ENHANCING TEACHER EDUCATION THROUGH MICROCOURSEWARE: A CASE STUDY OF THE FEDERAL UNIVERSITY OF EDUCATION, ZARIA

ZAJES 24(S)2024
p-ISSN:2795-3890
e-ISSN: 2805-3877

Yussuf Yakubu
Department of Computer Science, Federal University of Education, Zaria
TETFund Centre of Excellence for Technology Enhanced Learning Corresponding
yussyak@gmail.com
https://orcid.org/0000-0002-3650-7546

This study investigates the effectiveness of Micro-courseware in enhancing teacher education at the Federal University of Education, Zaria. With the increasing integration of technology in educational practices, this research evaluates how Micro-courseware can improve learning outcomes, student engagement, and teaching methodologies. Utilizing a mixed-methods approach, data were collected through surveys, interviews, and classroom observations involving 150 students and 20 lecturers. Quantitative analysis revealed a significant increase in student performance, with average test scores rising by 20% following the implementation of Micro-courseware. Additionally, qualitative feedback indicated high levels of satisfaction among students, with 82% reporting that Micro-courseware made learning more engaging and accessible. However, challenges such as technological barriers and resistance to change were also identified. The findings suggest that Micro-courseware can play a crucial role in modernizing teacher education, offering practical recommendations for its effective integration into curricula. This research contributes to the understanding of technology-enhanced learning in Nigerian educational contexts and highlights the need for ongoing support and training for educators to maximize the benefits of Micro-courseware.

Article History
Received: Oct. 2024
Review processes
Oct - Nov 2024
Received in revised form: Nov 2024
Accepted: Dec 2024
Published online: Dec 2024

KEYWORDS
- Micro-courseware
- Teacher Education
- Pedagogical Skills
- Educational Technology
- Technology Integration
- Student Engagement

Introduction

The teacher education landscape in Nigeria is experiencing substantial transformation aimed at enhancing educational practices and improving student results. Integrating digital tools into educational frameworks has become increasingly vital due to rapid technological improvements. This study examines the impact of Micro-courseware on improving teacher education at the Federal University of Education, Zaria, emphasising its capacity to promote effective teaching and learning methodologies.

Education is the foundation of society growth; hence the quality of teachers is critical to ensure successful learning results. In Nigeria, teacher education has made considerable strides toward improving educators' abilities and skills. However, it has historically experienced various obstacles, such as poor infrastructure and insufficient educator training. According to a report published by the National Commission for Colleges of Education (NCCE), there is an urgent need to modify teacher education programs to better prepare educators for modern classrooms. The quality of teacher education has a direct impact on teaching effectiveness and student learning outcomes. Recently, the Nigerian government realized that boosting teacher education is critical for improving overall educational quality (Ogunyemi, 2022).

In light of this, this study investigates how Micro-courseware could improve teacher preparation at Federal University of Education Zaria. Through programs created to give

students the teaching skills they need, the Federal University of Education Zaria plays a crucial role in preparing future teachers. The lack of involvement and relevance of traditional teaching approaches has frequently drawn criticism (Adebayo, 2023). As a result, educators and legislators are increasingly in agreement that incorporating technology into teacher education is essential to creating a more dynamic learning environment.

Integrating technology in education is not only a trend; it is a requirement in the 21st century. According to the World Economic Forum, pupils must be digitally literate in order to succeed in an increasingly digital society (World Economic Forum, 2023). Micro-courseware—small instructional modules offered through digital platforms—offers flexible learning opportunities that dramatically enhance educational experiences.

Research suggests that technology-enhanced learning settings can lead to greater student engagement and academic success (Zheng et al., 2022). Micro-courseware enables tailored learning experiences where students can continue at their own pace and revisit hard ideas as needed. This accords with constructivist learning theories encouraging active learning through content interaction (Jonassen, 2021).

Moreover, the COVID-19 epidemic enhanced technology use in education, highlighting both possible benefits and concerns linked with online learning (Adedoyin & Soykan, 2020). Experiences obtained during this period underline the importance for teacher education programs to successfully use technology.

In this context, deploying Micro-courseware gives a chance to address existing difficulties while aligning with global educational trends. By providing educators access to high-quality content, Micro-courseware boosts professional development and instructional practices. This study intends to evaluate its effectiveness at FUE Zaria.

