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The Relationship Between Learning Style and Cognitive Performance of Undergraduate Nursing Students of Medical-Surgical Nursing in North-west, Nigeria

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Abstract
Background: Medical-surgical nursing course is a critical component of the undergraduate nursing programme which provides foundations for clinical practice. Cognitive performance is the foundation for nursing skills. Learning styles can affect the cognitive performances of students in medical-surgical nursing. Aim: This study aimed to assess the relationship between learning style and undergraduate nursing students' cognitive performances in medical surgical nursing courses in North-west Nigeria. 4 objectives were achieved in the study. Methodology: Survey design was used in this study. The study population comprised 812 undergraduate nursing students from the Departments of Nursing Science of Bayero University, Kano and Usman Danfodio University, Sokoto. A sample size of 233 students was recruited via a multistage sampling technique. A total of 233 students' learning style questionnaires were distributed to the students. Only 176 questionnaires were retrieved and analysed (75.5% response rate). Two (2) instruments were used for data collection. Data was analysed by using Statistical Package for the Social Sciences (SPSS) version 23 using descriptive and inferential statistics. Results: The result revealed that 57.4% of the students were females with a mean age of 24.95 years. Visual learning style was mostly used by the students (29.5%). The cognitive performance of the students in medical-surgical nursing was very good with a mean score of 60.36. There is a significant negative correlation between learning style and students' cognitive performances in medical-surgical nursing (p-value < 0.05). There is a significant mediation effect of students' mode of entry on students' cognitive performance in medical-surgical nursing (p-value < 0.05). Conclusion: The study concluded that learning style is significantly related to cognitive performance. Students' mode of entry is a significant mediator between learning style and cognitive performance.

Keywords: Learning Style, Cognitive Performance, Undergraduate Nursing Students, Medical-Surgical Nursing, Northwest Nigeria
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Introduction

Learning styles are the manners or actions that students display during learning and they play a vital role in the lives of students. Students receive, process, store and retrieve information differently; some learn through visualization, hearing, reading and writing, (Fleming, 2001) acting, reflecting, experimenting (Kolb, 1984), competing, collaborating, avoiding, participating, depending and many more, (Rollins, 2015) . Learning styles can affect the cognitive performances of students in medical-surgical nursing (Chetty, *et al*., 2019). Cognitive skill is of vital importance for undergraduate nursing students. Developing cognitive ability in nursing education has been viewed as a challenging task. Lecturers need to be aware of students' learning styles so as to meet student's individual learning preferences and enhance knowledge and comprehension. (Amaniyan, *et al.,* 2020).

Medical-surgical nursing course is a critical component of the undergraduate nursing programme which provides foundations for clinical practice. Undergraduate nursing students' performance in medical-surgical nursing has been found to be relatively low (Sze, *et al.*, 2020). Current styles of learning medical-surgical nursing need to be identified in order to compare it with students' performance (Adepeju & Euphemia, 2019).

Ever since the commencement of the Bachelor of Nursing Science degree in Nigeria, several unconfirmed statements have been passed by nurses expressing their dissatisfaction with the performance of undergraduate nursing students. During the researcher's life as an undergraduate nursing student, he observed that many nurses lack confidence in undergraduate nursing students. Most nurses believe that they are deficient in cognitive skills compared to those who studied in Colleges of Nursing.

It is worrisome to note that many students are unaware of their learning styles, and therefore, do not consider them during the learning process. This may have negative consequences on students' performance. Efforts must be made to raise awareness as well as the application of the concepts of learning styles among undergraduate nursing students in order to enhance their cognitive performance in medical-surgical nursing.

Aim of the Study

This study aims to examine the relationship between learning style and undergraduate nursing students' cognitive performance in medical-surgical nursing in North-west, Nigeria.

Objectives of the Study

The study intends to achieve the following Objectives:

1. To identify the learning styles of undergraduate nursing students in North-west, Nigeria.
2. To find out the cognitive performance of undergraduate nursing students in medical-surgical nursing in North-west, Nigeria.
3. To discover the relationship between learning style and cognitive performance of undergraduate nursing students in medical-surgical nursing in North-west, Nigeria.
4. To determine the mediation effect of students' mode of entry on the relationship between learning style and cognitive performance of undergraduate nursing students in medical-surgical nursing in North-west, Nigeria.

