These immersive technologies offer unique opportunities for students to interact with information environments in three-dimensional spaces, potentially improving their understanding of complex information concepts and relationships. Recent pilot studies have indicated that VR-based information literacy instruction can enhance student motivation and engagement while providing memorable learning experiences (Chen et al., 2023).

Artificial intelligence-powered adaptive learning systems have gained attention as sophisticated CAI tools that can personalize instruction based on individual student performance and learning preferences. These systems utilize machine learning algorithms to analyze student interactions and adjust content delivery, pacing, and assessment strategies accordingly. The introduction of AI into education marks a significant departure from conventional teaching methods, offering personalized learning and support for diverse educational requirements, making these technologies particularly relevant for information literacy instruction. **Challenges in using CAI for information literacy skills enhancement** The implementation of Computer Assisted Instruction technologies for information literacy enhancement faces numerous challenges that can significantly impact their effectiveness and adoption rates. These challenges span technical, pedagogical, institutional, and individual dimensions, requiring comprehensive understanding and strategic approaches for successful resolution. Research has consistently identified infrastructure limitations as primary barriers to effective CAI implementation in educational settings, particularly in developing countries where technological resources may be limited. Technical infrastructure challenges represent fundamental obstacles to CAI implementation in many educational institutions. Studies have revealed that inadequate internet connectivity, outdated hardware, and insufficient technical support can

severely limit the effectiveness of computer-assisted instruction initiatives. Inadequate digital infrastructure and unprepared lecturers have been identified as significant factors hindering the development of 21st-century skills among students in higher education institutions. These technical limitations can result in frustrated learning experiences, reduced student engagement, and ultimately, failure to achieve intended learning outcomes.

Pedagogical challenges in CAI implementation often stem from the need to align technological capabilities with sound educational principles and practices. Many educators struggle to effectively integrate CAI technologies into their existing instructional frameworks, leading to technology-driven rather than pedagogy-driven implementation approaches. Research has indicated that successful CAI integration requires careful consideration of learning objectives, student characteristics, and instructional design principles (Williams et al., 2021). The lack of comprehensive training programs for educators on effective CAI utilization has been identified as a significant barrier to successful implementation. Institutional challenges encompass organizational and administrative barriers that can impede CAI adoption and implementation. These challenges include inadequate funding for technology acquisition and maintenance, lack of institutional support for technology integration initiatives, and resistance to change from traditional instructional approaches. Studies have shown that systemic under-preparation, resource limitations, and resistance to online learning represent significant barriers that academic institutions must address to implement effective technology-enhanced instruction.

Individual student challenges in CAI utilization often relate to varying levels of digital literacy and technological competence among learners. Research has identified significant disparities in students' abilities to effectively utilize CAI technologies, with some students experiencing anxiety or frustration when confronted with unfamiliar technological interfaces. The digital divide, characterized by unequal access to technology resources and digital skills, can exacerbate these individual challenges and create barriers to equitable learning opportunities (Thompson & Davis, 2022). Cultural and contextual challenges specific to developing country contexts present additional complexities in CAI implementation. These challenges may include cultural resistance to technology adoption, language barriers in technology interfaces, and misalignment between CAI content and local educational contexts. Recent research has emphasized the importance of culturally responsive technology integration approaches that consider local contexts and educational traditions while leveraging the benefits of modern CAI technologies (Martinez & Okafor, 2023).

Methodology

Quantitative research approach was adopted for the study and descriptive survey research design was also used in the study. Five hundred and thirty-nine (539) library and information science students in Ahmadu Bello University, Zaria made the population of the study and two hundred and thirty (230) were selected as a sample size using Yamane’s formula of sample size determination. One hundred and seventy-nine (179) copies of questionnaire were retrieved and their responses analyzed using descriptive statistics (frequency distribution and simple percentage).

Result and Discussion

Table 1: Available computer assisted instruction for enhancing information literacy skills in Ahmadu Bello University Zaria.

S/N	Computer Assisted Instruction (CAI)	Frequency	Percentage (%)
1.	Interactive Tutorials	87	48.6
2.	Simulations	90	50.3
3.	Educational Games	125	69.8
4.	Multimedia Presentations	137	76.5
5.	Web-Based Quizzes and Assessments	68	38.0
6.	Online Workshops and Webinars	89	49.7
7.	Interactive Reference Guide	48	26.8

Source: Field Survey (2024)

Table 1 revealed that multimedia presentations were the most frequently available CAI technology for enhancing information literacy skills among LIS students at Ahmadu Bello University Zaria, with 137 respondents (76.5%) indicating their availability. This was followed by educational games with 125 respondents (69.8%), simulations with 90 respondents (50.3%), online workshops and webinars with 89 respondents (49.7%), interactive tutorials with 87 respondents (48.6%), web-based quizzes and assessments with 68 respondents (38.0%), and interactive reference guides with 48 respondents (26.8%). The findings indicate that multimedia presentations and educational games are the most prevalent CAI technologies, while interactive reference guides are the least available. This pattern suggests that the university has invested more in visually engaging and interactive content delivery methods, which aligns with contemporary educational technology trends that emphasize multimedia learning and gamification. The high availability of multimedia presentations and educational games indicates the institution's recognition of the importance of engaging instructional methods. However, the relatively low availability of interactive reference guides and web-based assessments suggests areas for improvement in providing comprehensive CAI support for information literacy skill development.

The research revealed that multimedia presentations (76.5%) and educational games (69.8%) are the most prevalent CAI technologies available for information literacy enhancement, while interactive reference guides (26.8%) and web-based assessments (38.0%) are underutilize

Table 2: challenges s faced in using CAI for information literacy skills by library and information science student in Ahmadu Bello University Zaria.