The significance of this study on Micro-courseware's effectiveness involves contributions to educational practices and implications for policy development.

This research provides insights into practical applications of Micro-courseware in teacher education by identifying best practices for its integration into educational settings.

The outcomes will inform policymakers about integrating technology into teacher education programs leading to policies supporting digital tool adoption.

Purpose of the Study

The primary purpose is to evaluate Micro-courseware's effectiveness in enhancing teacher education at FUE Zaria by assessing its impact on student outcomes and teaching practices.

Specific Objectives

1. Examine Micro-courseware implementation within teacher education at FUE Zaria.
2. Assess its effectiveness in improving student engagement and academic performance.
3. Identify perceived benefits and challenges from both students' and lecturers' perspectives.
4. Provide practical recommendations for successful integration into curricula.

Research Questions

1. How is Micro-courseware implemented within teacher education at FUE Zaria?
2. In what ways does the implementation of Micro-courseware enhance student engagement and academic performance?
3. What are the perceived benefits and challenges of Micro-courseware from the

perspectives of both students and lecturers?

4. What practical recommendations can be made for successfully integrating Micro-courseware into the curriculum?

Literature Review

Micro-courseware, defined as small, focused educational modules delivered digitally, significantly enhances learning experiences by providing targeted content in an accessible format (Zheng, Long, Zhong, & Gyasi, 2022). Micro-courseware is designed to facilitate effective learning by incorporating various pedagogical strategies, making it a valuable tool in modern education. The key characteristics of Micro-courseware include:

1. **Modular Structure**: Micro-courseware is organized into manageable units that focus on specific learning objectives. This modular design allows learners to engage with content incrementally, making it easier to digest complex information and track progress over time (Hew & Cheung, 2014). Each module typically addresses a particular topic or skill, enabling students to concentrate on one aspect of their learning journey at a time.
2. **Multimedia Elements**: To create engaging and interactive learning experiences, Micro-courseware incorporates various multimedia elements, such as videos, animations, infographics, and interactive quizzes. By integrating visual and auditory stimuli, Micro-courseware can enhance comprehension and retention of information.
3. **Personalization**: One of the most significant advantages of Micro-courseware is its ability to offer personalized learning experiences tailored to individual needs. Students can progress through the material at their own pace, allowing them to spend more time on challenging concepts while quickly moving through areas they already understand (Hew & Cheung, 2014). This personalization fosters a sense of ownership over the learning process and can lead to improved academic outcomes.
4. **Accessibility**: Micro-courseware is designed for easy access across various devices, including computers, tablets, and smartphones. This flexibility ensures that learners can engage with content anytime and anywhere, breaking down geographical and temporal barriers to education (Giannakos, Jaccheri, & Krogstie, 2021). Such accessibility is particularly crucial in regions where traditional educational resources may be limited or inconsistent.
5. **Formative Assessment**: Formative assessments like quizzes and interactive tasks in Micro-courseware enable continuous monitoring of student progress and understanding. These assessments offer immediate feedback, empowering learners to identify areas for improvement and adapt their study strategies accordingly (Hew & Cheung, 2014). This ongoing evaluation helps educators track student performance and adapt instructional approaches as needed.

Micro-courseware represents a transformative approach to education by leveraging technology to create engaging, personalized, and accessible learning experiences. Its modular structure, multimedia elements, focus on personalization, accessibility across devices, and incorporation of formative assessments make it an effective tool for enhancing educational outcomes in diverse learning environments. As educational institutions increasingly integrate technology

into their curricula, Micro-courseware stands out as a promising solution for addressing the challenges faced by both educators and students in today's rapidly evolving educational landscape (Cheung, 2014).

Theoretical Framework

The integration of Micro-courseware is grounded in constructivist learning theory and the technology acceptance model.

The theory suggests that learners learn by actively creating knowledge through their experiences (Jonassen, 2021). Micro-courseware encourages participation through interactive features.

The model describes how users decide to use technology by considering its usefulness and ease of use (Davis, 1989). In this scenario, the acceptance of both teachers and students depends on how they view the technology (Teo, 2011).

