

Type of High Secondary School (Governmental Vs Private) and Type of High Secondary School Certificate (Sudanese Vs Arabian):

Do They Affect Learning Style?

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Abstract

Background: People differ in the way they perceive, process, store, and recall what they are attempting to learn. This study aimed to assess the learning styles among preclinical 1st year medical students and the influence of the type of high secondary school (governmental vs. private) and type of high secondary school certificate (Sudanese vs. Arabian) on learning style.

Materials and Methods: A cross sectional institutional-based study was conducted at Al Neelain University, Khartoum State, Sudan. First year students of Medicine, Dentistry and Physiotherapy Faculties were enrolled. The VARK (Visual, Auditory, Read and write, and Kinesthetic) learning style hard copy questionnaire, © Copyright Version 7.8 (2014) held by VARK Learn Limited, Christchurch, New Zealand was administered following permission. Data were analyzed using Statistical Package for Social Sciences (SPSS) version 21.

Results: Out of 320 students, 198 correctly completed VARK questionnaires, with mean age of 17.88 years (SD 1.52) and 74.2% were female students. About 59.6% were from governmental schools and 79.4% of the studied students had Sudanese High Secondary Certificates. About 64.1% demonstrated singular mode preference. Inferential statistics showed statistically significant difference between the learning styles and the type of secondary school whether governmental or private (P -value 0.005) while no statistically significant difference in relation to the type of high school certificate of the studied group (P -value 0.225).

Conclusion: The type of secondary school whether governmental or private may affect learning style of medical students while student's gender, type of college, or type of high school certificate (whether Sudanese or Arabian) do not. More and larger studies are encouraged.

Key word: Learning modalities, VARK questionnaire, Unimodal preference, Medical education, Sudan.

People are different; everyone has his own way of perception. These perceptions shape our thinking, decision making and the way that we prioritize things¹. Learning is a relatively

permanent change in an organism's behavior due to experience¹. Students' approach to learning is a topic of interest for medical educators for many decades. This is because the ability to learn is

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necessary to becoming a doctor. During the undergraduate years, medical students learn to be life-long learners, be able to collect and organize information from different sources and to apply the relevant knowledge to solve the patients' problems in a humanitarian healthcare perspective². The students face difficulty during the transition stage from preclinical to clinical education, due to the dramatic increase in the volume of content. Furthermore, today's medical students represent a wide range of diversities in terms of age, gender, experience, culture, ethnicity, and level of preparedness as well as learning preferences and styles. These diversities; conversely, presents a challenge for instructors to meet the educational needs of all students. Mainly, improvement of student motivation and performance is better when instructions are adapted to student learning preferences and styles^{3,4}. Learning is acquisition of information. Learning style is the learners' preferred mode of learning in terms of the sensory modality by which they prefer to take in new information. While learning, each of us has his own preferences for the way that he receives information. A learning style is the complex approach in which, and conditions under which, learners most efficiently and most effectively perceive, process, store, and recall what they are attempting to learn⁴⁻⁶. The learner's preferred mode of learning characterizes his learning style. Four modes of learning styles have been defined by Neil Fleming's, these are; Visual, Auditory, Read/write and Kinesthetic (VARK) learners. Each individual has his own preference in terms of the sensory modality by which he likes to take in new information depending on his own nervous system. VARK is a perceptual, instructional preference model that classifies learning by sensory preferences. Neil Fleming claimed that visual learners

have a preference for seeing (think in pictures; visual aids that represent ideas using methods other than words, such as graphs, charts, diagrams, symbols, etc.). Auditory learners best learn through listening (lectures, discussions, tapes, etc.). Tactile/kinesthetic learners prefer to learn via experience—moving, touching, and doing (active exploration of the world; science projects; experiments, etc.). Although students can use any single or combination of these sensory modes to learn, one mode is usually dominant and more preferred than the others^{1, 4,7,8}. The visual learners (V) are those who typically learn through observing or seeing with their eyes, for example, by using drawings, pictures, diagrams and demonstrations. The auditory learners (A) are very good listeners. They learn better by listening to or recording lectures, discussing material, and talking through material with themselves or others. The read/write learners (R) prefer printed words and texts. This type of people learns through interactions with textual materials. The kinesthetic learners (K) are tactile learners who learn best by using physical experiences, such as touching, performing an activity, moving, lessons that emphasize doing, and manipulation of objects. Student learners are able to use all of these sensory modes of learning. However, each individual has a distinctive preference or set of preferences, in which one mode is usually dominant. According to their score distribution among the different sensory modalities, students can be unimodal or multimodal (bimodal, trimodal and quadmodal)^{1, 4,7,8}. Learning style is not just a concept; it is the key to improve school climate and student achievement by recognizing that all students are not the same, and that all students do not learn the same way. Thus, because students have significantly different learning styles, it is the

responsibility of the instructor to address this diversity and develop appropriate learning approaches^{3,5}.

