ORIGINAL

RESEARCH

ARTICLE

TITLE

THE PREFERRED LEARNING STYLES OF CLINICAL MEDICAL STUDENTS AT THE IMO STATE UNIVERSITY, ORLU, SOUTH EAST NIGERIA.

AIM

To determine the preferred learning styles among clinical medical students at the Imo State University, Orlu, South East, Nigeria and to evaluate if a student's sex had any effect on the preferred learning style of the study population.

Abstract

Students have preferences in the way they internalize information. The VARK – an acronym for Visual, Aural, Read/Write and Kinesthetic questionnaire, tests students choices for preferred mode of internalizing information. The VARK questionnaire were administered to 400 level and 600 level medical students, a total of 123 of them participated in the study. Majority of them 89.4% preferred the multimodal mode of information reception while 10.56% were unimodal. A further analysis of the multimodals showed that females generally were quadmodal in their preferred sensory reception while the males were mainly trimodal.

Overall, as regards individual VARK component, Kinesthetic was more common (29.8%) among males (31.6%) while Read/write was more common among the females (29.6%).

Keywords:

VARK, Visual, Aural, Read/Write, Kinesthetic, learning styles, clinical medical students. Sex differences in learning styles, medical education.

INTRODUCTION

Knowledge is defined by Oxford languages as "facts, information, and skills acquired through experience or education; the theoretical or practical understanding of a subject". The repertoire of knowledge transfers this skill to a recipient through teaching; while the pupil grasps knowledge by the process of learning. Teaching and learning are thus like the two sides of a coin. Learning style is an individual's preferred mode of internalizing sensory modalities to effect a change in behaviour. Learning style is therefore a personal quality[1] and a potential gathering of individuals would therefore present potentially different preferred learning style attributes or needs. The Education industry thrives on teaching, learning and research. Research is in itself a form of learning. Identifying the learning styles of our students and providing adequately for them would make for more effective transfer of knowledge.[2, 3, 4, 5]

Diverse learning style instruments have been described including from Dunn, Keefe, Kolb, Gregore, Felder, Solomon and Fleming. Neil Fleming[6] introduced the VARK Model in 1987. VARK, learning styles are Visual, Aural, Read/Write and Kinesthetic. This model includes a questionnaire that identifies an individual's preferences for particular modes of presenting information.

The teaching method employed at the university level is usually the lecture method, and some maturity is expected of the students from the lecturers. It is relevant not only for the lecturers to be cognisant of their students' preferred learning styles, but also for the students to be aware of their own individual learning style needs for more effective learning to occur.

In Nigeria, there are only scant scholarly articles on the preferred learning styles of clinical medical students, this study adds to the available body of knowledge on the topic under reference.

Individuals with 'V' Preferences learn best using graphs, pictures, videos and animations, diagrams, demonstrations, generally imbibe information better when it is presented in a visually appealing format than when it is written out. While persons with 'A' Preferences internalize information best by listening (especially lectures, audio books or podcasts) and discussing information, generally being able to recite back heard and read words. Those with 'R' Preferences learn best with textual materials; while 'K' learners grasp information best when they are involved physically, practising physically or engaging in experiments. Everyone has a

preferred learning style which is the result of diverse influences. Some learning style characteristics are biological, others are developed through experience.[7, 8] Effective learning in medical study usually involves a combination of various modalities to varying degrees.

SETTINGS AND DESIGN:

This study was done at the faculty of Clinical Medicine, College of Medicine and Health Science Imo State University, Orlu Campus, Nigeria. It was a descriptive cross-sectional study.

SUBJECTS AND METHODS:

This descriptive cross sectional study was conducted in Orlu, South East Nigeria. The Visual, Aural, Read/Write; and Kinesthetic (VARK) questionnaire, a self-administered instrument was administered to 123 clinical medical students comprising 400 level and 600 level students who volunteered to participate. The paper version of the questionnaire was used. The questionnaire contained an attachment which briefly described the aims of the research, sought for each potential participant's consent, and obtained the sex and age of the participant while remaining anonymous. The questionnaires were administered to the respective clinical sets in the course of a single routine lecture. Copyright permission was obtained from VARK Learn, New Zealand.

