



Effect of 7E Instructional Strategy on Academic Achievement in Medical-Surgical Nursing in Kano, Nigeria

By

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ABSTRACT

This study investigated the effect of the 7E instructional strategy on the academic achievement of students in the Medical-Surgical Nursing course at the College of Nursing, Kano, Nigeria. A quasi-experimental non-equivalent control group design was employed. A total of 158 second-year basic nursing students participated: 80 from the School of Nursing Kano (intervention group) and 78 from the School of Nursing Madobi (control group). The intervention group was taught using the 7E instructional strategy, while the control group received a traditional lecture. Data were collected using the Medical-Surgical Achievement Test (MSNAT) developed by the researcher and tested; a Cronbach's alpha value of 0.841 was obtained. Pretest and posttest data were analyzed using paired and independent t-tests, with Analysis of Covariance (ANCOVA) used to test hypothesis at a 0.05 significance level, controlling for pretest as a covariate. Pretest scores did not differ significantly between groups ($p=0.116$). Post-intervention, the intervention group demonstrated a significant mean increase in achievement scores (from 43.63 ± 5.206 to 52.79 ± 5.618 ; $p < 0.05$), while the control group also showed significant, though smaller, change (from 45.37 ± 8.362 to 48.96 ± 4.919 ; $p < 0.05$). After controlling for baseline achievement using ANCOVA, the adjusted mean posttest remains significantly higher in the intervention group ($M=52.74$, 95% CI [51.58, 53.9]) than in the control group ($M=48.78$, 95% CI [47.61, 49.94]), $F(1,155) = 23.58$, $P < 0.05$, partial $\eta^2 = 0.132$. The findings suggest that the 7E instructional strategy may be an effective student-centred approach for improving academic achievement in the Medical-Surgical Nursing course.

Keywords: 7E instructional strategy, academic achievement, nursing students, Medical-Surgical Nursing.

Introduction

Academic achievement is the measurable amount of academic content a student acquires within a specific timeframe, which

indicates the extent to which specific goals in educational institutions are attained. Various factors, including student commitment, self-concept, engagement, task



values, and teachers' style of teaching, influence learning achievement. (Suleiman, 2023). An inclusive and interactive learning environment increases engagement and motivation, which positively affect learning achievement and outcomes (Munna & Kalam, 2021).

Instructional strategies in nursing vary around the world; most developed countries use student-centred strategies (Jeffery et al., 2020), which are seen to be effective in enhancing critical thinking (Yu et al., 2021; Garwood et al., 2018), moral development (Khatiban et al., 2019), evidence-based practice knowledge and skills (Hornstvedt et al., 2018) and applying theory to practice (Garwood et al., 2018) among students. However, evidence from some Nigerian nursing education settings indicates continued reliance on teacher-centred instructional approaches (Ewunonu & Makata, 2023; Abubakar et al., 2021) where memorisation is emphasised over critical thinking, problem-solving, and clinical decision-making (Gyampoh et al., 2020; Wodaj & Belay, 2020; Xu, 2016).

Medical-Surgical Nursing is a core component of nursing education, which is complex and covered at a rapid pace; it requires students to integrate theoretical knowledge with clinical decisions and

practical skills (Garko et al., 2023; Lin et al., 2021). As such, nursing education systems are responsible for preparing students to achieve their learning outcomes and academic success (Sharda & Nowell, 2025). The 7E instructional strategy is an inquiry-based instructional approach comprising seven sequential and interconnected phases: Elicit, Engage, Explore, Explain, Elaborate, Evaluate, and Extend (Cherono et al., 2021; Nicol et al., 2020; Matutes & Sangcopan, 2022; Rahman & Chavhan, 2022). This strategy has been associated with improved academic achievement and motivation in several science disciplines, including chemistry, biology, and mathematics (Adolphus et al., 2022; Cherono et al., 2021; Hussain et al., 2022).