The aim of this study was to assess the learning styles among preclinical 1st year medical students and the influence of the type of high secondary school (governmental vs. private) and type of high secondary school certificate (Sudanese vs. Arabian) on learning style.

MATERIALS AND METHODS:

A descriptive cross sectional institutional based study was conducted at Al Neelain University, Khartoum State, Sudan during March 2015. First year students of Medicine, Dentistry and Physiotherapy Faculties were enrolled. The VARK (Visual, Auditory, Read and write, and Kinesthetic) learning style hard copy questionnaire, © Copyright Version 7.8 (2014) held by VARK Learn Limited, Christchurch, New Zealand was administered. Following Copyright Permission the questionnaire was translated to Arabic language. VARK questionnaire is composed of 16 questions, each with four options.

The questionnaires were distributed to all the students in the classes, with a total number of 320 students. Students were informed about the objectives of the study, instructions of how to fill it were illustrated, and confidentiality was

insisted. Filling the questionnaire was optional. All members of the classes who signed a written informed consent were included in the study. Correctly filled questionnaires were included in the study. Ethical clearance was obtained and permission for conducting the study was obtained from the concerned body in Al Neelain University.

Data were analyzed using Statistical Package for Social Sciences (SPSS) version 21 (IBM). Independent samples *t*-test and one-way ANOVA tests were used to study the effect of, gender, type of secondary school certificate, and faculty on the learning modality preference.

P-value at 0.05 was considered statistically significant.

RESULTS:

Out of 320 students, 198 correctly completed VARK questionnaires, with response rate of 61.9%. Mean age of the studied group was 17.88 (SD 1.52). Female students were 74.2%. About 59.6% of the studied students were from governmental schools. More than three quarters (79.4%) of the studied students had Sudanese Secondary Certificates. Those from Faculty of Medicine represented 42.6 %, while 31.5 % were from Faculty of Dentistry, and 25.9 % from Faculty of Physiotherapy.

Figure 1 showed the modal preferences

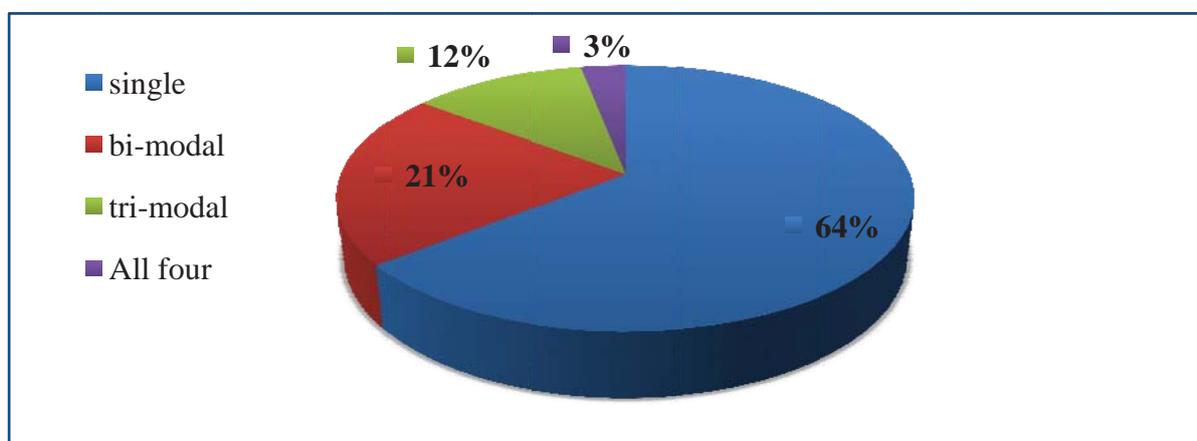


Figure 1: The modal preferences of studied students.

