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Transforming Virtual Learning: A Study On Enhancing Emotional Support, Academic Integrity, And Intellectual Engagement In Public Education

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ABSTRACT

A virtual classroom is an online learning environment where teachers and students communicate in real time through tools such institutional learning management systems (LMS), Webex, and Zoom. These settings effectively bridge time and spatial separation by simulating traditional classroom dynamics through the use of video conferencing, live chat, and collaboration tools (Mosquera-Gende, 2025). Both synchronous and asynchronous learning modalities are included in online education. It supports student autonomy and adaptation by providing flexible access to course contents and interactions via gadgets like tablets, computers, and cellphones. (Chang et al., 2024).

Synchronous learning involves live lectures and direct feedback, fostering engagement and reduced cognitive load. For instance, fourth-year medical students who attended live Webex lectures reported significantly lower cognitive load compared to those who viewed asynchronous recordings, though performance and satisfaction were comparable (Chang et al., 2024). Asynchronous learning provides self-paced access to pre-recorded content, offering flexibility but sometimes increasing mental effort and limiting immediate interaction.

Collaborative learning dynamics also vary by format. A study in Spain (Mosquera-Gende, 2025) found students preferred small groups and valued tools fostering autonomy and digital belonging indicators that both synchronous and asynchronous designs can support collaborative engagement depending on tool choice.

In dialogic online discussions, a study of postgraduate science education showed that well-facilitated synchronous and asynchronous discussion formats enhanced students' understanding of the nature of science and supported epistemic agency when moderators guided reflective engagement (Rido et al., 2024).

A significant new problem emerges when virtual learning becomes more widely available, interesting, and effectively administered within public education systems: maintaining academic integrity, emotional health, and educational quality in increasingly digitalized learning environments. While increased screen

time and little social interaction lead to student exhaustion, loneliness, and decreased motivation, the growing reliance on digital platforms has revealed challenges in maintaining strict assessment standards, preventing academic dishonesty, and encouraging critical thinking and collaboration. This changing environment calls for a change in approach to creating comprehensive virtual learning environments that foster intellectual, ethical, and emotional growth in addition to technological functionality. Thus, the goal of this research is to find out how virtual learning environments might be changed into places that are intellectually stimulating, integrity-driven, and supportive of long-term student achievement in public education. Thereby the study delves in Designing and analyzing of Student Interactive Learning Hub (SILHU), a multimedia-based digital learning environment, on student learning outcomes and satisfaction. The scope of the research was limited to IT program students at the College of Nursing and Midwifery Katsina (CONAMKAT). It examined the effectiveness of integrating multimedia content such as video, audio, interactive diagrams, and self-paced modules within a student-centered instructional framework guided by the ADDIE model. The implementation and evaluation of the students' academic performance through pre-test and post-test assessments and collected quantitative feedback using structured questionnaires to determine user perception, engagement, and satisfaction with the SILHU platform.

RELATED LITERATURES

Emerging technologies are reshaping virtual classrooms. Eye-tracking studies in AI-enhanced VR environments demonstrate increased student engagement, motivation, and performance by personalizing feedback and interaction (Wei et al., 2025).

Recent empirical studies reveal minimal differences in academic outcomes between synchronous and asynchronous modalities. A study in Taiwan involving medical students showed no statistically significant difference in performance, though synchronous learning was associated with slightly lower cognitive load and increased self-efficacy (Chang et al., 2024). Similarly, Alsaif et al. (2023) found that while both formats yielded comparable satisfaction levels, asynchronous learning improved time management and synchronous formats supported greater real-time engagement.

Technological advances are transforming pedagogy in virtual classrooms. Tools such as AI, virtual reality, and eye-tracking systems are being deployed to personalize instruction, enhance interaction, and boost learning outcomes (Burhanuddin et al., 2025). These innovations support a shift from passive content delivery to interactive, student-centered methods that anticipate outcomes and foster meaningful learning (Arxiv.org, 2024).

Synchronous learning environments are structured around live lectures and real-time interaction, offering immediate feedback and greater engagement. In contrast, asynchronous environments lack real-time elements, instead providing pre-recorded content and delayed communication through discussion forums or emails. These approaches cater to different learning needs and time constraints (Educause, 2024). The concept of bichronous learning, which combines synchronous and asynchronous elements, has recently emerged as a flexible and effective model (Martin et al., 2025).