Previous Studies on Micro-courseware Effectiveness

Numerous studies have highlighted Micro-courseware's effectiveness. Hew and Cheung (2014) conducted a comprehensive analysis that demonstrated significant improvements in student engagement when utilizing Micro-courseware. The research by Hew and Cheung (2014) indicated that students who interacted with Micro-courseware reported higher levels of interest and motivation in their learning processes, leading to more active participation in classroom activities. This finding highlights how Micro-courseware can change passive learning settings into engaging, interactive experiences that improve understanding and memory retention. Giannakos et al. (2021) further reinforced the positive impact of Micro-courseware by reporting increased satisfaction among students compared to traditional instructional methods. Giannakos et al. (2021) revealed that students appreciated the flexibility and accessibility provided by Micro-courseware, enabling them to learn at their own pace and review challenging content as necessary. This enhanced satisfaction not only contributes to a more enjoyable learning experience but also correlates with improved academic performance, as satisfied learners are more likely to engage deeply with the material. In a similar vein, Zheng et al. (2022) conducted a meta-analysis that synthesized findings from multiple studies, revealing significant positive effects of Micro-courseware on academic performance across various subjects. Zheng et al. (2022) highlighted those students utilizing Micro-courseware showed higher test scores and improved overall academic outcomes compared to students under traditional instruction. This evidence suggests that Micro-courseware can effectively bridge learning gaps and provide targeted support for students, ultimately leading to enhanced educational attainment.

Thus, the body of research surrounding Micro-courseware illustrates its multifaceted benefits in education, including increased student engagement, higher satisfaction levels, and improved academic performance. The results support the wider implementation of Micro-courseware as an effective solution for contemporary educational obstacles, especially in situations where traditional teaching approaches may be inadequate. Integrating Micro-courseware into curricula offers a promising way for educational institutions to enhance student success and engagement in diverse learning environments as they strive for innovation.

Challenges Faced in Implementation

Despite the well-documented advantages associated with the integration of technology in

educational settings, numerous challenges persist that can impede effective implementation. These challenges can be categorized as follows:

1. **Technological Barriers**: A significant obstacle is the limited access to reliable internet connectivity, which can severely restrict the ability of both educators and students to engage in digital learning environments. This issue is particularly pronounced in rural or underprivileged areas, where infrastructure may be inadequate. Adedoyin and Soykan (2020) highlight that without consistent and dependable internet access, the potential benefits of technological integration remain largely unfulfilled.
2. **Resistance from Educators**: Another critical challenge arises from the resistance exhibited by some educators towards adopting new technological methodologies. Many lecturers may harbour a preference for traditional pedagogical approaches, rooted in established practices and familiarity. Furthermore, a lack of confidence in utilizing new technologies can exacerbate this resistance, leading to a reluctance to innovate or adapt. Teo (2011) underscores that addressing these concerns is essential for fostering a more conducive environment for technological integration in teaching.
3. **Instructional Design Challenges**: The development of high-quality online learning modules presents its own set of complexities. Crafting effective instructional materials that are engaging and pedagogically sound demands significant time, expertise, and resources. Hew and Cheung (2014) assert that the intricacies involved in instructional design can deter educators from fully embracing technology, as they may feel ill-equipped to create content that meets the diverse needs of learners.
4. **Lack of Institutional Support**: The successful implementation of technology in education is heavily contingent upon robust institutional support. This includes not only the provision of necessary training for educators but also the allocation of adequate resources to facilitate the transition to technology-enhanced learning environments. Adedoyin and Soykan (2020) emphasize that without institutional commitment and backing, initiatives aimed at integrating technology into educational frameworks are likely to falter.

While the potential benefits of technology in education are significant, these challenges must be systematically addressed to ensure effective implementation and maximize the advantages offered by technological advancements.

Methodology

Research Design

A case study approach was employed due to its suitability for exploring complex phenomena within real-life contexts (Yin, 2018). This qualitative design allows an in-depth examination of Micro-courseware implementation at FUE Zaria.

Participants

a) **Students**: This study includes 150 students from various levels (NCE I, II, and III) enrolled in teacher education programs at FUE Zaria. This diverse group allows for a thorough exploration of how Micro-courseware influences student engagement and academic performance throughout different stages of their education.

b) **Lecturers**: The population for the lecturers component includes 20 lecturers who have experience with Micro-

courseware, selected from various departments within the teacher education programme

Sampling

A stratified random sampling method was used to guarantee representation across all academic levels among the students. This approach enables a more detailed analysis of how Micro-courseware affects students at various points in their educational paths. A purposeful sampling technique was applied for the lecturers to select those who have actively utilized Micro-courseware in their teaching. This choice ensures that participants have the relevant insights and experiences essential for understanding the implementation and influence of Micro-courseware.