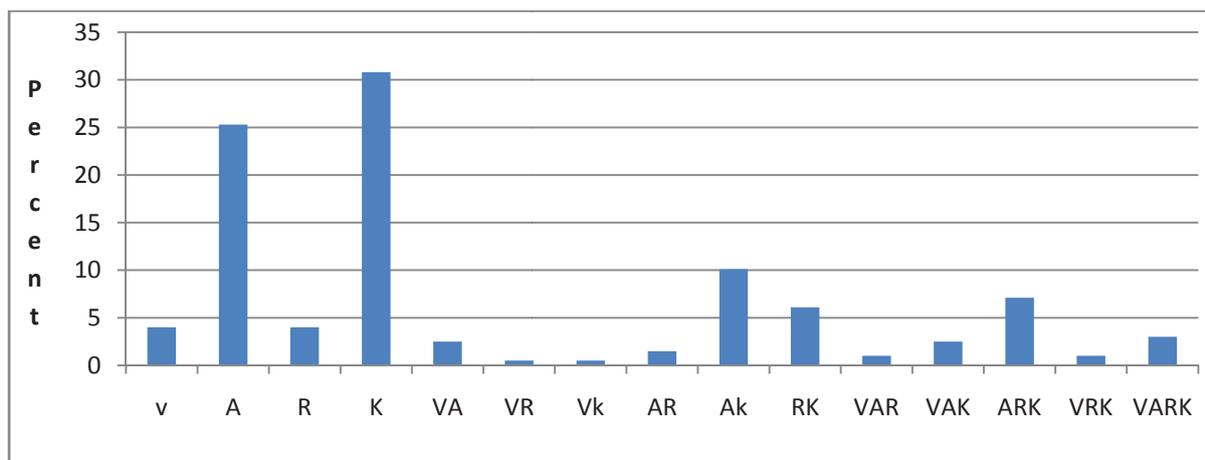


Figure 2 : The learning styles of the studied group.

of the studied students; 64.1% had singular mode preference, 21.2% were bi-modal, 11.6% were tri-modal and 3.1% preferred all four modes. Figure 2 reflects the learning styles; 30.8% showed preferences for Kinesthetic sensory style, 25.3% showed preferences for Auditory style, 4% showed preferences for Visual style and 4% showed preferences for Read/write style, while the others are multi-modal.

No significant gender difference was seen in terms of unimodal or multimodal learning preferences (Figure 3). There was also no significant difference in individual sensory modality preference among unimodal learners. There was no statistically significant difference between the learning styles and the type of high school certificate of the studied group (P -value 0.225) as seen in figure 4.

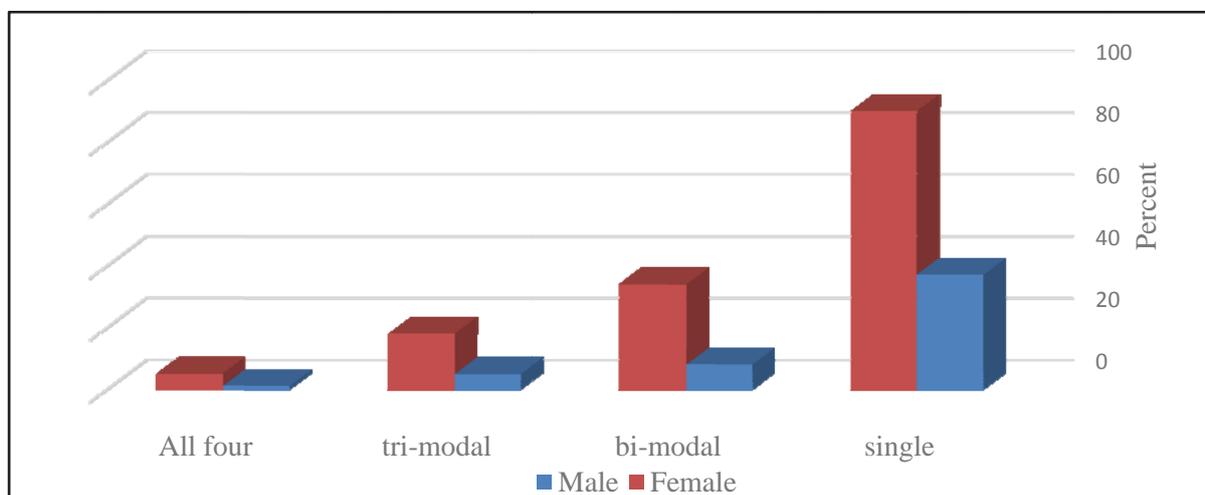


Figure 3 : The learning styles according to gender of the studied group (P -value 0.210).