Methods and Materials

The survey design was applied to obtain data on the relationship between learning style and undergraduate nursing students' cognitive performance in medical-surgical nursing in North-west, Nigeria. The researcher obtained data through the use of Fleming's VARK Learning Style Questionnaire (FVLSQ) and students' recent academic score sheets on cognitive performance in medical-surgical nursing. The research setting is the Nursing Departments of two Universities in North-west, Nigeria. The study population comprised all the undergraduate nursing students in Northwest, Nigeria. A sample size of 233 undergraduate nursing students (Isaac & Michael, 1981; Smith, 1983) was used for this study at a 0.05 margin of error and 95% level of confidence. (Creswell, 2014). Multi-stage sampling technique was used in this study.

1. North-west universities that run bachelor of nursing science programmes were divided into four (4) clusters. Two out of the four clusters (universities) were randomly selected for the study. Each University contributes to the sample according to its percentage contribution to the population
2. Undergraduate nursing students in each university were divided according to their level of study into two (2) smaller groups called strata. The students in each level of study were made to contribute study sample according to their percentage contribution to the study population.

3. A computer random number generator was then used to select participants from each stratum. The data collection instruments include:

    1. *Student socio-demographic questionnaire*
    2. *Fleming's VARK Learning Style Questionnaire (FVLSQ)*
    3. *Students' academic score sheet*

Fleming's VARK Learning Style Questionnaire (FVLSQ) was adapted by the researcher. The student socio-demographic questionnaire was handed over to the group of research experts to ensure its expert, face, content and cultural validity and some items were reconstructed to ensure its cultural relevance. It was also pre-tested among twenty (20) students and was found to be reliable with Cronbach's alpha of 0.66 to 0.88. Cronbach's alpha for the scores of the VARK sub-scales were 0.85, 0.82, 0.84, and 0.77 for the visual, auditory, read/write, and kinesthetic sub-scales, respectively. (Leite, Svinicki, & Shi, 2015).
The data was collected in phases:

1. Ethical approval and permission letters were obtained from the Research and Ethics Committee (REC) of Bayero University Kano (BUK/CHS/HREC/216) and the institutions where the study was carried out before study commencement. One research assistant was recruited from each of the institutions where the study was carried out and trained in data collection and management for one week.
2. The socio-demographic characteristics questionnaire and VARK Learning Style Questionnaire version 8.01 were administered to the students.
3. The most recent academic record sheets of undergraduate nursing students in theoretical medical-surgical nursing examinations were retrieved and reviewed.
4. The filled questionnaires were retrieved and stored in a safe place under lock and key. The questionnaires were coded, entered into SPSS and cleaned for data analysis.

Ethical Consideration

The researcher fully explained the nature and objectives of the research to the respondents who gave informed consent. Voluntary participation was ensured in this study. The respondents were also informed of their rights to withdraw from the study at any time if they so wished. Privacy and confidentiality of the information provided by the respondents were ensured throughout the period of the study. The completed questionnaires were coded, entered, cleaned and analysed by using the statistical package for the social sciences (SPSS) version 23. Data was analysed using descriptive statistics, cross-tabulation and regression analyses at a p-value of 0.05.

Results

Socio-demographic Profile

Table 1 shows that the mean age of the students was 24.95 years with a standard deviation of 3.259 years Among the students, 42.6% were males and 57.4% were females. Out of the 176 students involved in the study, 9 (5.0%) did not indicate their actual ages. Only 3.0% of the students were below 21 years, 58.8% were between 21 and 25 years and 38.4% were above 25 years. Of the total number of students involved in the study, 48.9% were in the 300 level while 51.1% were in the 400 level. The mode of entry of 72.2% of the students was through the UTME. Only 27.8% were direct entry.

