

Learning Styles of Medical Students

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Abstract

Introduction: Knowledge of learning styles of the students helps educators to address various needs of learners. Study objective was to determine learning styles of undergraduate medical students.

Methods: A cross sectional survey was conducted at Lahore Medical & Dental College (LMDC), Lahore, between January and March 2011 among students from first to fourth year MBBS classes using an online VARK inventory. Additional information was obtained using a structured questionnaire. Data was analysed using SPSS version 16 computer package. Chi square test was applied for association and statistical significance was determined with $p \leq 0.05$ as the cut-off point.

Results: Among the 338 study participants, 61% were females, 63% were between the age groups 20-23 years and 78% had done FSc. Each class representation was 1st year (26%), 2nd year (25%), 3rd year (29%) and 4th year (20%). Most students depicted multimodal learning style (69%). The preferred unimodal styles were aural (14%) and kinesthetic (12%). In different combinations, the favoured learning modes were kinesthetic (70%), read/write (60%), aural (57%) and visual (55%). Around 89% of "A" level students, compared with 66% of those who had done FSc were multimodal ($p=0.002$). The preference for multiple learning modes increased with the transition from pre-clinical first and second years to the clinical third and fourth years ($p= 0.006$).

Conclusion: Medical students prefer multiple variety of information transfer. For a better impact, learning style diversity can be converted into appropriate teaching and learning methods that enable more students to attain success.

Key Words: Learning style, VARK questionnaire, visual, aural, read/ write, kinesthetic, modal, medical students

Introduction

Individuals have a tendency to perceive and manage information differently. A learning style is the process by which a person understands and retains information, thereby gaining knowledge or skills (Adesunloye *et al.*, 2008). Learners learn in multiple ways, with one or more learning styles (Abidin *et al.*, 2011).

The concept of learning styles has many implications for students and educators. Students can understand their learning modalities and develop individual study strategies and perform better in their studies (Boström, 2011). It can remind educators that students are different and educators should increase their sensitivity to those differences and vary instructions to help students become more aware of the ways they most effectively learn (Eggen & Kauchak, 2004). The knowledge of learning styles of learners also help educators to develop a curriculum to address various needs of learners in a group or class (Pallapu, 2007). Diversity of learning styles in medical education calls not only for multiplicity of instructions but also matching assessment modalities (Shukr *et al.*, 2013). It is interesting to note that in Pakistan, students entering a medical college come from two diverse educational systems. The pre-requisite entry qualification for admission in professional colleges is completion of 12 years of education

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and passing national examinations administered by the regional Board of Intermediate and Secondary Education (BISE). The Pakistani certificate awarded upon completion of 12 years of education is the Higher Secondary School Certificate (HSC). This level of education is also called 'intermediate' or the Fellow of Science (FSc) or Fellow of Arts (FA). Students can also pursue equivalent approved certificates from international boards. The most popular alternative to this local certificate is the British General Certificate of Education (GCE) where the HSC has been replaced by Advanced Level, commonly referred to as "A" Level. These two systems are completely different in terms of syllabi, teaching learning methodologies, teacher training, examination and style and type of exam papers (Saeed, 2007).

One characterization of learning styles is to define the learners' preferred modes of learning in terms of the sensory approaches in which they prefer information (Lujan & Dicarlo, 2006). In 2006, Fleming introduced four sensory styles of learning i.e. visual (V), auditory or aural (A), read-write (R), and kinesthetic (K) (Fleming, 2006). Students with a *visual* preference learn best by seeing or observing (drawings, pictures, diagrams, demonstrations, etc). Learners that prefer *aural* are best suited to learn by listening to or recording lectures, discussing materials, and talking through materials with themselves or others. *Read and write* type learners learn through interactions with textual materials. *Kinesthetic* learners perform best by using physical experiences: moving, touching or performing an activity. They prefer lessons that emphasize doing, and manipulation of objects. Student learners are capable of using all of these sensory modes of learning; however, each individual has a unique preference, or set of preferences, in which one mode is often dominant. Learners with a single learning style preference are referred to as *unimodal*, whereas others preferring a variety of styles are known as *multimodal*. Among the multimodal learners, there are sub-classifications for *bi*, *tri* and *quadra* modal learners, who prefer to use two, three, or all four styles, respectively. Student motivation and performance improves when instruction is adapted to student learning styles. One of the commonly used inventories is the visual, auditory, read/write and kinesthetic (VARK) questionnaire also developed by Fleming (2011). It can be used to guide instructors in their selection of learning and assessment

strategies. This inventory has been fully validated and checked for reliability (Leite *et al.*, 2010).

The aim of the present study was to determine the learning styles of undergraduate medical students using the online VARK questionnaire.