Before data gathering, the questionnaire was explained to the students and the aims of the study outlined. The options in the questionnaire presented different learning scenarios from which the students were expected to select the most appropriate option(s) or nil if none was applicable. The answers were then collated and the respective preferred learning styles of individual students recorded. The age and sex of respondents were analysed for any influence on the learning style preferences observed.

DATA ANALYSIS

Obtained data was entered into SPSS version 22 and analysed. Results are presented in simple proportions and presented in tables and figures. Chi square was used to test for associations between variables.

RESULTS

A study of the 400 level and 600 level classes resulted in 123 Medical students completing the questionnaire. The males were 67 (54.5%) while females were 56(45.5%) in number. Their mean age were 26.3 years ±(2.4) range 22 years to 34 years; but the males were significantly older than the females (27 years ±2.5) vs 25.7 years ±2.0; t = 2.6; P value 0.01.

Majority of the cohort preferred the multi modal learning style (89.4%). A test of the modes of learning using chi square did not show any significant preference (x^2 = 7.69, P value = 0.053).

About 89.4% of the study population preferred the multimodal learning style (males 46.3%, females 43.1%) while 10.56% were (males 8.1%, female 2.4%) had unimodal preference.

Table 1: Preferred maximum learning modes among the sexes

	Uni-modal N (%)	**Bi-modal N (%)**	**Tri-modal N (%)**	**Quad-modal N (%)**	**Total (N)**
Male	10 (14.9)	22 (32.8)	23 (34.3)	12 (17.9)	67
Female	3 (5.36)	14 (25)	18 (32.1)	21 (37.5)	56
	13 (10.6)	36 (19.3)	41 (33.3)	33 (26.8)	123
					χ^2 = 7.69, p value = 0.053
Difference in proportion P-value	0.087	0.34	0.79	0.015	

The preferred multimodal combinations from this study were trimodal, bimodal, quadmodal and unimodal in that order.

The female students showed a significant preference for quadmodal form of learning compared to the males 26.8% and 17.9% respectively (P value 0.015). Of the multimodal options, trimodal was most common among males 34.3% compared to 32.1% among females.

Table 2: Breakdown of tri-modal learning among the sexes

	VAK	ARK	VAR	VRK	Total trimodal responses
Male	39 (43.8%)	24 (26.9%)	17 (19.1%)	9 (10.2%)	89 (100%)
Female	28 (26.7%)	26 (24.8%)	27 (25.7%)	24 (22.8%)	105 (100%)
Total	67 (34.5%)	50 (25.8%)	44 (22.7%)	33 (17%)	194
Difference in proportion P value	0.012	0.74	0.27	0.02	

The most common trimodal responses among males was VAK (Visual, Aural, Kinesthetic) (43.8%), ARK (26.9%) VAR (19.1%), VRK (10.2%). The VAK combination is significantly more common among the males, VAK combination amongst females was 26.7%, (P value 0.012). The least common trimodal combination response amongst males VRK (Visual, Read/Write, Kinesthetic) 10.2% was fairly common amongst the female medical students studied 22.8% (P value 0.02)

A test of the variables in table II using Chi square showed a significant difference between the learning styles (x^2 14.18, P value 0.0026).

Table 3: frequencies of preferred learning style option among the sexes

	V	A	R	K	Total responses
Males: N (%)	290 (17.4%)	444 (26.7%)	404 (24.3%)	525 (31.6%)	1663
Females: N (%)	276 (18.2%)	368 (24.3%)	449 (29.6%)	422 (27.9%)	1515
	566 (17.8%)	812 (25.6%)	853 (26.8%)	947 (29.8%)	3178

Males generally preferred the Kinesthetic mode of learning (31.6%) over others, auditory (26.7%), Read/Write (24.3%) and Visual 17.4%. While females preferred the read/write mode of learning (29.6%) over others. Kinesthetic 27.9%, auditory (24.3%) and visual (18.2%).

