



Development Of Interactive Digital Learning Environment For College Of Nursing And Midwifery Katsina (CONAMKAT)

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ABSTRACT

This research paper details the development and implementation of an Interactive Digital Learning Environment (IDLE) for College of Nursing and Midwifery Students in Katsina, Nigeria. Utilizing the ADDIE instructional design model, the researchers created a multimedia-rich platform to address challenges posed by traditional teaching methods and enhance student engagement. The study employed a mixed-methods approach to assess the IDLE's effectiveness, analyzing student learning outcomes, perceptions, and feedback. Results indicated significant improvement in student learning and high satisfaction rates with the IDLE, suggesting its potential for improving educational access and outcomes. The researchers also explored the broader context of online learning challenges in Nigeria, specifically addressing issues of digital literacy and access. The study concludes by highlighting the benefits of student-centered learning and multimedia integration in enhancing educational experiences.

Keywords: Multimedia-mediated Content, Interactive Learning Environment, SILHU, Instructional model.

INTRODUCTION

A virtual classroom is an online learning environment where instructors and students engage in real-time through digital platforms, replicating the interactions of a traditional classroom. It typically includes features like video conferencing, chat, screen sharing, and interactive tools for teaching and collaboration (Muthuprasad,2021). It is a learning environment created in the virtual space, separating students and teachers by time and space. It is generally less expensive than traditional modes of learning in higher education (Malik, 2012).

Singh and Thurman (2019) define online learning as a flexible educational method that occurs in digital environments. Students can access learning materials and interact with teachers and peers using various devices like computers, tablets, or smartphones. This learning can happen at any time and place, providing learners with independence and autonomy in their educational journey.

According to Littlefield (2018), synchronous learning environments are structured with live lectures, real-time interactions, and instant feedback between educators and students. In contrast, asynchronous learning environments lack this structure, offering content through various systems and forums without live classes, making instant feedback and immediate responses unfeasible.

Innovative pedagogical approaches, especially interactive technology, are being developed in education due to the need for a systemic, person-centered approach that guides meaningful student actions. Traditional verbal knowledge transmission is being replaced by more active learning methods. Additionally, it has become crucial to anticipate learning outcomes, avoid negative consequences, and ensure positive results through a well-structured technological framework that enhances instructor-student interaction (Burkhanova & Rodionova, 2012).

The diverse learning needs of students in a classroom present significant challenge, such as varying learning paces, different learning styles, and difficulty in identifying individual learning gaps. Large class sizes often prevent teachers from providing personalized attention to each student, while the burden of administrative tasks reduces the time available for effective instruction. Additionally, traditional teaching methods and assessments may fail to engage all students or provide timely, detailed feedback. These challenges necessitate the use of Virtual learning in our institutions

Moreover, the growing adoption of virtual learning environments in public institutions, significant challenges persist that hinder their effectiveness and accessibility. Issues such as technological barriers, lack of engagement, and disparities in digital resources impact the equitable delivery of education. Additionally, the need for flexible and cost-effective solutions to address overcrowded classrooms and ensure continuity during disruptions remains critical. The purpose of this project is to investigate these challenges and assess how virtual learning can be optimized to enhance accessibility, engagement, and resource management in public education systems, thereby addressing the gaps and improving overall educational outcomes.

Following in the footsteps of scholars, the current project will provide a successful way of giving personalized learning environment. The study aimed at developing a more modern Interactive Digital Learning Environment that will enhance more on the current learning culture in College of Nursing and Midwifery Katsina. By constructing a robust learning classroom that is slightly different from regular virtual environment that will help in enhancing accessibility, engagement and resource management in the classroom and provide more easier way of accessing lecture materials from various modules

The number of illiterates in Nigeria is rising despite the government's efforts to lower the country's illiteracy rate. According to Adam (2021), 76 million Nigerians lack literacy, with women accounting for 60% of this population since they are typically the ones who raise and care for their children. This means that they are denied access to digital knowledge, including information about healthcare, education, and government services. They are also unable to use the internet to access information and communicate with others. Natural language processing (NLP) has the potential to solve this problem by enabling the development of chatbots that can convert speech to text and translate between different languages. Chatbots can be used to provide illiterate Nigerians with access to digital knowledge and the internet, even if they cannot read or write.

Liguori and Winkler (2020) argue that academic institutions cannot instantly convert all of their curricula into online formats. The three main challenges they identify in online teaching are distance, scale, and personalized learning. They emphasize that innovative solutions are essential for overcoming these challenges, particularly in response to pandemic outbreaks. Our research, will surely focus on development of interactive learning classroom that will go in line with personalized learning environment.