Methods

A descriptive cross sectional study was conducted between January and March 2011, among MBBS students from first year to fourth year of Lahore Medical & Dental College (LMDC), Lahore. Out of 400 registered learners in the four classes, 338 participated in the present study (response rate = 82%). The participants of the study were asked to complete the online VARK inventory (Fleming, 2011) which had 13 questions about orientation to information processing. All questions had four responses and each response allowed determination of one of the VARK learning preference. The learners could tick more than one response for each question. Additional information, including age, gender, entry qualification and year of study were obtained using a structured questionnaire. Data was entered, cleaned and analysed using SPSS version 16 computer package. Chi square test was applied to detect association between age groups, year of study, gender and medical school entry qualifications with learning modes. Statistical significance was determined with $p \leq 0.05$ as the cut-off point. Verbal consent was taken from students for publication of the study.

Results

Of the 338 MBBS students interviewed, 205 (61%) were females. Ninety nine respondents (29%) were either 19 years old or younger, 135 (40%) were between the age groups 20-21 years old, 79 (23%) were 22-23 years old and 25 (7%) were 24-25 years old. The medical college entry qualification of 265 (78%) students was FSc and of 73 (22%) was "A" levels. Among the respondents, 89 (26%) were from 1st year, 87 (25%) were from 2nd year, 93 (29%) were from 3rd year and 69 (20%) were from 4th year.

The analysis of learning styles of respondents revealed that around 31% had a unimodal style while 69% were multimodal (Figure 1). The preferred modes of learning by unimodal students in order were aural (14%), kinesthetic (12%), read/write (4%) and visual (1.2%).

Figure 1: Learning Styles of 338 MBBS students

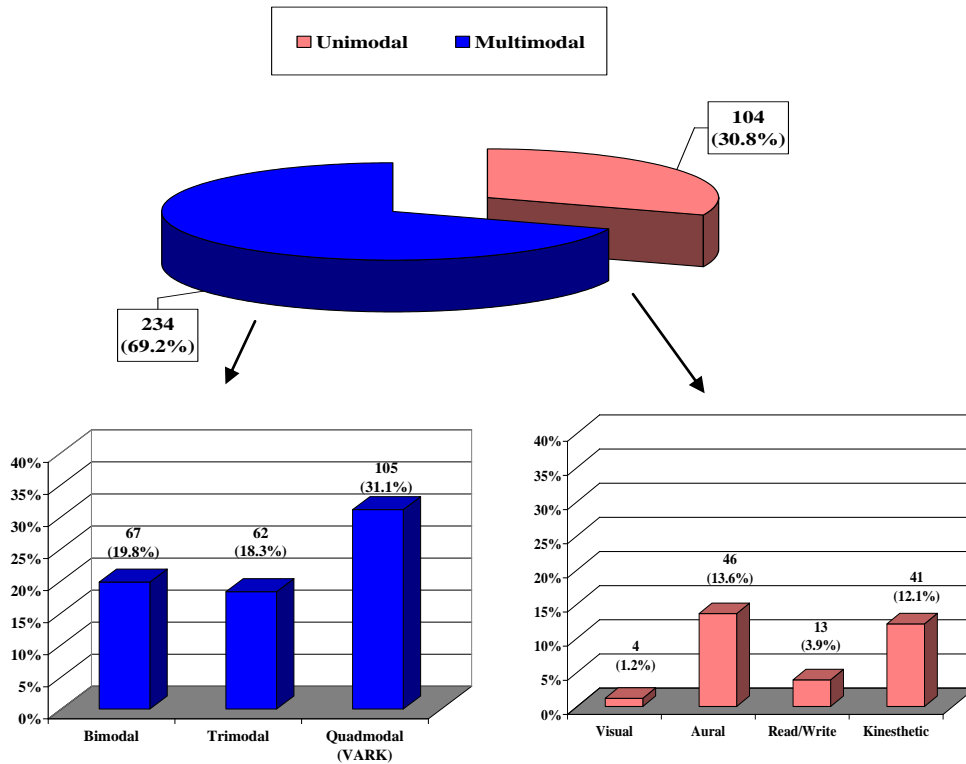


Table 1: Combinations of learning modes used by 338 medical students

Learning Mode	n	%
Visual only	4	1.2
Aural only	46	13.6
Read/Write only	13	3.8
Kinesthetic only	41	12.1
Visual and Aural	4	1.2
Visual and Read/Write	8	2.7
Visual and Kinesthetic	4	1.2
Aural and Read/Write	17	5.0
Aural and Kinesthetic	24	7.1
Read/Write and Kinesthetic	10	2.9
Visual, Aural and Read/Write	10	2.9
Visual, Aural and Kinesthetic	11	3.2
Visual, Read/Write and Kinesthetic	5	1.5
Aural, Read/Write and Kinesthetic	36	10.6
Visual, Aural, Read/Write and Kinesthetic	105	31.0
Total	338	100