A difference in proportions test showed no difference in the preference among both sexes for visual and aural style (P value = 0.55 and 0.12 respectively), but the females significantly preferred the read/write over the males (P value = < 0.005); and males significantly preferred the Kinesthetic mode over the females (P value = 0.02).

About 29.3% of respondents were bimodal in their preferred sensory perception modality. Of the bimodals, males were 22 (17.9%) while females were 14 (11.4%) respectively.

DISCUSSION

Majority of the respondents preferred the multimodal pattern of learning 89.4%. This result is in concordance with Baykan[9] et al 2007, Wehrwein[10] et al 2007, Uba[11] 2012, Agu[12] et al 2021, and Prabha[13] V. (2013). Abdullah Bin Eid Et[14] al 2021, Almaguer[15] and co-workers 2019, and Samarakoon[16] et al 2013, all reported multimodal preferences in their studies. In a systematic review, Shakeri and co-workers 2022, again reported a multimodal preponderance in learning style preferences among medical students. However, some researchers have reported students being predominantly unimodal. Baykan, et al 2007, Prabha V, Wehrwein et al 2007, and Sinha[18] and co-workers reported that female cohorts preferred unimodal learning whereas males preferred multimodal learning. Assad Rezigalla and Ozaz Ahmed[19] reported overall unimodal preferences in their work.

In our study, of the females who preferred multimodal learning style, a quadmodalpattern was more common while the trimodal pattern was most common amongst male students. Medical study involves a multimodal approach to learning, so this should be expected among the students.

The most frequently occurring learning style in the cohort were in the order: trimodal, quadmodal, Bimodal and unimodal. As the males in the study had preponderance for the

trimodal mode, and males formed majority in the cohort, the overall picture may have been skewed in favour of trimodal preference for the population studied.

For each VARK component the relative frequencies were in the order kinesthetic, Read/write, Auditory and visual respectively. Males generally preferred the kinesthetic mode over others while females generally preferred the Read and Write mode of learning over others. This is in concordance with the findings of Ubah J N (2012) who observed that most of the males preferred the Kinesthetic mode while most females preferred the Read and Write mode.

Again, males were in the majority so this possibly skewed the result towards Kinesthetic for the study population. Similar to our study as a whole, Salihu[20] AS and Co-workers found that for the individual VARK component. Kinesthetic was the most frequently occurring while visual was the least. Shakeri[17] et al also reported Kinesthetic mode as the most preferred individual VARK component among medical students studied.

Characteristics of Kinesthetic learners include that they remember best what has been practised or experimented on, over what was only seen or solely talked about. Kinesthetic learners find it hard to be attentive in solely auditory or visual presentations. Medicine is practical and clinical medicine even more so. It is apt that clinical students showed high affinity for kinesthetic component in their preferred learning styles.

Although trimodal multimodal was the preferred method of information reception in this group of medical students, the commonest combinations were VAK, ARK, VAR and VRK in that order. VRK was significantly common among females in this group. Bedside teaching and tutorials would greatly enrich the learning experience of this group of medical students or any group of students with similar learning style preferences.

Possible drawback to this study include that the respondents were 400 level and 600 level medical students. The 500 level students were then in fragmented small classes and were not easily reachable. There were more males than females in this study. This study, and some others referenced herein have demonstrated that sex of respondents may influence learning style preferences or choices.

CONCLUSIONS

Differences in learning styles preferences were noted between the sexes. Majority of the respondents mainly preferred trimodal while the most frequently occurring pattern in males was alsotrimodal;whereas, the preferred learning style of females was quadmodal. Of the individual VARK components, males were mainly Kinesthetic while females were mainly Read/write in preference.

When it comes to learning, individuals have different learning styles. A teacher needs to incorporate diverse teaching styles while presenting information to students to optimize teaching style/learning style matches which has been associated with superior learning outcomes. More pertinent research using distinct levels of clinical students to assess the strengths of the relationships reported in this study are needed.

We recommend that further studies on learning styles should factor in the sexes of respondents for a better elucidation and understanding of the choices made and of the subject.

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Competing Interests
The authors have no competing interests

Authors Contributions
AJE conceived the idea of the study
Both authors wrote the manuscript and both approved its final version