Natural disasters like floods and pandemics disrupt education, often leading to school closures and depriving students of their right to learn. These crises affect millions of young people globally, and both students and teachers face psychological challenges like stress and anxiety, impacting focus and concentration (Di Pietro, 2017). It is important not to focus solely on the advantages of adopting online learning during crises but to also prioritize improving and enhancing the quality of virtual courses provided in such situations (Affouneh et al., 2020).

Online learning presents numerous challenges involving students, educators, and content development. Institutions find it difficult to engage students and encourage active participation in the learning process. Teachers face obstacles in transitioning from traditional offline methods to online formats, requiring them to

adjust their teaching strategies and time management. Additionally, creating content that not only meets curricular requirements but also captivates students' interest remains a significant hurdle (Kebritchi et al., 2017).

A digital learning ecosystem thrives on a robust technological foundation comprising devices, operating systems, and internet connectivity. This ecosystem encompasses active participation from instructors and learners, facilitating the seamless exchange of learning content. Interactive learning lies at its core, where learners collaborate through online tools, engaging in knowledge sharing and fostering creativity. This interactive process necessitates accessibility, digital identity management, seamless tool integration, opportunities for innovation, and a receptive environment that encourages active participation and knowledge sharing (Meepung et al., 2021).

ADDIE MODEL FOR INSTRUCTIONAL DESIGN FRAMEWORK

The ADDIE model, a five-step process encompassing Analysis, Design, Development, Implementation, and Evaluation, is a widely recognized framework for creating effective technology-driven instruction. It has become a benchmark for high-quality distance learning programs developed by professionals. The model's success hinges on its emphasis on a structured approach, clearly defined learning outcomes, well-organized content, manageable workloads for instructors and learners, the effective use of various media, engaging student activities, and thorough evaluation aligned with the desired learning outcomes. (Dick and Carey, 2004). Studies indicate that the Center for Educational Technology (CET) created the ADDIE model as a structured framework for the design, development, and evaluation of instructional materials and training programs, enabling a more meaningful prediction and analysis of learners' cognitive processes and acquired skills. It emphasizes a systematic approach to defining measurable learning objectives, analyzing learner needs, and developing tailored instructional strategies. Key aspects include task and content analysis, learner-centered design, and integrating formative and summative evaluations to ensure instructional effectiveness. According Branch, R. M. (2009) ADDIE is Grounded in behaviorism and cognitivism, the framework provides tools for scaffolding, sequencing, and reinforcement, enabling designers to create outcome-driven and adaptable learning solutions (Boucher, 2022).

Table 1: ADDIE's key phases in the instructional design process (Dick, Carey, and Carey 2005).

ADDIE's Instructional phases	Outcome Design goals
Analysis	Identify the learning problem, target audience, goals, and requirements.
Design	Create a blueprint for the instructional content and learning activities.
Development	Produce the instructional materials based on the design blueprint
Implementation	Deliver the instructional materials to the target audience
Evaluation	Assess the effectiveness of the instructional program

Basically, ADDIE model was chosen to the research because of its conceptual framework that is relevant to the standard of learning with technology. Indeed, the ADDIE model's five-phase structure can be effectively applied to create a modular teaching module for subjects like Design and Technology. Each phase of ADDIE offers a structured approach to ensuring that the module is comprehensive, engaging, and aligned with learning outcomes (Zamri, Nasri, Bukar, 2019).

Consequently, the current research design integrates ADDIE's five instructional phases into the development of this IDLE, where multimedia elements are used to enhance interactivity in the learning content. The learning environment is also structured around the principles of student-centered learning, allowing learners to engage more effectively with the content and maintain focus throughout the learning process.

