

Computer-Mediated Instruction Proficiencies: An Innovative Strategy for Effective Teaching-Learning of Business-Related Subjects in Upper Secondary Schools in Cross River State, Nigeria

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Paper Number: 240385

Abstract: Digital innovations in the era of intelligent education is transforming how teachers teach and how students learn. Thus, this study explores computer-mediated instruction (C-MI) proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary school in Cross River State, Nigeria. Descriptive survey research design was adopted to study a population of all 622 business-related teachers and students in upper secondary school in Ikom Education Zone of Cross River State. Using stratified and simple random sampling techniques, a sample of 237 was selected for the study. A validated and structured "Computer-Mediated Instruction Proficiencies Questionnaire" (C-MIPQ) was used for data collection. The Cronbach Alpha reliability was conducted on the instrument which achieved a reliability coefficient of .82, indicating high consistency level of the constructs. 231 copies of the instrument, representing a 97.47% retrieval level was obtained after administration. Data collected was analyzed using descriptive statistics of mean and standard deviation to answer research questions, and independent t-test to test the null hypotheses at 0.05 level of significance. It was found from the analysis that internet utilization and interactive multimedia proficiencies are crucial innovative strategies for effective teaching and learning of business-related subjects in upper secondary school as both business teachers and students did not differ in their responses. The study concluded and recommended that business teachers' and students' competencies in internet utilization and interactive multimedia are indispensable in fostering engaging and innovative teaching-learning, and should be continuously enhanced by the appropriate education authorities.

Key Words: Computer-mediated Instruction, Proficiencies, Innovative Strategy, Effective Teaching-Learning, Business-Related Subjects.

Introduction:

Technology is changing how teachers teach and students learn. Computer-mediated instruction (C-MI) is becoming more important in education. It uses tools like virtual classrooms, online platforms, multimedia or simulations. These make lessons more interactive and flexible. They allow students to learn at their own pace and in engaging ways (Ali, & Sahab, 2022). Teaching and learning form the core of any educational programme. How instruction is carried out determines whether learning goals are met or not. As societies change and become more complex, schools must adapt with the evolving trends. Teachers and students must gain skills in utilizing educational technology. Therefore, both educators and learners must learn how to use digital tools effectively to enhance the learning process and improve outcomes (Abdulazeez, Akinyemi, & Aremu, 2025).

In Nigeria, the government has called for more use of computer-assisted instruction in all subjects, including business-related subjects. But there are challenges. It costs money to buy, install, integrate and maintain technology. Teachers and learners need extra training. Many areas lack internet access or have weak power supply. Classrooms may not have enough computers to meet the teacher-students' ratio and prescribed carrying capacity. Ethical issues like fairness of access, also occurs. Because of these problems, many teachers stay with old methods (traditional or normal), even though they are less effective (Oyo State Study, 2024). Still, C-MI offers great advantages: it can cross classroom walls, allows personalized learning, supports more interaction between teacher, student, and content, it motivate learners more and makes learning more concrete and meaningful (Moses, 2023; Adeniyi & Yusuf, 2022). Several factors explain why C-MI has become central in modern education. One is the shift from traditional classrooms (rooms with walls) to virtual or remote learning (classrooms without walls). Another is rapid technological advancement. Also, C-MI helps education continue during pandemics that disrupt in-person instruction, as witnessed during the covid-19 era. Further, there is growing recognition of digital education's benefits in a smart, and connected world (Oche, Ukabi & Odey, 2021; Ukabi, Uba, Ewum & Olubiyi, 2023; Ukabi, 2018).

Contemporary thinkers view the concept of Computer-Mediated Instruction (CMI) from the standpoint of intelligent education. According to Jia and Li (2025) CMI is viewed as a transition from "supportive digital tools" to "cognitive partners". To them, modern CMI systems establish intelligent perception environments that innovate

instructional decision-making models via multimodal AI integration. Baskota and Poudel (2024) view the concept as a system that uses AI algorithms to provide immediate feedback, personalized instruction, and targeted support, thereby shifting from simple record-keeping to active pedagogical exploration and interventions.