Sample Size

A sample of 150 students was chosen to provide adequate statistical power to detect notable differences in both engagement and performance. For the lecturers, a sample of 20 was selected to facilitate in-depth qualitative analysis while maintaining a manageable data collection and analysis process. This sample size is sufficient to capture a range of perspectives and experiences related to the benefits and challenges associated with Micro-courseware.

Quantitative data from surveys were analyzed using descriptive statistics to summarize the key findings. This included calculating measures such as means, percentages, and frequency distributions to provide a clear overview of the data collected.

Findings

The analysis of the effectiveness of Micro-courseware in enhancing teacher education at the Federal University of Education, Zaria, was conducted using descriptive statistics. This approach provides a clear summary of the data collected from surveys, interviews, and classroom observations involving 150 students and 20 lecturers. The analysis focuses on key metrics such as mean scores, percentages, and frequency distributions to illustrate the impact of Micro-courseware on student engagement and academic performance.

Student Performance

The performance of students before and after the implementation of Micro-courseware was evaluated through test scores. The results are summarized in Table 1.

***Table 1**: Performance of students before and after implementation of Micro-courseware*

Performance Metric	Before Implementation	After Implementation	Change (%)
Mean Test Score	75%	90	+20%
Percentage Below 70%	30%	10	-20%

- **Mean Test Scores**: The average test scores increased from **75%** to **90%**, indicating a significant improvement in overall academic performance following the introduction of Micro-courseware.
- **Score Distribution**: The percentage of students scoring below **70%** decreased from **30%** to **10%,** highlighting a shift towards higher academic achievement among students.

The findings from this study illustrate the transformative potential of Micro-courseware in enhancing teacher education at the Federal University of Education, Zaria. The significant increase in mean test scores from **75% to 90%**, along with a reduction in the percentage of students scoring below **70%**, underscores the effectiveness of Micro-courseware as an educational tool. This aligns with existing literature that emphasizes technology's role in improving academic performance through personalized learning experiences (Zheng et al., 2022).

Student Engagement

The impact of Micro-courseware on student engagement was assessed through survey responses and observational data. The findings are presented in Table 2.

***Table 2**: The impact of Micro-courseware on student engagement.*

Engagement Metric	Before Implementation	After Implementation
Active Participation in Class	50%	75%
Students Reporting Engagement	82%	N/A

- **Engagement Levels**: Observational data indicated that active participation in class discussions rose significantly from **50%** to **75%** after implementing Micro-courseware.
- **Survey Responses**: A substantial **82%** of students reported that Micro-courseware made learning more engaging and accessible.

The increase in active participation from 50% to 75% highlights that Micro-courseware significantly enhances academic performance while also creating a more engaging learning environment. This aligns with constructivist theories advocating for interactive learning experiences, as noted by Jonassen (2021). Furthermore, feedback reveals that 82% of students found Micro-courseware engaging, indicating its effectiveness in capturing student interest and fostering active learning. This observation corroborates previous studies that emphasize how technology can transform passive learning into dynamic educational experiences (Hew & Cheung, 2014).

Satisfaction with Micro-courseware

Student satisfaction with Micro-courseware was gauged through a satisfaction survey, summarized in Table 3.

Table 3: Student satisfaction with Micro-courseware usage.

Satisfaction Rating	Percentage of Students
Very Satisfied	45%
Satisfied	40%
Neutral	10%
Dissatisfied	5%

- **Satisfaction Ratings**: The survey revealed that a combined total of 85% of students expressed satisfaction with the Micro-courseware format, indicating high levels of approval.
- **Feedback Themes**: Qualitative feedback highlighted key themes such as flexibility, ease of access, and improved understanding of complex topics.

The high satisfaction ratings—wherein a combined total of **85%** expressed contentment with the Micro-courseware format—demonstrate its acceptance among students. Such satisfaction is crucial as it correlates with increased motivation and engagement, which are essential for effective learning outcomes (Giannakos et al., 2021). Students appreciated the flexibility offered by Micro-courseware, allowing them to learn at their own pace and revisit challenging content as needed. This personalization is vital for accommodating diverse learning styles and needs within the classroom.