Although the effectiveness of the 5E model has been demonstrated among midwifery students (Metwally et al., 2017), evidence on the effectiveness of the 7E instructional strategy in nursing education remains limited, particularly in low-and middle-income countries. Most studies have focused on secondary school science subjects including biology, chemistry, physics and mathematics (Abdullahi et al., 2021; Cherono et al., 2021; Hussain et al., 2022; Wodaj & Belay, 2020). Furthermore, no published quasi-experimental study has



investigated its influence on academic achievement among Nigerian nursing students. This study therefore investigated the effect of the 7E instructional strategy on academic achievement in the Medical-Surgical Nursing course among students at the College of Nursing, Kano.

Hypotheses

H₀₁-There is no significant difference in the mean academic achievement scores of students taught using the 7E instructional strategy and those taught using the traditional lecture method.

METHODOLOGY

Design

A quasi-experimental, non-equivalent control group design was adopted. This design was appropriate because random assignment was not feasible, yet comparison between intervention and control groups allowed for causal inference on the impact

of 7E instructional strategy.

Setting

The study was conducted in two campuses of the College of Nursing, Kano State, Nigeria: The School of Nursing Kano (intervention group) and School of Nursing Madobi (control group). Both campuses follow the same curriculum and student assessment framework.

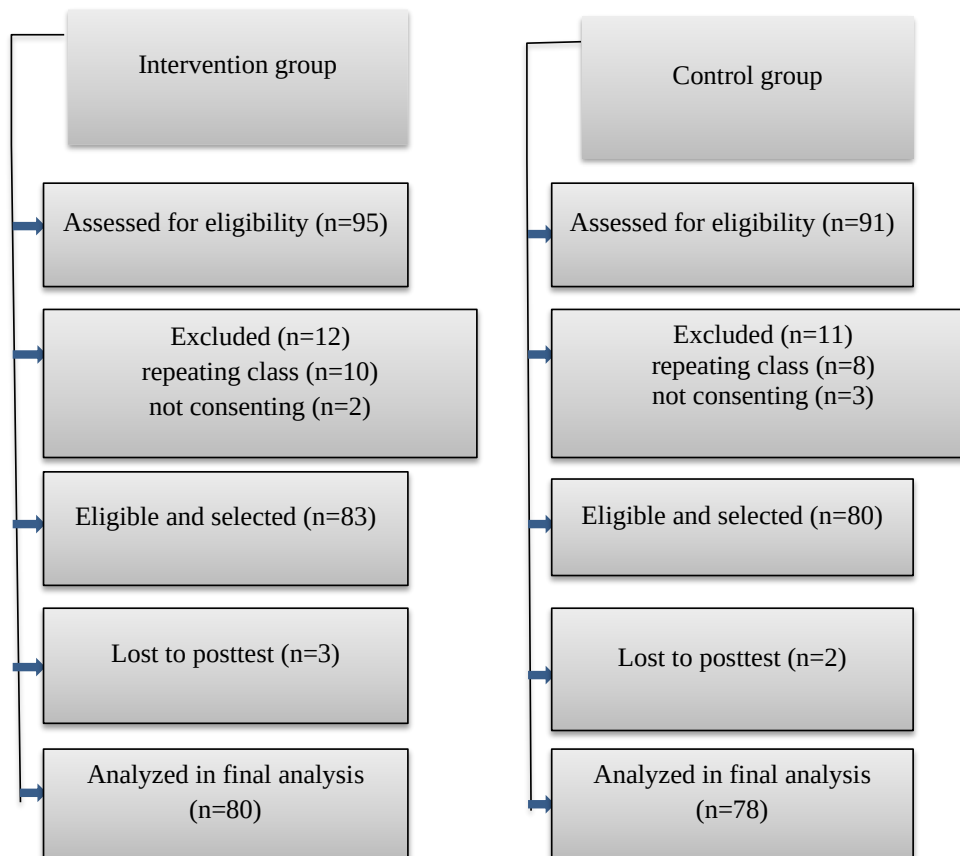
Sample size

The sample size was calculated using the formula for comparing two means (Serdar et al., 2021)

A minimum sample size of 69 was calculated; this was adjusted by 20% to account for possible non-response and errors in data collection, yielding a target sample size of 83 per group. The Consolidated Standards of Reporting Trials (CONSORT) flow diagram (Figure 1) illustrates the flow of participants through the study.