DESIGN FRAMEWORK

One well-known paradigm for developing successful technology-driven education is the ADDIE model, which consists of five steps: analysis, design, development, implementation, and evaluation. It is now a standard for expertly created remote learning programs of the highest caliber. The model's effectiveness depends on its focus on a methodical approach, well-defined learning objectives, well-structured content, manageable workloads for both teachers and students, efficient use of a variety of media, interesting student activities, and comprehensive evaluation that is in line with the intended learning outcomes. (Carey and Dick, 2004). The Center for Educational Technology initially created the ADDIE model, which is still a fundamental instructional design framework in modern learning environments, according to recent studies. Although the model has historically been founded on behaviorist and cognitivist ideas, it is increasingly being modified to accommodate competency-based, online, and hybrid learning

approaches. Modern ADDIE implementations have more of an emphasis on learner agency, adaptation, and real-time feedback, which is more in line with constructivist and connectivist methodologies, claim Watson and Reigeluth (2020). Additionally, the integration of agile approaches and learning data has allowed instructional designers to personalize learning experiences and iterate more quickly (Siemens, 2022). This change is indicative of a larger movement in digital education toward adaptable, data-driven teaching models that accommodate a range of learner demands and outcomes. To guarantee increased relevance and instructional impact, the ADDIE cycle is presently being enhanced with components like embedded assessments, microlearning, and continuous needs assessment (Kumar & Ritzhaupt, 2021).



Figure 1: ADDIE's Instructional Framework

3.4 DEVELOPMENT OF SILHU

The foundation of this study's student-centered learning strategy was the Student Interactive Learning Hub (SILHU). Multimedia-rich content was incorporated into this SILHU, which was created using the ADDIE instructional design model. An open page with the primary menu and an introduction was part of the SILHU's user interface. Four main categories, each with a number of subtopics, were accessible through the "Home" option. Students were led via a "Objective" and then a "Review" screen inside each part. The SILHU's instructional materials and activities were designed using the ADDIE instructional events, as shown in the table below, to improve student learning. The SILHU interface's visual design is displayed in Figure 2, 3,4 and 5.

Table 1: Use of ADDIE’s five events of instruction in developing SILHU (Sani et al., 2025).

ADDIE’s Events, Instructional Rationales and Features in the SILHU
Event 1- Analysis: To define the student needs about their existing knowledge and skills.
<ul style="list-style-type: none"> ✓ 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.
<ul style="list-style-type: none"> ✓ 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.
<ul style="list-style-type: none"> ✓ 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.
<ul style="list-style-type: none"> ✓ 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.
<ul style="list-style-type: none"> ✓ A test assessed students' understanding after using the SILHU. ✓ A performance summary was provided to display the students' results. ✓ Suggestions tailored to the level of achievement were included to motivate students

4 STUDENT INTERACTIVE LEARNING HUB WEBSITE

This section provides images showcasing the website for the College of Nursing and Midwifery Katsina, highlighting its integrated digital learning environment. The site is designed to empower the next generation of healthcare professionals through enhanced student and lecturer engagement. Users are given options to sign up using Google, Facebook, or email, suggesting a focus on accessibility for joining online programs. Additionally, the website potentially offers courses on leadership and technology, indicating a comprehensive educational platform.

4.4.1 Website Homepage

The homepage for the SILHU prominently displays a logo for the College of Nursing and Midwifery Katsina on the top left, alongside the welcoming title "Welcome to College of Nursing and Midwifery Katsina". A navigation bar is present at the top right, featuring options such as "Log In," a "Search..." bar, and links for "BLOG," "ABOUT," "ONLINE PROGRAMS," "ARTICLES," "More," and "SUBSCRIBE". A key feature highlighted is the INTEGRATED DIGITAL LEARNING ENVIRONMENT, which is further detailed in three distinct boxes. These boxes explain that the environment is for the Students of College of Nursing and Midwifery Katsina, aims at "Enhancing Student and Lecturer Engagement, and is focused on Empowering the Next Generation of Healthcare Professionals.