Table 1: Students' Socio-Demographic Characteristics (N=176)

Variable	Frequency	Percent (%)	Mean
Age	75	42.6	
Gender			**24.95**
Male			
Female	101	**57.4**	
Marital status			
Single	134	**76.1**	
Married	42	23.9	
Tribe			
Hausa	116	**65.9**	
Igbo	4	2.3	
Yoruba	19	10.8	
Others	37	21.0	
Religion			
Christianity	28	15.9	
Islam	148	**84.1**	
Level of study			
300L	86	48.9	
400L	90	51.1	
Mode of entry			
D.E.	49	27.8	
U.T.M.E.	127	**72.2**	

Students' Learning Styles

In Table 2, the result of the study revealed that all four learning styles (VARK) were employed by the undergraduate nursing students. Among the four learning styles, Visual was the most utilized learning style (29.5%) followed by Kinaesthetic style (28.4%). Read/Write and Auditory styles followed by 24.4% and 17.6% respectively.

Some of the students however used a combination of two (bi-modal) learning styles. For example, Kinaesthetic and Auditory (10.3%), Kinaesthetic and Read/Write (9.0%), Kinaesthetic and Visual (13.3%), and Auditory and Read/Write (8.3%) while 10.8% used Auditory and Visual. Only 7.7% of the students used a combination of Visual and Read/write learning styles.

Other students used a combination of three to four (multi-modal) learning styles. The combination of Kinaesthetic, Auditory and Read/Write was used by 9.0% of the students and 6.4% used a combination of Auditory, Read/Write and Visual while 8.3% of the students used a combination of Read/Write, Kinaesthetic and Visual as their learning style. Students who used a combination of Auditory, Kinaesthetic and Visual were 7.7%. and only 9.0% of the students used a combination of all four learning styles; Visual, Auditory, Read/Write and Kinaesthetic. Overall, 59.7% of the total students involved in the study used the bi-modal learning styles while 40.3% of the students were found to have used multi-modal learning styles.

Table 2: Learning styles of Undergraduate Nursing Students in the Study Setting (n=176)

Learning styles	Frequency	Percentage (%)
Uni-modal		
Visual	52	29.5
Auditory	31	17.6
Read and Write	43	24.4
Kinaesthetic	50	28.4
Bi-modal (59.7%)		
Kinaesthetic and Auditory	18	10.3
Kinaesthetic and Read/write	16	9.0
Kinaesthetic and Visual	24	13.5
Auditory and Read/Write	15	8.3
Auditory and Visual	19	10.8
Visual and Read/Write	13	7.7
Multi-modal (40.3%)		
Kinaesthetic, Auditory and Read/Write	16	9.0
Auditory, Read/Write and Visual	11	6.4
Read/Write Kinaesthetic and Visual	15	8.3
Auditory, Kinaesthetic and Visual	13	7.7
Visual, Auditory, Read/Write and Kinaesthetic	16	9.0

Cognitive Performance of the Nursing Students

Table 3 shows that only 11.4% of the students performed excellently (with scores between 70 and 100%), 47.2% had very good, 33.5% had good and 8.0% had poor performance. The mean cognitive performance for all the students was 60.36. From the observation here, the students could be said to have a very good cognitive performance in medical-surgical nursing courses in North-west, Nigeria.

Table 3: Cognitive Performance of Undergraduate Nursing Students in Medical-Surgical Nursing (n=176)

Cognitive performance	Frequency	Percent (%)
70 - 100 (Excellent)	20	11.4
60 - 69 (Very Good)	**83**	**47.2**
50 - 59 (Good)	59	33.5
0 - 49 (Poor)	**14**	**8.0**

Cross tabulation of Learning styles with the cognitive performance of undergraduate nursing students

Table 5 below shows that 11 (55.0%) of the 20 students who had excellent cognitive performance in medical-surgical nursing are Read and write learners. Also, 31 (37.3%) of the 83 students who had very good cognitive performance in medical-surgical nursing are Read and write learners. Out of the 14 students who performed poorly in medical-surgical nursing cognitive performance 11 (78.5%) are Visual learners.