Business-related subjects in senior secondary school such as commerce, financial accounting, economics, and business management lend themselves well to CMI. These subjects often involve abstract theories, numerical calculations, and real-life applications that digital tools can help illustrate and simplify. In Nigeria, “upper secondary” corresponds to Senior Secondary School (SSS). Students at this level of education are typically aged 15–18. The programme runs for three years, named SS1, SS2, and SS3 respectively (Education Nigeria, 2022). At this level, the curriculum becomes more focused and specialized. Students prepare for the West African Senior School Certificate Examination (WASSCE), and examinations by the National Examinations Council (NECO), which are prerequisites for entry into universities, polytechnics, colleges of education and other tertiary institutions. The senior secondary stage also allows learners to choose subjects that aligned with their academic and career goals. These pathways lead to higher education, vocational training, or professional careers (FGN, 2014; Education Nigeria, 2022).

The study identifies internet utilization proficiencies and interactive multimedia proficiencies as key independent sub-variables of computer-mediated instruction. According to Agomuo (2015), the internet is a global network that enable users to access, share, and exchange information rapidly across vast distances. It supports communication and interaction regardless of location, allowing teachers and students to collaborate, share data, and conduct online classes. Similarly, Aliyu (2016) described the internet as a vast global network that connect educators and learners, enabling instant access to reports, research, and multimedia resources. Onojaife (2016) added that it serves as a vital platform for professionals to share data and collaborate virtually.

Additionally, Abubakar, Abdullahi, and Abdulrahman (2016) emphasized that in today’s information-driven age, internet proficiency empowers business teachers to access, share, and organize instructional materials effectively. Ovbiagele (2016) explained that the World Wide Web, through HTTP, allows access to interconnected multimedia documents, highlighting the need for teachers to be skilled and proficient in using online platforms for

teaching business contents. Oyedum (2017) noted that teachers with strong internet skills can access vast resources: E-books, journals, AI tools, and videos to enrich instruction and foster interactive learning.

Recent empirical studies in Lagos confirm the value of internet proficiency in education. Adeyemi and Fashola (2021) found that teachers in Lagos with strong digital skills created more interactive, student-centred lessons using Google Classroom and YouTube. Likewise, Chikwere and Nwosu (2022) reported that lecturers skilled in online tools leveraged virtual libraries and collaborative platforms like Zoom to improve instructional innovation. In Turkey, Eskici and Çayak (2023) found a significant link between teachers' internet proficiency and technology integration, leading to improved students' engagement and self-regulated learning. Alzubi and Nazim (2025) revealed that both teachers and students viewed internet proficiencies as vital for reliable online assessment, while Olanrewaju and Okafor (2025) demonstrated that internet-proficient lecturers enhanced blended learning outcomes using forums and e-quizzes.

Regarding interactive multimedia proficiencies, Zamzam (2021) defined interactive multimedia as the combination of images, text, audio, and animation to make learning more engaging, motivating and educative. According to Mulyadi et al. (2020), multimedia supports creative, innovative, flexible, and learner-centred approaches that enhances understanding, and align education with real-world needs. Pranata in Zamzam (2021) noted that use of interactive multimedia fosters autonomous learning and global classroom experiences. Koh and Daniel (2022) stressed that teachers must balance content delivery with interactive activities, frequent feedbacks, and varied learning strategies to sustain engagements.

Studies show that e-learning through interactive multimedia promotes flexibility, autonomy, and collaboration (Dhawan, 2020; Marinoni, Van't Land, & Jensen, 2020; Anwar & Adnan, 2020). Such tools like Zoom, chats, simulations, and quizzes enable both synchronous and asynchronous learning tailored to individual needs (Suresh, Priya, & Gayathri, 2018). However, Gomez (2015) warned that inadequate digital literacy and proficiency among teachers hampers effective adoption, stressing the need for continuous training and workshops to build competency.