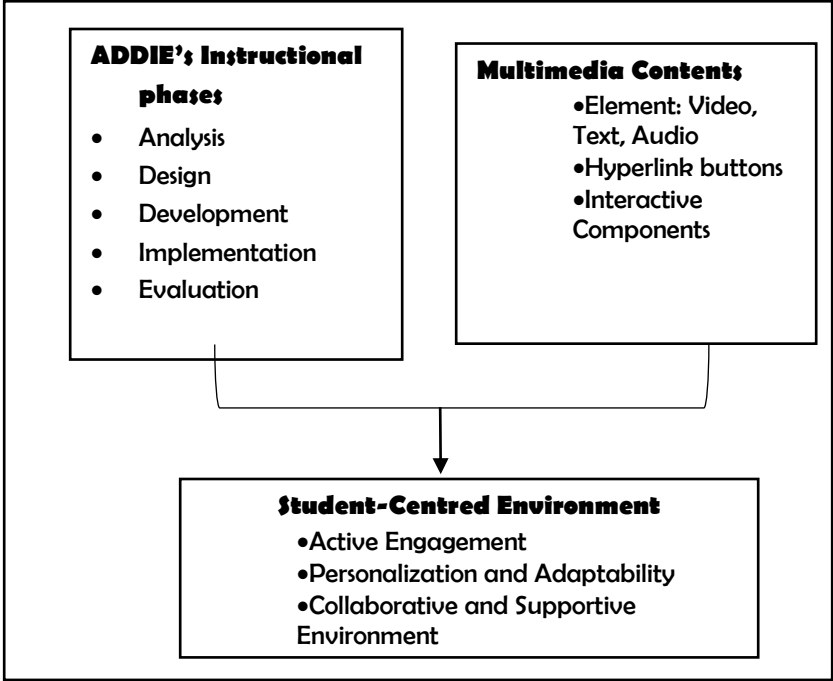


Figure 1: Student-Centred Environment with the Use of Multimedia and ADDIE’s model

RESEARCH METHODS

Research Design

This research investigated the effectiveness of an online learning environment using IDLE (Integrated Development and Learning Environment) on IT program students at the College of Nursing and Midwifery Katsina (CONAMKAT).

Participants:

- The study included nursing program students with basic computing skills and English proficiency.
- They were familiar with traditional face-to-face learning but had no prior experience with web-based interactive learning in higher education.

Data Collection:

- **Pre-test:** Assessed students' prior knowledge before using IDLE.
- **Post-test:** Measured student learning outcomes after using IDLE.
- **Questionnaires:** Assessed student attitudes towards the learning environment using a 3-point scale and 10 open-ended questions.

Data Analysis:

- Employed a mixed-methods approach, combining quantitative and qualitative data.
- Used triangulation to validate findings from different data sources.

Focus Areas:

The study focused on analyzing student perceptions in three key areas:

1. **Student-centeredness:** How well the environment catered to individual student learning needs.
2. **Multimedia Content:** The effectiveness of multimedia resources within the learning environment.
3. **Feedback Availability:** The availability and usefulness of feedback mechanisms for students.

Key Features of the IDLE Environment:

- **Accessibility:** IDLE was hosted on a web server, allowing students to access it from any computer with internet connectivity, promoting flexible learning.

DEVELOPMENT OF IDLE

This study utilized an Interactive Digital Learning Environment (IDLE) as the core of its student-centered learning approach. This IDLE was developed based on the ADDIE instructional design model and incorporated multimedia-rich content. The IDLE's interface featured an open page displaying the main menu and an introductory section. The "Home" tab provided access to four primary sections, each with various subtopics. Within each section, students were guided through an "Objective" screen followed by a "Review" screen. The table below illustrates how the ADDIE instructional events were applied in designing the instructional materials and activities within the IDLE to enhance student learning. Figures 2 and 3 showcase the visual design of the IDLE interface.

Table 2: Use of ADDIE's five events of instruction in developing the IDLE.

ADDIE's Events, Instructional Rationales and Features in the IDLE	
Event 1- Analysis:	To define the student needs about their existing knowledge and skills.
✓	Introductory animation clip depicting a relevant story
✓	Questions related to the content were included in the short animation clip to spark curiosity
✓	The lessons incorporated animated visuals to capture and focus the student's attention
Event 2- Design:	To designed and achieve the learning objectives.
✓	The Learning Objective section was placed at the beginning of each chapter.
✓	Hypertext allowed students to navigate back to the Objective section from any point in the event.
Event 3- Development:	To create the actual training materials.
✓	Text explanations were structured in both paragraph and bullet point formats.
✓	Additional information could be accessed through provided hyperlinks.
✓	A video clip was included to enhance the explanation with visual details.
✓	Audio options were offered as an alternative, allowing students to learn through listening.
Event 4- Implementation:	To support practice and improve knowledge encoding.
✓	Clear instructions and user controls were provided for navigating different sections of the content.
✓	Interactive activities were included to help students practice and reinforce newly acquired knowledge.
✓	Interactive diagrams were utilized to present information in a sequential manner.
Event 5- Evaluation:	To assess knowledge mastery and reinforce learning.
✓	A test assessed students' understanding after using the IDLE.
✓	A performance summary was provided to display the students' results.
✓	Suggestions tailored to the level of achievement were included to motivate students

FINDINGS

STUDENT LEARNING OUTCOMES

Student learning outcomes are evaluated through pre-test and post-test results, identifying their achievements within the learning environment.