According to inferential statistics, the only significant effect was found in relation to the type of secondary school whether governmental or private (P -value 0.005)

(Figure 5). Figure 6 shows that the learning styles of the students belonging to the different faculties didn't differ greatly (P -value 0.052).

DISCUSSION:

Every individual has a different learning style and there is a considerable variation between the results obtained from different studies worldwide. In this study 64.1% had singular mode preference. This differs greatly from Baykan *et al* study who found unimodality preference in 36.1% and Guraya's and Sarabi's studies in which no single learning style predominated, but slightly higher than Almigbal *et al* who reported 57% with unimodal preference^{7,9-11}. Among the mono-modal students who participated, 30.8% were kinesthetic, 25.3% were auditory, 4% were visual and 4% were read/write learners. There are remarkably more auditory learners among the Sudanese studied students compared with the Turkish students in one study⁷.

In the current study, 21.2% were bi-modal, 11.6% were tri-modal and 3.1% preferred all four modes. This distribution is lower than that reported by Baykan; bimodal (30.3%), trimodal (20.7%), and quadmodal (12.9%)⁷.

There is no agreement between different studies on the influence of gender on learning styles. This study revealed no statistically significant difference in the learning preference between male (72.55% unimodal) and female (61.22% unimodal) students. Female students represent 75%, 74%, and 70.49% of the visual, auditory, and kinesthetic unimodal learners, respectively.

Equal number of male and female students (50%) preferred reading and writing learning style.

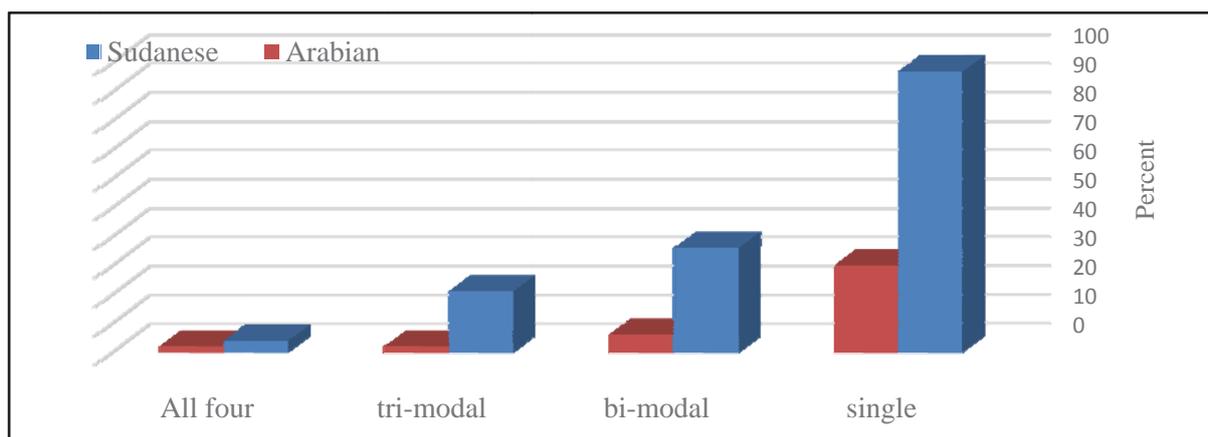


Figure 4 : The learning styles according to type of high school certificate of the studied group (*P*-value 0.225).

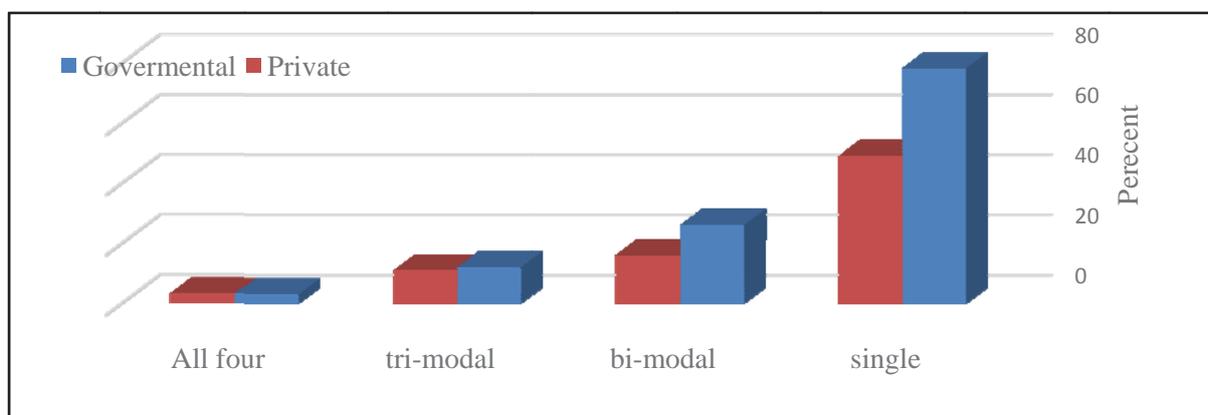


Figure 5 : The learning styles according to type of high secondary (governmental vs private) school of the studied group (*P*-value 0.005).