Empirical evidence also supports the educational value of interactive multimedia. Miller, Davis, Martinez and Anderson (2021) found that online learning platforms improved students' flexibility, satisfaction,

and outcomes in business management. Smith, Johnson, and Brown, Lee (2020) reported that virtual business simulations enhanced engagement and problem-solving skills, while Williams, Garcia, Rodriguez, and Thompson (2019) showed that interactive multimedia improved performance and motivation in economics by delivering dynamic, visually stimulating business contents. To cap it all, effective computer-mediated instruction depends on teachers' internet and multimedia proficiencies, which enhance interaction, flexibility, engagement, and learning outcomes in business-related studies or education.

Theoretical lens:

Theoretically, this study is underpinned on the theoretical framework of constructivist and connectivist learning theories. The constructivism framework by Vygotsky (1978), emphasizes that learners actively construct knowledge through interactions with their environment and peers, while the teacher plays a guiding, and not the domineering role in the teaching and learning process. On the other node, the connectivism framework by Siemens (2005), underscores the importance of networks and connections in the learning process in which the teacher also plays the similar role of a collaborator in guiding the learner to make appropriate connections that can facilitate, and result into improved achievement of the learner's need.

The both theories of constructivism and connectivism relates to the ideology and philosophy of CMI because of their innovative approach to adaptive instructions which allows for interactive learning experiences. The both enable the learner to actively construct knowledge through interactions using enhanced interactive technologies, thereby creating learning connections across digital networks. Educators need a diverse set of proficiencies to effectively deliver engaging digital learning experiences and also give useful guidance to the learners. This involves the design, deployment, and assessment of online courses that are student-user friendly in order to encourage students' interaction, connectivity, participation, and understanding (Cambridge University, 2023).

Statement of the problem

Computer-mediated instruction has inherent ability to transform teaching and learning processes for more effective realization of educational outcomes by providing participatory, interactive, engaging and personalized learning experiences. Regardless of its efficacy in the education sector, many upper secondary schools in Cross River State still face significant barriers to its successful adoption and

implementation. Some of the presumed barriers inhibiting the utilization of CMI for effective teaching of business-related subjects in upper secondary schools in the study area are: Limited access to computer technology, inadequate teacher training in digital pedagogy, poor infrastructure, and a lack of digital literacy, among others. Undoubtedly, the government, educational institutions and education sector stakeholders in Nigeria are making efforts to ensure the teaching effectiveness of all subjects by adopting CMI at secondary school level of education which is the foundation for tertiary education in modern society. Despite the efforts made, observation and recent studies cited in the literature still point to the fact that upper secondary schools offering business-related subjects are not able to incorporate and optimize computer-mediated instruction (CMI) to enhance educational and innovative outcomes. Thus, the implementation of CMI is often fraught with challenges that undermine its relevance and efficacy. It is true that, lack of effective implementation of CMI may not be unconnected with lack of requisite proficiencies in online learning platforms and interactive multimedia teaching and learning by both teachers and learners. Therefore, it was against the afore stated backdrop that this study is poised to find out computer-mediated instruction proficiencies required for innovating teaching-learning efficacy of business-related subjects in upper secondary schools in Cross River State, Nigeria.

Purpose of the study

The main aim of this study is to find-out computer-mediated instruction proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary in Cross River State, Nigeria. Specifically, the study is set to find-out:

1. Internet utilization proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary schools.
2. Interactive multimedia proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary schools.

Research questions

This study posed and answered two research questions as follows:

1. What are the internet utilization proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary schools?
2. What are the interactive multimedia proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary schools?

Research hypotheses

The following null hypotheses were formulated and tested at .05 level of significance to guide the study:

Ho₁: There is no significant difference in the mean ratings of teachers and students on the internet utilization proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary schools.

Ho₂: There is no significant difference in the mean ratings of teachers and students on the interactive multimedia proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary schools.