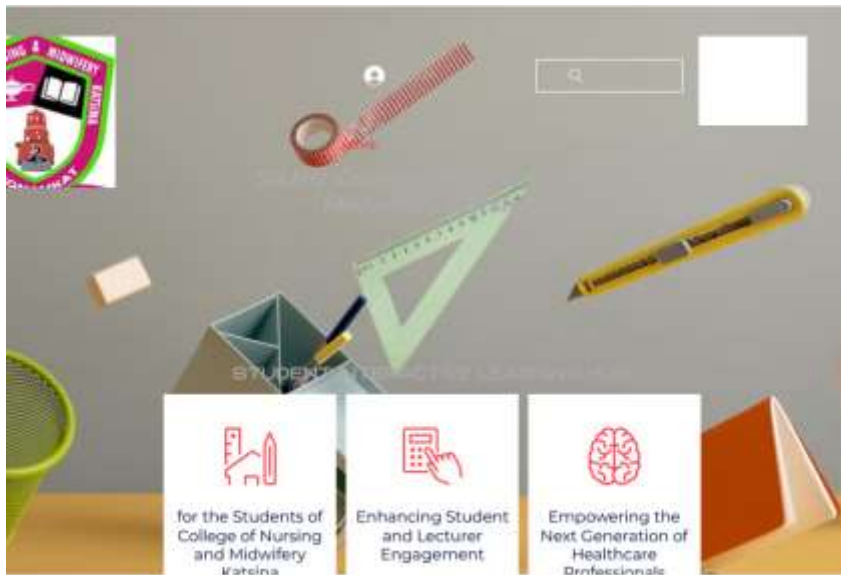


Figure 2: Website homepage

4.4.2 Logging Interface

This interface features two distinct sections. The top section displays a "Sign Up" page. This page prompts users with "Already a member? Log In" and offers multiple options for registration, including "Sign up with Google," "Sign up with Facebook," or "Sign up with email". It also includes a note stating that "Your profile will be set to public automatically when you sign up," with the option to "change this later in your profile settings"

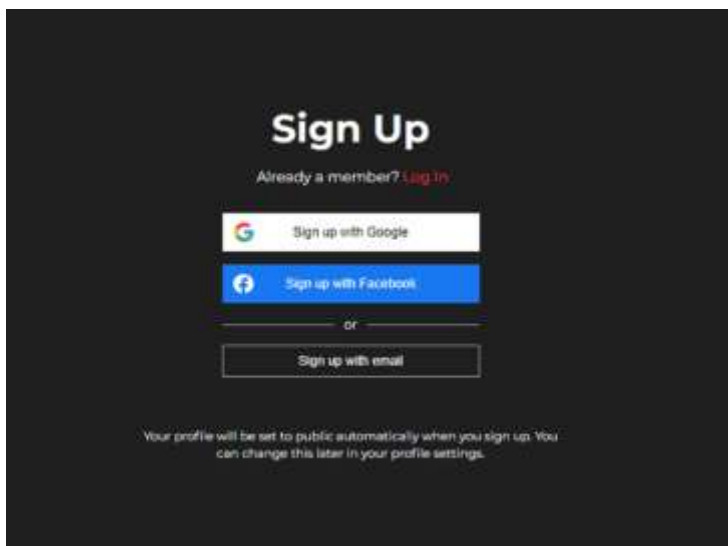


Figure 3: Logging Interface

4.4.3 About the College

This interface shows the information about the college where you can learn about the courses the college offers and how/where to locate the college.



Figure 4: About the College

4.4.4 Program Showcase

This interface showcases a section of the College of Nursing and Midwifery Katsina's website, specifically highlighting online programs or courses. Visually, this module includes an image depicting two individuals in a learning environment, possibly a lecturer and a student interacting with computer. The programs are free and can be join at student convenient time but the programs last for five and four weeks.



Figure 5: Program showcase

CONCLUSION

The study concludes that the Student Interactive Learning Hub (SILHU), designed using the ADDIE instructional model and enriched with multimedia elements, has a positive and significant impact on student learning in the College of Nursing and Midwifery Katsina (CONAMKAT). The results showed a substantial improvement in students' academic performance, as reflected in the increased mean scores from pre-test to post-test. Additionally, students expressed high levels of satisfaction with the platform,

particularly in its ability to support self-paced learning, facilitate independent navigation, and provide easy access to relevant learning resources. These findings indicate that a well-structured SILHU when effectively implemented, can enhance not only academic achievement but also learner motivation, engagement, and confidence. The study reinforces the value of integrating multimedia and instructional design principles into digital education, especially in nursing and other practice-based disciplines.

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