Figure 1: CONSORT Flow Diagram



Sampling Technique

A multistage sampling technique was employed. The College of Nursing Kano State operates six campuses: two were randomly selected using the paper-basket method. The same method was used to randomly assign one selected school to the intervention group and the other to the control group. Simple random sampling was also used to select one level of study from

the three available levels; the same level (second-year) was selected across both campuses, from which the participants were drawn.

Instrument

The Medical-Surgical Nursing Achievement Test (MSNAT) was developed by the researcher to assess students' academic achievement in selected medical-surgical nursing topics, particularly coronary artery



diseases, pathophysiology, diagnosis and management. It consists of 20 factually accurate clinical statements based on the learning content covered during the intervention. Each statement had three response options: Strongly Agree, Agree, Disagree. Responses were scored according to the degree of correctness; “Strongly Agree” reflects the highest level of accurate content knowledge and was scored 3 points, “Agree” 2 points and “Disagree” 1 point; no items were reverse-scored. Total score ranges from 20 to 60 with higher scores indicating greater achievement. Sample items include: “Nitroglycerin has a vasodilatory effect on coronary arteries in the management of angina pectoris”, “percutaneous coronary intervention (PCI) is

a surgical intervention in the treatment of myocardial infarction”. Test items were constructed based on the topic covered during the intervention, recommended textbooks and input from a subject matter expert in nursing education. The instrument was validated by four experts in Medical-Surgical Nursing, each having a minimum of five years of clinical and teaching experience, who reviewed the items for content relevance and clarity. A pilot study was conducted with a sample of 32 second-year nursing students from a different college not participating in the main study, after which Cronbach’s alpha was calculated. It was used for both pretest and posttest.

Table 1: Cronbach’s Alpha Internal Consistency Reliability Test

Reliability statistics				
Instrument	Cronbach's Alpha	Cronbach's Based Standardized Items	Alpha on	No of items
MSNAT	0.841	0.840		20

Key: MSNAT= Medical-Surgical Nursing Achievement Test

Table 1 above shows the Cronbach’s Alpha internal consistency value of 0.841, which is above 0.7 and as such shows the instrument is reliable.

Procedure for Data Collection

Data collection was conducted in four phases:

Phase I (Pre-intervention): Ethical clearance was obtained from the Health Research and Ethics Committee of the Kano State Ministry of Health before commencement of the study. Three research assistants, each holding at least a bachelor's degree in nursing and previous experience in educational or interventional study, were



recruited and trained on the study protocol, participant recruitment procedures, administration of research instruments and ethical considerations to ensure uniformity in data collection.

Before implementation, detailed lesson plans based on the 7E instructional strategy were developed by the researchers for coronary artery disease (CAD). Experts in nursing education reviewed the lesson plans to ensure content accuracy and consistency. To maintain intervention fidelity, the same lesson objectives, course content, instructional duration, and learning materials were used in both study groups.

Phase II (Pretest): A pretest involving the administration of MSNAT to the students was printed and distributed to students. The same was collected after completion and kept safe for analysis.

Phase III (Intervention): The intervention was implemented over 6 weeks of instruction, with two-hour teaching sessions conducted each week. Both the intervention and control groups were taught by the researcher. The intervention group received instruction using the 7E instructional strategy, which was structured around the seven sequential phases of the model:

- Elicit: Each lesson began by exploring prior knowledge and identifying

misconceptions about CAD through guided questioning and discussion.

- Engage: Students were introduced to realistic clinical scenarios and images related to patients with CAD to stimulate curiosity and encourage participation.
- Explore: Students worked collaboratively in small groups to analyse patient cases, discuss disease mechanisms, identify risk factors, interpret clinical findings and propose appropriate nursing actions under the guidance of the researcher.
- Explain: Students presented and justified their findings, after which the researcher clarified concepts and corrected misconceptions.
- Elaborate: Students applied newly acquired knowledge to additional case scenarios and prepared a nursing care plan for a patient with CAD.
- Evaluate: Assessment was done through questioning, discussions and reflective activities. Formative assessment was done to monitor understanding and provide immediate feedback.
- Extend: Students were required to transfer knowledge beyond the classroom by designing a health education flyer on the prevention of CAD for members of the public.