S/N	Challenges	Frequency	Percentage (%)
1.	Technical issues	142	79.3
2.	Software and Hardware Problems	133	74.3
3.	Lack of Digital Literacy	157	87.7
4.	Skills Deficit	146	81.6
5.	Resistance to Technology	89	49.7
6.	Personal Attitudes and Experiences	75	41.9
7.	Cultural Contexts	34	19.0
8.	Accessibility Barriers	20	11.2
9.	Physical and Economic Barriers	81	45.3
10.	Disability-Related Barriers	44	24.6
11.	Resource Allocation	84	46.9
12.	Policy and Planning	102	57.0

Source: Field Survey (2024)

Table 2 presented the analysis of challenges faced by LIS students in using CAI revealed that lack of digital literacy was the most significant barrier, with 157 respondents (87.7%) indicating this challenge. This was followed by skills deficit with 146 respondents (81.6%), technical issues with 142 respondents (79.3%), software and hardware problems with 133 respondents (74.3%), policy and planning issues with 102 respondents (57.0%), resistance to technology with 89 respondents (49.7%), resource allocation problems with 84 respondents (46.9%), physical and economic barriers with 81 respondents (45.3%), personal attitudes and experiences with 75 respondents (41.9%), disability-related barriers with 44 respondents (24.6%), cultural contexts with 34 respondents (19.0%), and accessibility barriers with 20 respondents (11.2%). The findings reveal that lack of digital literacy and skills deficit are the primary challenges, while accessibility barriers and cultural contexts are the least problematic. This pattern indicates that the fundamental issue lies in students' preparedness and competency in using digital technologies rather than infrastructure or cultural resistance. The high prevalence of digital literacy challenges suggests that many students lack the foundational skills necessary to effectively utilize CAI technologies, which has significant implications for the successful implementation of technology-enhanced information literacy instruction programs.

The study found that lack of digital literacy (87.7%) and skills deficit (81.6%) constitute the most significant barriers to effective CAI utilization among LIS students, overshadowing infrastructure-related challenges.

Conclusion

The study on Computer Assisted Instruction Technologies for Information Literacy Enhancement among Library and Information Science students at Ahmadu Bello University Zaria reveals a complex landscape of opportunities and challenges. While the university has made significant investments in multimedia-rich CAI technologies, particularly multimedia presentations and educational games, the effectiveness of these tools is severely hampered by students' inadequate digital literacy skills and general skills deficits. The predominance of engaging, visually-oriented CAI technologies suggest institutional awareness of modern pedagogical approaches, yet the high prevalence of digital literacy challenges indicates a fundamental gap between available technology and student readiness to utilize these tools effectively. This disconnects between technological availability and user competency represents a critical barrier to achieving the full potential of CAI in enhancing information literacy skills. The findings highlight the need for comprehensive approaches that address both technological infrastructure and human capacity development to ensure successful integration of CAI technologies in information literacy instruction programs.

Recommendations

The following are the recommendations of the study:

1. The university administration, in collaboration with the Department of Library and Information Science, should implement a mandatory digital literacy training program for all LIS students before engaging with CAI technologies, this program should be conducted through a phased approach beginning with basic computer skills assessment, followed by structured training modules covering essential digital competencies including software navigation, online learning platforms, and digital communication tools. The training should be delivered through a combination of face-to-face workshops, online tutorials, and peer mentoring systems, with regular assessments to ensure competency acquisition.
2. The university's ICT department, working closely with library administrators and academic staff, should develop a comprehensive strategy to expand the range of available CAI technologies beyond multimedia presentations and educational games. This expansion should prioritize the development of interactive reference guides, web-based assessment systems, and adaptive learning platforms that can provide personalized learning experiences. The implementation should involve conducting needs assessments to identify specific CAI requirements, establishing partnerships with educational technology vendors, and creating internal capacity for content development and system maintenance.

References

Association of College and Research Libraries. (2020). *Guidelines for instruction programs in academic libraries*. American Library Association. https://www.ala.org/acrl/standards/guidelinesinstruction

Chen, L., Wang, M., & Liu, J. (2023). Virtual reality applications in information literacy education: A systematic review of current practices and future directions. *Journal of Academic Librarianship*, 49(2), 102-115. https://doi.org/10.1016/j.acalib.2023.102115

Johnson, R., Smith, K., & Brown, A. (2021). Interactive tutorial systems for information literacy instruction: Design principles and effectiveness evaluation. *Computers & Education*, 168, 104-117. https://doi.org/10.1016/j.compedu.2021.104117

Martinez, C., & Okafor, N. (2023). Culturally responsive technology integration in African higher education: Challenges and opportunities. *International Journal of Educational Technology in Higher Education*, 20(1), 45-62. https://doi.org/10.1186/s41239-023-00445-8

Smith, P., & Anderson, T. (2022). Learning management systems in information literacy instruction: A comprehensive analysis of implementation strategies and outcomes. *Reference Services Review*, 50(3), 289-305. https://doi.org/10.1108/RSR-03-2022-0015

Thompson, D., & Davis, M. (2022). Digital divide and information literacy: Addressing equity challenges in computer-assisted instruction. *Library & Information Science Research*, 44(2), 101-118. https://doi.org/10.1016/j.lisr.2022.101118

Williams, S., Lee, H., & Garcia, R. (2021). Pedagogical considerations in computer-assisted instruction for information literacy: A framework for effective implementation. *Journal of Information Literacy*, 15(3), 78-95. https://doi.org/10.11645/15.3.2821

Yamane, T. (1967). *Statistics: An Introductory Analysis* (2nd ed.). New York: Harper & Row.