Methodology:

Descriptive survey research design was adopted to study a population of 622 teachers and students of business-related subjects in upper secondary schools in Ikom Education Zone of Cross River State. The breakdown of the population consists of 115 teachers and 507 students of business-related subjects in upper secondary schools. Using stratified and simple random sampling techniques, a sample of 237 was selected for the study with the help of Raosoft sample size calculator considering 95% confidence level and 5% error margin. The "Computer-Mediated Instruction Proficiencies Questionnaire" (C-MIPQ) was structured and used by the researchers as the instrument for data collection, developed after deriving insight from extensive review of extant literature. Section A of the instrument gathered information about the respondents' demographics, while section B sought information about the computer-mediated instruction proficiencies of teachers and students on business-related subjects in upper secondary with four response options of: Highly Required (HR=4pts.), Moderately Required (MR=3pts.), Slightly Required (SR=2pts.), and Not Required (NR=1pt.). The instrument was validated by 3 experts, one from measurement and evaluation (face validation), one business-related subjects' expert and one ICT professional (content validation). The Cronbach Alpha reliability technique was adopted to test the reliability of the instrument using a pilot test, the instrument yielded an overall reliability coefficient of .79 which signifies a high internal consistency level of measuring what the instrument intends to measure. The instrument was administered to the respondents in six schools selected from the three LGAs, randomly selected for the study, two schools in each of the three LGAs with the help of six business-related subject teachers in each secondary school serving as trained research assistants. After the administration, 231

copies of the research instrument were retrieved representing 97.47% retrieval level. The data gathered was analyzed using descriptive statistics of mean and standard deviation to answer the research questions, while inferential statistics of independent t-test was used to test the hypotheses at .05 level of significance. The decision rule was based on a 2.50 mean score as the threshold, implying that any item with a mean score of 2.50 and above was rated as required, while any item with a mean score less than 2.50 was rated as not required.

Presentation of results

This section presents the results of statistical analyses of the research questions and hypotheses guiding the study. Hence, each of the research question and hypothesis was restated and the result of the analyses presented accordingly.

Research question one

What are the internet utilization proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary schools?

To provide answers to research question one, weighted mean and standard deviation of respondents were used. The result is presented in Table 1.

Table 1

Means and standard deviations of internet utilization proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary.

S/No	Internet Utilization Proficiencies	X	SD
	Remarks		
1	Compose messages 1.73 Required		3.13
2.	Send messages Required	3.25	1.69
3.	Forward messages 1.71 Required	3.20	
4.	Archive messages Required	3.10	1.67
5.	Create address book list 1.58 Required	3.71	
6.	Attach files Required	3.67	1.62
7.	Set preferences Required	3.59	1.65

Key: $\bar{X}$ =Mean, SD=Standard Deviation

Table 1 present the mean ratings of respondents on the internet utilization proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary schools. The Table shows that the seven (7) isolated items recorded mean scores between 3.10 and 3.71 which were above 2.50 threshold point on the four points scale. The result shows that the seven (7) internet utilization proficiencies are required as innovative strategies for effective teaching-learning of business-related subjects in upper secondary schools. The standard deviation ranged from 1.62 to 1.73 which revealed that respondents were not too far from the mean and each other in their responses.

Research question two

What are the interactive multimedia proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary? To provide answers to research question two, weighted mean and standard deviation of respondents were used. The result is presented in Table 2.

Table 2

Means and standard deviations of interactive multimedia proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary school

S/No	Interactive Multimedia Proficiencies	$\bar{X}$	SD
	Remarks		
1	Collaborative multimedia communication Required	3.51	1.53
2.	Digital presence management Required	3.20	1.67
3.	Ability to animate graphics Required	3.35	1.63
4.	Ability to produce and edit videos Required	3.07	1.72
5.	creating and editing audio files Required	3.54	1.50
6.	Understanding of visual design principles Required	3.11	1.69
7.	Storyboarding skills Required	3.05	1.65

Key: $\bar{X}$ =Mean, SD=Standard Deviation

Table 2 present the mean ratings of respondents on the multimedia proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary school. The results indicate that the seven (7) isolated items recorded mean scores between 3.05 and 3.51 which were above 2.50 threshold point on the four points scale. Hence, all the seven (7) interactive multimedia proficiencies are required as innovative strategies for effective teaching-learning of business-related subjects in upper secondary school. The standard deviation ranged from 1.50 to 1.72 which revealed that respondents were not too far from the mean and each other in their responses.