Among the students who preferred more than one mode of learning, 20% were bimodal, i.e. used any two combinations of VARK, 18% were trimodal i.e. used any three combinations of VARK and 31% used all four modes, i.e. visual, aural, read/write and kinesthetic. As depicted in Table 1, the most used unimodal learning method was aural (14%), bimodal

combination was aural and kinesthetic (7%) and the trimodal blend was aural, read/write and kinesthetic (11%). In different combinations, kinesthetic mode of learning was reported by 236 (70%) students, read/write by 204 (60%) students, aural by 193 (57%) students and visual by 151 (55%) of students (multiple responses).

Table 2: Comparison of learning styles and characteristics of the 338 medical students

Characteristics	Unimodal		Multimodal		p values
	n	%	n	%	
Age group (Years)					
≤19 (99)	35	35.4	64	64.6	p= 0.23
20-21 (135)	42	31.1	93	68.9	
22-23 (79)	21	26.6	58	73.4	
24-25 (25)	6	24.0	19	76.0	
Gender					
Male (133)	46	34.6	87	65.4	p= 0.65
Female (205)	58	28.3	147	71.7	
Medical school entry qualifications					
FSc (265)	90	34.0	175	66.0	p= 0.002
A levels (73)	14	19.2	69	80.8	
Year of study					
First year (89)	28	31.5	61	68.5	p= 0.006
Second year (87)	39	44.8	48	55.2	
Third year (93)	19	20.4	74	79.6	
Fourth year (69)	18	26.1	51	73.9	

Table 2 shows the comparison of learning styles and characteristics of the learners. It was noticed that the multimodal learning preferences of the respondents increased with age and was more in females than males, though this difference was not found to be statically significant. However, the medical school entry qualification and the year of study had statistically significant bearing on the learning modes of respondents. The preferred learning approaches of learners who had done FSc or “A” levels were most tilted towards multimodality. However, higher number of “A” level students (89%), compared with those who had done FSc (66%) learned through multiple means (p=0.002). Similarly, the reported multimodality was 68% in first year, 55% in second year, 80% in third year and 74% in fourth year. The preference for multiple learning modes increased with the transition from pre-clinical first and second years to the clinical third and fourth years (p= 0.006).

Discussion

The Position Statement of College Reading and Learning Association (CRLA) on Rights of Adult Readers and Learners (2003) notes that today’s students in post-secondary institutions are a large yet diverse group with different goals, styles, skill levels, backgrounds, and experiences. In order to maximize students’ success at the post-secondary level, instruction should incorporate these differences in learning, with the goal of developing independent, responsible, and lifelong learners. It is widely recognized that

the more cognizant students are about how they learn— their learning styles—the more they are able to effectively implement reading and learning strategies in the variety of educational settings that they encounter at the college level (Angus & Greenbaum 2003).

In the present study 69% of medical students exhibited multimodality, indicating that they use a combination of learning styles when processing information. This finding is endorsed by similar studies from medical schools in USA, where multimodality was reported to be 61-69% in San Francisco, California (Breckler *et al.*, 2009) and 70% in Gainesville, Florida (Dobson, 2010). In another study from Saudi Arabia using VARK inventory, multimodal learning approaches were preferred by 73% medical students (Nuzhat *et al.*, 2011). Interestingly, our results were in accordance with those quoted by Fleming (Fleming, 2011), where he collated the results of 40,228 respondents from the general public all over the world, who used the online questionnaire. According to these results, 63% of respondents were multimodal. Kumar *et al.*, (2009) also supported this finding that learners adopted an assortment of learning styles. Kumar *et al.* (2009) added that these students had a balanced set of preferences, which meant they preferred information to arrive in a variety of modes. Thus, most learners may benefit more from active learning strategies than the traditional lecture format. Active learning strategies reach all types of learners in the visual, auditory, reading/writing and kinesthetic schemes. In

contrast, the traditional lecture format assumes that all students are auditory learners, and that all students acquire the same information presented orally at the same pace without any interaction with the teacher. Laight (2004) commenting on health professionals' education concluded that student learning is enhanced when instructors present information using the particular styles that students prefer.