The control group received instruction using a traditional lecture method. Both groups received equivalent instructional time and covered identical topics. To ensure intervention fidelity, the researcher used a fidelity checklist based on the 7E instructional strategy during each session to ensure that instructional activities were implemented as planned.

Phase IV (Posttest): The question arrangement for the posttest was modified; the same was distributed to students to answer. Answered questions were then collected and kept for analysis. Before analysis, scripts were marked by the researcher and assistants; these were then entered into Excel and cleaned for analysis. No significant errors were encountered during data collection; test materials were printed and distributed under standardized conditions at both campuses.

Method of Data Analysis

Data collected were coded and entered into Statistical Package for Social Sciences (SPSS) version 25, and the analysed data

were presented using descriptive statistics, i.e. mean and standard deviation. Independent and paired t-tests were used to test the hypothesis at a 0.05 level of significance. ANCOVA was also used to test the hypothesis.

Ethical Consideration

Ethical approval (Approval Number: SHREC/2024/5271) was obtained from the Health Research Ethics Committee (HREC) of the Kano State Ministry of Health. Written informed consent was obtained from all participants. Participation was voluntary, confidentiality and anonymity were maintained throughout the study, and students in the control group received the 7E instructional strategy after completion of the study to ensure ethical equity.

Results:

Socio - Demographic Characteristics

This section presents the socio-demographic data of respondents, which includes gender, age, previous CGPA and monthly income. Findings of Socio-demographic characteristics are presented in Table 1



Table 2: Distribution of Respondents by Socio-Demographic Characteristics

Variable	Intervention group (N=80)		Control group (N=78)	
	Frequency	Percentage (%)	Frequency	Percentage (%)
Gender				
Male	23	28.7	31	39.7
Female	57	71.3	47	60.3
Age				
18-22 years	60	75	57	73.1
23-28 years	20	25	21	26.9
Previous CGPA				
Clear pass	47	58.7	62	79.5
Pass with resit	33	41.3	16	20.5
Monthly Income (₦)				
10000-20000	54	67.5	42	53.8
21000-30000	26	32.5	36	46.2

Table 2 reveals that in both groups, most participants were females aged 18-22 years. The intervention group had a higher proportion of students with previous resits,

whereas the control group had a higher proportion of students with clear passes. Monthly income was broadly comparable between the two groups.

Baseline comparison

Table 3: Baseline comparison between the intervention and control group

Variable	$\bar{x} \pm \sigma$		Mean Difference	t-value	p-value
	Intervention N=80	Control N=78			
MSNAT Pretest	43.63±5.206	45.37±8.362	-1.747	-1.581	0.116

There was no statistically significant difference in mean pretest achievement between groups ($p = 0.116$). However, since group assignment was determined at the

school level rather than at the individual student level, the absence of statistical significance should not be interpreted as proof of complete baseline equivalence between students in the two groups.

Table 4: Paired t-test comparing achievement scores for intervention and control groups before and after study

group	MSNAT		Mean difference	t-value	p-value
	Pretest $\bar{x} \pm \sigma$	Posttest $\bar{x} \pm \sigma$			
Intervention	43.63±5.206	52.79±5.618	9.16	10.44	0.000
Control	45.37±8.362	48.96±4.919	3.59	3.946	0.000

After the intervention, the MSNAT score for the intervention group increased significantly from 43.63 ± 5.206 to 52.79 ± 5.618 ($p < 0.05$). The control group also

demonstrated a statistically significant increase in mean achievement scores, although the increase was smaller than that



observed in the intervention group, from 45.37 $\pm$ 8.362 to 48.96 $\pm$ 4.919 ($p < 0.05$).

Table 5: Independent t-test comparing posttest scores of students across groups

Variable	$\bar{x} \pm \sigma$	Group	Control N=78	Group	Mean Difference	t-value	p-value
MSNAT	52.79 $\pm$ 5.618				3.826	4.558	0.000

After intervention, independent t-test analysis for posttest scores shows that there

is a significant difference between the posttest scores of intervention and control groups.