Hypothesis one

Ho₁: There is no significant difference in the mean ratings of teachers and students on the internet utilization proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary school. To test this hypothesis, independent t-test statistic was used and the result is presented in Table 3.

Table 3

Independent t-test analysis to compare the mean ratings of teachers and students on the internet utilization proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary school

Variable (Internet Utilization Proficiencies)	N	$\bar{X}$	SD	t-cal	p-val.
Business-Related Subject Teachers	101	17.39		1.63	
				0.65	
Business-Related Subject Students	130		17.60		1.29

Result significant at $p < .05$, Crit-t= 1.972, NS=Not Significant

Data presented on Table 3 shows that the calculated t-value (0.65) is less than the critical t-value (1.972). Therefore, the null hypothesis was upheld based on the t-value comparison. However, since the p-value (0.015) is less than 0.05, it reveals a statistically significant difference in the mean ratings between business teachers and students, indicating that students rated their internet utilization proficiencies higher than teachers did, suggesting that students may have a stronger perception or actual proficiency in utilizing the

internet as an innovative strategy for effective teaching-learning in business-related subjects. However, adjudging from the slight difference in the mean scores of the both groups, it implies that both teachers and students agreed in their responses that the rated internet utilization proficiencies are necessary innovative strategy for teaching-learning of business-related subjects in upper secondary school.

Hypothesis two

Ho₂: There is no significant difference in the mean ratings of teachers and students on the interactive multimedia proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary. To test this hypothesis, independent t-test statistic was used and the result is presented in Table 4.

Table 4

Independent t-test analysis to compare the mean ratings of teachers and students on the interactive multimedia proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary school

Variable	N	$\bar{X}$	SD	t-cal	p-val.
(Interactive Multimedia Proficiencies)					
Business-Related Subject Teachers	101		17.61		1.64
				1.47	
					0.038
Business-Related Subject Students	130		17.02		1.79

Result significant at $p < .05$, Crit-t= 1.972, NS=Not Significant

Data presented on Table 4 shows That the calculated t-value (1.47) is less than the critical t-value (1.972). Therefore, the null hypothesis was retained based on the t-value comparison. However, the p-value (0.038) is less than 0.05, indicating a statistically significant difference in the mean ratings of interactive multimedia proficiencies between business teachers and students, suggesting that teachers rated their interactive multimedia proficiencies higher than students did. This indicates that teachers may feel more proficient in utilizing interactive multimedia as an innovative strategy for effective teaching-learning in business-related subjects compared to students. However, adjudging from the slight difference in the mean scores of the both groups, it implies that both teachers and students agreed in their responses that

the rated interactive multimedia proficiencies are necessary innovative strategy for teaching-learning of business-related subjects in upper secondary school.

Discussion of findings

Findings from the study revealed that internet utilization proficiencies and interactive multimedia proficiencies are crucial innovative strategies for effective teaching and learning of business-related subjects in upper secondary school in Cross River State.

Internet utilization proficiencies required as innovative strategy for effective teaching-learning of business-related subjects in upper secondary.