Challenges Identified

Despite the positive outcomes, several challenges were reported by both students and lecturers. These challenges are summarized in Table 4.

Table 4: Challenges of Micro-courseware usage

Challenge Category	Percentage Reporting Issues
Technological Barriers	40%
Resistance to Change	30%

- **Technological Barriers:** Approximately 40% of students indicated issues with Internet connectivity affecting their ability to consistently access Micro-courseware.
- **Resistance to Change:** Feedback from lecturers suggested that about 30% were hesitant to adopt new technologies due to comfort with traditional teaching methods.

Despite these positive outcomes, challenges related to technological barriers and resistance from educators cannot be overlooked. The reported issues with internet connectivity highlight a significant obstacle in implementing technology-enhanced learning environments, particularly in regions where infrastructure is lacking (Adedoyin & Soykan, 2020). Furthermore, resistance from educators may stem from a lack of confidence or familiarity with new technologies. Addressing these concerns is essential for fostering an environment conducive to innovation in teaching practices (Teo, 2011).

Recommendations

To maximize the benefits of Micro-courseware in teacher education, several recommendations emerge from this study:

1. **Infrastructure Improvement**: Institutions should invest in reliable Internet connectivity and technological resources to ensure all students have access to digital learning tools.
2. **Professional Development Programs**: Ongoing training for educators on utilizing technology effectively can alleviate resistance and enhance their confidence in adopting new methodologies.
3. **Continuous Feedback Mechanisms**: Establishing channels for ongoing feedback from both students and educators can help

identify challenges early on and adapt strategies accordingly.

4. **Curriculum Integration Strategies**: Developing clear guidelines for integrating Micro-courseware into existing curricula can facilitate smoother transitions and enhance overall educational practices.

In conclusion, this study demonstrates that Micro-courseware has the potential to significantly enhance teacher education at FUE Zaria by improving academic performance and student engagement while also highlighting areas for further support and development. As educational institutions continue to navigate the integration of technology into teaching practices, findings from this research provide valuable insights into effective strategies for fostering successful educational outcomes.

Limitations of the Study
While valuable insights were obtained from this study:

a. Reliance on self-reported data may introduce bias.
b. Conducting research solely within one institution limits generalizability; future studies should encompass diverse contexts.

Conclusion

This study evaluated Micro-courseware's effectiveness in enhancing teacher education at FUE Zaria with key findings indicating high levels of student satisfaction alongside significant improvements in academic performance metrics while identifying unique challenges related to technological barriers and resistance among educators.

References

Adebayo A.O., Ogunyemi B., & Adedoyin O.B. (2023). Enhancing Teacher Education Through Technology Integration: A Case Study from Nigeria.

Adedoyin O.B., & Soykan E. (2020). The impact of COVID-19 on education: Insights from Nigeria. Education and Information Technologies, 25(6),1-20.

Giannakos, M.N., Jaccheri, L., & Krogstie, J. (2021). Student Engagement Through Microlearning: A Comparative Study. Computers & Education, 162(104069). https://doi.org/10.1016/j.compedu.2021.104069

Hew K.F., & Cheung W.S. (2014). Use of MOOCs by Higher Education Institutions: A Case Study Approach. Journal of Educational Technology & Society,17(2),45-56.

Jonassen D.H. (2021). Learning as Constructing Meaning: A Constructivist Perspective. Educational Psychology Review, 33(3), 325-345.

NCCE. (2021). National Commission for Colleges of Education Report: Teacher Education Reform Needs.

Ogunyemi B. (2022). Policy Perspectives on Teacher Education Quality Improvement in Nigeria. Journal of Educational Policy, 37(4), 543-558.

Teo T. (2011). Technology Acceptance Model: A Meta-analysis Approach. Computers & Education, 57(4), 2432-2440.

World Economic Forum. (2023). The Future of Jobs Report: Digital Skills Demand Analysis.

Yin R.K. (2018). Case Study Research: Design and Methods. Thousand Oaks: SAGE Publications.

Zheng, B., Long, M., Zhong, L., & Gyasi, J.F. (2022). Meta-analysis on Technology-enhanced Learning Environments: Effects on Academic Performance Across Studies. Educational Technology Research & Development, 70(6), 1235–1258. https://doi.org/10.1007/s10639-022-11092-7