Table 4 : Cross-tabulation of Learning Styles with Cognitive Performance of Undergraduate Nursing Students

	Cognitive Performance			
Learning styles	**70 - 100% (Excellent)**	**60 - 69% (Very Good)**	**50 - 59% (Good)**	**0 - 49% (Poor)**
Visual	0	4	**37**	**11**
Auditory	1	27	3	0
Read and write	**11**	**31**	1	0
Kinaesthetic	8	21	18	3

Mediation effect of students' mode of entry on learning styles and cognitive performance

Table 5 shows the mediation effect of students' mode of entry on the relationship between learning styles and cognitive performance of undergraduate nursing students. A mediation of students' mode of entry into the school and their learning styles significantly contributed to their cognitive performances. The observed F-value for the test which explains the model was 22.771 obtained at 2, 173 df and the p-value for the model was 0.041 ($p < 0.05$). The observed coefficient of determination (r^2) was 0.208 which means that students' mode of entry and learning styles could explain 20.8% of the total variance for students' cognitive performance in the selected schools. The multiple R which is the Pearson Product Moment correlation coefficient was -0.435 which showed a weak relationship between the combined explanatory variables and the students' cognitive performance. The functional relationship for the model could thus be estimated as Students' cognitive performance = 2.387 - 0.325, Learning styles - 0.262. Students' mode of entry into the schools. Based on these observations, undergraduate nursing students' mode of entry has a significant mediation effect on the relationship between students' learning styles and students' cognitive performance in medical-surgical nursing.

Table 5: Mediation Effect of Students' Mode of Entry on The Relationship between Learning Styles and Cognitive Performance of Undergraduate Nursing Students

	Standardised Coefficients		Standardised Coefficients		
Variables	B	Std. Error	Beta	T	p-value
(Constant)	2.387	0.185		12.935	0.000
Learning styles	-0.325	0.048	-0.488	-6.737	0.000
Students' Mode of Entry	-0.262	0.128	-0.149	-2.056	0.041
Dependent Variable: Cognitive performance					

Discussion

The result of the study indicated that the students were relatively young (mean age: 24.95 years) with a gender distribution of 42.6% males and 57.4% females but mostly through UTME entry mode (72.2%). Slightly more than half (51.1%) were 400-level students with 48.9% being 300-level students. The age and level of the study of the undergraduate nursing students indicate their ripeness to be able to provide useful information regarding their learning style and its relationship with their cognitive performances in medical-surgical nursing.

The result of the study revealed that Visual was the most utilized learning style among the students. Some students, however, used a combination of two (bi-modal) learning styles while some used a combination of three to four (multi-modal) learning styles. This finding is consistent with Rollins (2015) who reported that students vary in the way they receive, process, store and retrieve information; some students learn through visualizing, hearing, reading and writing, competing, collaborating, avoiding, participating, depending and many more. The finding contradicts the previous study by Cetin and Suat (2018) who found that students mostly used VARK (Visual, Aural, Read-write, Kinesthetic) with Kinesthetic as the leading learning style.

The study found the cognitive performance of undergraduate nursing students to be very high (mean = 60.36).

Over 50% of the students had very good and above performance. Therefore, the students could be said to have a very good cognitive performance. This finding contradicted the report of a previous study by Sze, Baaska and Martin (2020) who found that undergraduate nursing students' performance in medical-surgical nursing is relatively low.

The cross-tabulation of learning style and cognitive performance revealed that most of the students who had excellent and very good performances were read-and-write learners.

This study found a significant mediation effect of students' mode of entry on the relationship between students' learning styles and cognitive performance in medical-surgical nursing. The finding here is reflective of a previous study by Nicolette, Cailee, and Welch, (2019) who reported that the five factors that may affect cognitive academic performance in developing strategies for student enhancement in academic performance are: test anxiety, academic competence, test competence, time management and strategic studying methods on students' performance.

Conclusion

Visual learning style was the most utilized learning style among undergraduate nursing students in North-west, Nigeria. The cognitive performance of the students is very good. Read and write learners have better cognitive performance. Learning style is significantly correlated with the cognitive performance of the students. Students' mode of entry has a significant mediation role in the relationship between learning style and cognitive performance.

Recommendation:

Conflict of Interest: There is no conflict of interest in this study.

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