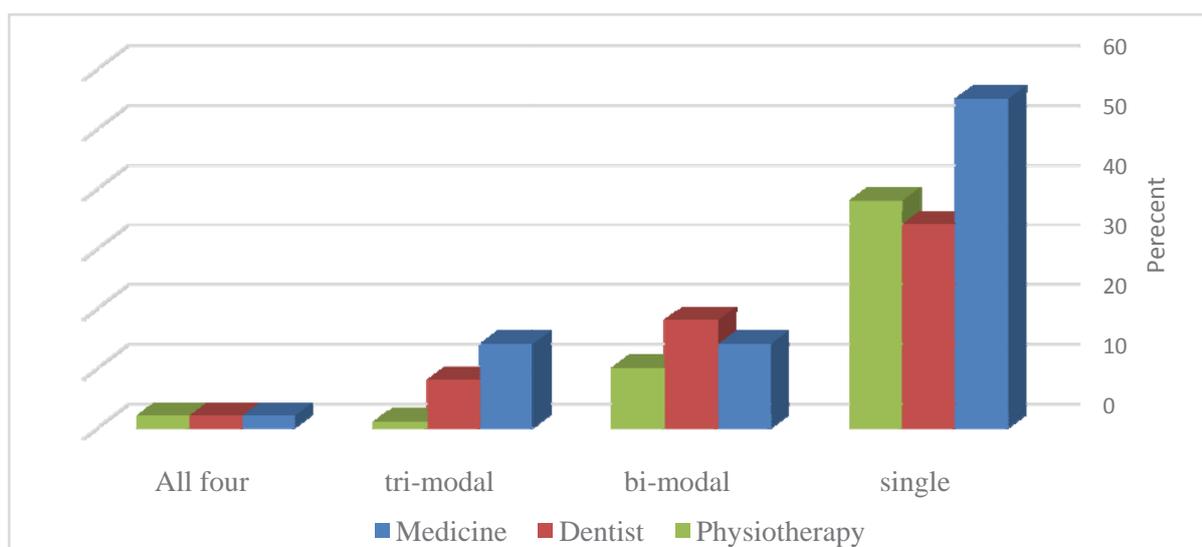


Figure 6 : The learning styles in the different faculties among the studied group (P -value 0.052).

Similarly, Urval *et al* found that most of the female undergraduate medical students (68.3%) preferred more than one modality of learning with diverse sensory modality combinations in both gender. Among those with unimodal preferences in their study, female students were predominantly aural (49.3%). This is the same as many other studies^{3,12}. However, Sarabi *et al* found a significant relationship between gender and single modal learning styles ($P=0.009$). He reported that male students preferred to use the kinesthetic learning style more than females, while, female students preferred the aural learning style¹¹. On the other hand, Wehrwein *et al* found that a majority of male students preferred multimodal instruction, specifically, four modes (VARK), whereas a majority of female students preferred single-mode instruction with a preference toward kinesthetic learning¹³. While in another study female students were found to have a slightly higher average percentage of the read/write learning style (preferred read/write) compared with male students (28.9 +/- 0.9%, $n = 63$, vs. 25.3 +/- 1.3%, $n=32$, $P < 0.03$)¹⁴. Bearing in mind that there are physiological and physical differences between males and females,

the influence of gender on learning styles necessitates further studies.

This study revealed that the type of high school certificate whether Sudanese or Arabian does not influence the learning style preference. Moreover, being in medicine, dentistry or physiotherapy faculty doesn't change the preferable model of student learning. Upon the internet search, there are no published studies in the English literature to the date of writing this article concerning the influence of high secondary school certificate or type of faculty on learning styles, so comparison is restricted. However, Luccheset al assessed the predictive capacity of a series of indicators associated to the population of candidates attempting entrance to medical studies. They concluded that predictors are associated to sociocultural factors related to family environment, mainly educational level of the mother, and to a high-school grade point average (GPA) value between 8 and 9 points¹⁵. In Sudan for many years only those who obtain high grades enter medical schools. But things are becoming more complicated in the recent years when medical schools accept students with high range of grades and sociocultural variation.