Table 6: ANCOVA comparing posttest MSNAT scores between groups controlling for pretest scores.

Group	Adjusted mean	SE	95% CI	F	df	p	Partial η^2
Intervention	52.74	0.586	51.58-53.90	23.580	1,155	0.000	0.132
Control	48.78	0.588	47.61-49.94				

Key: ANCOVA-analysis of covariance; SE=Standard error, CI=Confidence Interval

After controlling for pretest scores, ANCOVA revealed a statistically significant difference in posttest MSNAT scores between the intervention group ($M=52.74$, $SE=0.586$) and control group ($M=48.78$, $SE=0.588$), $F(1,155) = 23.58$, $p=0.000$, Partial $\eta^2=0.132$, with adjusted mean difference of 3.97 points favouring the intervention group. The partial $\eta^2=0.132$ indicates a medium-to-large effect, with approximately 13.2% of the variance in the posttest achievement associated with group membership.

Hypothesis testing

H₀₁-There is no significant difference in the mean academic achievement scores of students taught using the 7E instructional strategy and those taught using the traditional lecture method.

Table 6 shows that a statistically significant difference in posttest achievement scores exists between intervention and control groups after adjusting for baseline achievement, $F(1,155) = 23.58$, $p=0.000$, Partial $\eta^2=0.132$. Therefore, the null hypothesis was rejected.

Discussion

Findings of this study reveal that students taught using the 7E strategy achieved significantly higher posttest scores than those taught using the traditional lecture method, even after adjusting for baseline achievement differences via ANCOVA. Notably, both groups showed statistically significant improvement from pretest to posttest, which is expected given that both received instruction on the same content; however, the intervention group's gain was larger, and this advantage persisted even



after controlling for baseline differences between the two campuses. This strengthens the evidence that the improvement is attributable to the instructional strategy itself rather than pre-existing differences between the groups. The significant improvement in achievement can be attributed to the structured and cyclical nature of the 7E strategy. Phases such as the elaborate and extend phase encourage students to apply concepts in new and practical ways, which likely enhances understanding of concepts and provides a scaffolded learning experience that helps students move from basic recall to higher levels of application.

These findings support those of Gyampoh et al. (2020) in Ghana; the results show that students taught using the 7E instructional strategy had a higher achievement that is statistically significant when compared to those taught using the traditional lecture method. Also, in line with the study by Said.Bani Attih (2021) in Jordan, which reveals that students taught using the 7E instructional strategy had higher achievement scores when compared to those taught using the traditional lecture method. Also, it is consistent with a study conducted in Kenya by Cheroni et al. (2021), which shows that achievement scores between experimental and control groups are

statistically significant. Also, in line with the study by Libata et al. (2021), which reveals that the intervention group taught using the 7E strategy performs better when compared to the control group.

Conclusion

The study examines the effect of the 7E instructional strategy on students' achievement in the Medical-Surgical Nursing course. Pretest scores did not differ significantly between groups before intervention. After controlling for baseline achievement using ANCOVA, students taught using the 7E instructional strategy demonstrated significantly higher posttest achievement scores than those taught with the traditional lecture method. The findings suggest that the 7E instructional strategy may be a useful student-centred approach for teaching Medical-Surgical Nursing among nursing students in similar settings.

Recommendation

Based on the findings, it is vital for institutions offering nursing programs to adopt and integrate the 7E instructional approach into their curriculum. Nurse educators should be trained on the design and delivery of instruction through the 7E model to ensure effective implementation. Multicentre studies with larger sample sizes



and longer-term evaluation of academic achievement are recommended.

Strengths and Limitations

The study is distinctive as it provides evidence on the effectiveness of the 7E instructional strategy in nursing education within Northern Nigeria. Comparable pretest scores between groups strengthened the

internal validity of the study. Limitations include a single institution setting, use of one state only, no randomisation, focus on one course, and reliance on students' perspectives.

Conflict of Interest

The authors have no conflict of interest to disclose



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