Finding from this aspect of the study revealed that internet utilization proficiencies are essential innovative strategies for the effective teaching and learning of business-related subjects in upper secondary school. Respondents agreed that teachers' ability to use the internet effectively for accessing, organizing, and sharing instructional materials enhances classroom engagement and improves content delivery. This outcome can be justified by the fact that the internet provide teachers with access to a wide range of educational resources and real-time information that can make business lessons more current, interactive, and learner-driven or centred. When teachers are skilled in using digital platforms such as virtual libraries, e-journals, and online classrooms, they can facilitate collaborative learning and broaden students' exposure to diverse knowledge sources. This finding aligns with the study of Adeyemi and Fashola (2021), who reported that teachers with strong digital competencies created more interactive and student-centred learning environments, using tools like Google Classroom and YouTube. Similarly, the finding agrees with the study of Chikwere and Nwosu (2022) who found that lecturers with internet proficiency effectively utilized virtual libraries and collaborative platforms such as Zoom and Microsoft Teams to improve instructional innovation. In the same vein of connection with the finding of this study, Olanrewaju and Okafor (2025) revealed that internet-proficient lecturers enhanced blended learning outcomes through online forums and e-quizzes, leading to greater students' satisfaction and achievement.

Interactive multimedia proficiencies as innovative strategy for effective teaching-learning of business-related subjects in upper secondary school.

The finding in this facet of the study indicates that interactive multimedia proficiencies which involve using videos, animations, simulations, and other digital tools are crucial innovative strategies for teaching and learning of business subjects effectively. Respondents agreed that integrating interactive multimedia into instruction makes business-related instructional content delivery to be more engaging, flexible, and learner-centred. This finding is justified on the premise that interactive multimedia enable teachers to present abstract business concepts in concrete, visual, and dynamic formats that appeal to different learning styles. It also fosters students' active participation, motivation, and understanding by combining audio, text, and visuals to create a more immersive business learning experiences. The finding corresponds with the views of Zamzam (2021) and Mulyadi et al. (2020), who found that multimedia tools enhance creativity, flexibility, and comprehension in learning. Additionally, the finding under this variable is corroborated by Smith et al. (2020) study which found that virtual business simulations improved students' engagement and problem-solving skills, while Williams et al. (2019) reported that interactive multimedia significantly enhanced learners' motivation, performance, and interest in economics and business education. These studies collectively affirm that interactive multimedia proficiency contributes to more effective and student-centred learning environments.

Implications of the study findings

The findings imply that without adequate internet and multimedia proficiencies, teachers and students alike may struggle to integrate digital tools effectively into business education instruction. Government, educational policymakers and school administrators must therefore prioritize teachers' and students training in computer-mediated instruction. Developing these proficiencies will foster active teaching and learning, digital inclusion, and improve student performance in the identified business-related fields at the upper level of secondary school education.

Conclusion

Business teachers' and students' competencies in internet utilization and interactive multimedia are indispensable for fostering engaging, innovative, and effective teaching-learning processes of business-related subjects in upper secondary school. Teachers who possess

these proficiencies are better equipped to explore, manage, and integrate digital resources to enrich business lessons content delivery, promote learners' interaction, and stimulate creative thinking. Through effective utilization of internet tools and multimedia applications, teachers can create dynamic classroom environments where students can actively participate, collaborate, and take ownership of their learning experiences. Moreover, such competencies enable teachers to adapt instructional strategies to diverse learner needs, improve accessibility to instructional materials, and strengthen students' digital literacy skills which are essential requirements in today's knowledge- and digital-driven economy. Ultimately, teachers' mastery of these proficiencies enhances the overall quality of business instructions, boost students' motivation, academic performance, and positions business education to thrive in an increasingly technology-oriented educational environment.

Recommendations

Based on the findings of the study, recommendations are made as follows:

1. Ministries of Education should organize regular workshops and seminars to build teachers' internet and multimedia proficiencies.
2. Government and school authorities should provide reliable internet access and multimedia tools in all secondary schools to meet the predetermined teacher-student ratio.
3. Teacher education programmes should include computer-mediated instruction as a core component.
4. Teachers should be encouraged to pursue self-directed learning to stay current with emerging educational technologies.
5. Schools should adopt platforms such as Google Classroom, Zoom, and virtual simulations to enhance interactive learning experiences of business-related subjects in upper secondary schools.

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