In this study a significant effect was found between preference of learning style and the type of secondary school whether governmental or private. To the best of our knowledge this is the first study that relate student's learning style to the type of secondary school among Sudanese undergraduate students. The authors emphasize the importance of such studies. There are many advantages behind Knowledge about the learning styles of students at educational institutes. It is valuable and helps solve learning problems among students, and allows students to become better learners¹¹. Using pre and post intervention change in student's perception about usefulness of knowing learning styles on their learning, learning behavior, and performance in examinations, Kumar *et al* found that post intervention mean scores showed a significant change ($P < 0.0001$) in student's self-perceptions about usefulness of knowing one's learning style and discovering strategies that worked within the institutional environment¹⁶. A strong correlation between the use of strategic and deep learning styles and success in the exam as well as the GPA was also reported^{17,18}. However, Dobson found no statistically significant relationship between perceived sensory modality preferences and course scores ($P = 0.01$ by ANOVA)¹⁹. Moreover, it can help provide learning situations tailored to the student's individual preference, overcome the predisposition to treat all students in a similar way, and motivate teachers to move from their preferred mode(s) to using others^{3,9}.

Medical school curricula are undergoing transformational change in response to calls for integrating content across courses and years to enable better retention and application and for individualizing learning to meet the diverse backgrounds

and thus differing needs of students. In this context, it is recommend that students should be informed about their learning style and that educational planners should ensure an adequate mix of students with different learning styles and design approaches that promote lifelong learning skills as well as disciplinary knowledge^{16,20}. Furthermore, awareness of learning styles motivates students to adapt other learning strategies and use mixed methods for learning²¹.

The use of teaching methods consistent with the learning style is also recommended because it would be more effective^{22,23}. It was realized that students whose learning styles are compatible with the teaching style of a course instructor tend to retain information longer, apply it more effectively, and have more positive post-course attitudes toward the subject than do their counterparts who experience learning/teaching style mismatches²⁴. Furthermore, increased student interest and learning gains can be achieved when learning strategy is designed with students' learning styles in mind^{17,25}. Studies proved that providing students with multiple ways to access content and to demonstrate knowledge and skills, improves learning, increases engagement and learning, and provides teachers with more accurate understanding of students' knowledge and skills²⁶.

We have to put into consideration that the learning styles amongst the undergraduate medical students may differ from the postgraduates and also it may differ according to student's level^{27,28}. Whether students' learning style differs by time or not should also be considered².

The limitations of this study include that it included one level of students and didn't consider the motivation, cultural variations and emotional factors which can affect learning style and allow more reliable

results, better counselling to the students, and enrich the literature with valuable information²⁹.

In this study VARK model was used while some other studies used Kolb's learning style which divides learners into four groups (Diverger, Assimilator, Converger and Accomodator), that differ both in terms of their learning behavior as well as personality and preferences³⁰⁻³⁴. Other models or scales do exist eg. Grasha-Riechmann Student Learning Style Scales^{35,36}, Fisher's self-directed learning readiness (SDLR) scale³⁴ and California critical thinking standardized questionnaire²² while Laight conducted special methods (Duff's 30-item revised approaches to study inventory (RASI)³⁷. Another one is Learning Style Questionnaire (LSQ) which is used to assess and categorize the participants into Honey and Mumford classification of learning styles. The responses of each student ranges from 'very strong,' 'strong,' 'moderate', and 'low' preference towards activist, theorist, reflector and pragmatist learning styles²⁷.

The visual-aural-read/write-kinesthetic (VARK) questionnaire has the advantages of being simple, freely available, easy to administer tool that encourages students to describe their behavior in a manner they can identify with and accept. Though learning styles have been categorized in a number of different ways - visual/auditory/kinesthetic, diverger/assimilator, impulsive/reflective, etc. - yet there is no overarching model that has been proven to have reliable outcomes³⁸.

Identification of the learning style preferences of undergraduate students in relation to their academic achievement would have imposed more power to this study. Moreover, home language and Strength or weakness of English language if it is the second tongue is a challenging

issue. Weather it plays a role in the way students are motivated to learn needs to be addressed³⁹.

CONCLUSION:

The type of secondary school whether governmental or private may affect learning style of medical students while student's gender, type of college, or type of high school certificate (whether Sudanese or Arabian) do not. Larger and more studies are encouraged.

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