Table 3: Mean scores and standard deviation from pre-test and post-test results

Test results (total=100)	Mean	STD
Pre-test	26.93	10.93
Post-test	69.3	19.91

Table 3 reveals that the mean score (M) for the pre-test is 26.93 with a standard deviation (STD) of 10.93, suggesting that students' learning outcomes were below average due to their lack of specific knowledge to answer the questions prior to instruction. In contrast, the post-test results indicate a mean score of 69.3 and a STD of 19.91, implying that students' learning outcomes reached a satisfactory level, as the mean score is above average. A normality test confirmed that this sample follows a normal distribution, and a paired-

samples t-test showed a significant difference between the pre-test and post-test scores. Consequently, it can be concluded that this learning environment has notably enhanced student learning achievement.

RESULT

Table 4: Survey Result on Students' Perceptions

S/N	Survey Items	Mean	STD	%
1.	Would you be interested in using similar computer-based learning modules in future lessons?	5.87	2.63	58.7
2.	Were the expectations of the program clearly communicated to you?	5.33	2.70	52.6
3.	Did the program provide an adequate number of illustrations and examples?	7.93	1.00	79.3
4.	Did the learning module allow you to learn at your own pace and in your preferred style?	8.67	1.01	86.6
5.	Are you receptive to the feedback provided, and do you find it to be positive?	7.1	0.88	71.3
6.	Did you experience any difficulties navigating the tutorials independently?	8.7	0.72	88.6
7.	Has this interactive learning module inspired you to seek further knowledge in this area?	7.73	1.77	77.3
8.	Do you believe that multimedia technology (such as animation, narration, and interactivity) is a more effective method for presenting concepts or information?	7.60	1.62	76.0
9.	Were you able to easily access the necessary materials and resources?	8.73	1.12	87.3
10.	Did this module effectively motivate you to fully engage with each section?	9.53	0.72	95.3
11.	Would you recommend this program to other students?	9.00	1.15	90.0
12.	Were the learning materials in this module well-organized and presented in a logical sequence?	7.07	3.04	70.7
13.	Did the video clips help you connect the learning to real-world situations?	6.87	3.05	68.7
14.	Did the final review section enhance your understanding of the subject matter?	8.20	1.60	82.0
15.	Did the supporting examples in the module increase your confidence in learning?	6.6	2.94	66.0

The study results show high levels of student satisfaction with the computer-based learning module. Over 85% of students agreed that the module allowed them to learn at their own pace (86.6%), navigate tutorials independently (88.6%), and access necessary materials (87.3%). Students were also highly motivated to engage with the material (95.3%). Furthermore, 90% of students would recommend the program to others, and 77.3% were inspired to seek further knowledge in the area. While satisfaction was high overall, some aspects received lower agreement. Only 58.7% of students expressed interest in using similar modules in the future, and 52.6% agreed that the program's expectations were clearly communicated. The organization and real-world application of materials also received lower scores, with 70.7% agreeing on the logical organization of materials and 68.7% finding the video clips helpful in connecting learning to real-world situations.

DISCUSSION

This study aimed to determine the impacts of a Student Interactive learning Hub (SILHU) on student learning. The study was conducted in a College of Nursing classroom, where Researchers identified some key impacts of SILHU on student learning. Multimedia-mediated content plays an essential role in making

learning experiences more meaningful. It gives students more choices in a student-centered environment, engages them in learning, and boosts their learning interest (Leow & Neo, 2014). ADDIE instructional events were proven to be a suitable pedagogy for guiding the design of learning content for a student-centered learning environment. This model can be used with multimedia elements to present information in a non-linear manner. Students' learning outcomes and retention improved as demonstrated by an increase in mean scores from pre-test to post-test. This improvement highlights the effectiveness of media-rich and systematic approaches in enhancing students' learning and retention. The student-centered learning approach effectively strengthens student motivation by focusing on their needs and interests and giving them more control over the learning process. This approach makes the learning experience more meaningful and feasible. Students become more engaged and self-directed learners when they are actively involved in the learning process and interact with the IDLE. Increased retention further reinforces engagement, leading students to become more proactive in their learning.

CONCLUSION

This research aimed to assess the impact of a student-centered Interactive Digital Learning Environment (IDLE) called SILHU on IT program students at the College of Nursing and Midwifery Katsina (CONAMKAT). The IDLE was developed based on the ADDIE instructional design model and incorporated multimedia elements such as video, audio, and interactive diagrams to enhance learning engagement. The study employed a mixed-methods approach, combining pre-test and post-test scores to measure learning outcomes and questionnaires to gather student feedback on the IDLE's effectiveness.

The findings revealed a significant improvement in student learning outcomes, demonstrated by a substantial increase in mean scores from the pre-test to the post-test. Student satisfaction with SILHU was exceptionally high, with a large majority agreeing that the platform facilitated self-paced learning, enabled independent navigation, and provided easy access to essential resources. The study concludes that incorporating multimedia content into a student-centered IDLE, guided by the ADDIE model, can effectively enhance learning outcomes, motivation, and satisfaction in nursing education.

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