The present study further demonstrated that while the aural (14%) and kinesthetic (12%) categories were the single categories most often endorsed, there was still student representation of every learning style. Either in isolation or in different combinations, the most commonly reported learning mode was kinesthetic (70%), followed by read/write (60%), aural (57%) and visual (55%). Similar preferences were reported by Dobson from USA (2010) as in his study, the learning preferences were kinesthetic (76%), read/write (64%), aural (58%) and visual (51%). Relating to their USA based study, Lujan and DiCarlo (2006) state that the most common learning preference was kinesthetic (88%), followed by read/write (85%), visual (74%), and auditory (72%). In a Korean study, over 60% of medical students were visual learners (Yeo *et al.*, 2006).

In the present study, 31% used all four modes, i.e. visual, aural, read/write and kinesthetic. This finding conforms to the findings of Shah *et al.*, (2012) where quadrimodal learning was reported by 33% of respondents. The most commonly used bimodal combinations in the present study were aural and kinesthetic (7%) and the trimodal learning style was aural, read/write and kinesthetic (14%). Comparable popularity of learning styles was quoted by Baykan and Nacar from Turkey (2007), though the frequencies were different, that is, 20% for aural and kinesthetic and 14% for aural, read/write and kinesthetic. This reiterates that some students prefer one of the modalities over the other three so strongly that they struggle to understand the subject matter unless special care is taken to present it in their preference mode. The present study and others provide evidence that most learners are able to learn effectively when the teacher provides a blend of visual, auditory, reading/writing, and kinesthetic activities. To meet these needs, teaching should be multisensory and filled with variety. To achieve this goal, it becomes important to use active learning strategies (DiCarlo, 2009). With active learning strategies, visual learners are

targeted by the presence of models and demonstrations (DiCarlo, 2009). Auditory learners are reached through discussion during peer instruction (Cortright *et al.*, 2005) and collaborative testing (Cortright *et al.*, 2003). Manipulating models and role playing fulfils kinesthetic and tactile learners (Kumar *et al.*, 2009). Cooperative learning exercises, role playing, simulations, models, debates, and games are active learning strategies that can be used effectively in large classrooms. These activities also promote working in groups and generate high levels of motivation and enthusiasm.

In the present study, higher number of "A" level students (89%), compared with those who had done FSc (66%) learned through multiple means ($p=0.002$). Researchers have inferred that high school education has implications on learning characteristics of learners pursuing higher education (Akram *et al.*, 2013; Boström, 2011; Kuh, 2008). The two education systems prevalent in the schools of this country differ considerably with regards to curricula, teaching methodology, assessment styles and utilization of learning resources. This affects the learning pattern of learners in higher education. Behlol and Anwar (2011) studied the difference between English language teaching methods in local and British education systems in schools of Punjab, Pakistan. Their study revealed that the British system fosters active learner participation, critical thinking, versatility of learning activities and use of audio-visual equipment. In contrast, the local Pakistani education system uses mostly didactic lectures where learners are passive recipient of knowledge and nurtures memorizing coursework rather than exploring and analysing.

In our study, the reported multimodality was 69% in first year, 55% in second year, 80% in third year and 74% in fourth year. Other studies have endorsed this finding that learning styles of medical students change with time (Bitran *et al.*, 2012) and maturity (Teunissen & Westerman, 2011). Learning methods of first year medical students in our study are compatible with other studies that have used the VARK questionnaire as a learning style inventory. Lujan and DiCarlo from USA (2006) and Baykan and Nacar from Turkey (2007), found multimodal learning in first year medical students to be around 64%, while Johnson, evaluating the learning styles of first year medical students in USA (2009), reported multimodality to be around 52%. Evidence suggests that even medical

freshman prefer more than one mode of learning, though multimodality increases as medical studies expand from class room teaching and laboratory practical to more patient and community based exposures.

In the present study there was no difference in learning styles between male and female medical learners. This finding is strengthened by similar studies carried out in medical schools of Turkey (Baykan & Nacar, 2007), Chile (Bitran *et al.* 2012) and USA (Slater *et al.* 2008).

Conclusion

Medical learners prefer multiple ways of information transfer. For better impact, learning style diversity, when properly understood by both learners and educators, can be converted into appropriate teaching and learning methods. Active learning strategies should be introduced in medical teaching, from the initial pre-clinical years to the clinical ones. This will make the educational experience more productive and help students in attaining success.

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References

- Abidin, M.J., Rezaee, A.A., Abdullah, H.N. & Singh, K.K.B. (2011) Learning styles and overall academic achievement in a specific educational system, *International Journal of Humanities and Social Science*, 1, 10, pp. 143-152.
- Adesunloye, B.A., Aladesanmi, O., Henriques-Forsythe, M. & Ivonye, C. (2008) The Preferred Learning Style among Residents and Faculty Members of an internal Medicine Residency Program, *Journal of the National Medical Association*, 100, pp.172-175.
- Akram, M., Farid, S., Khan, W.A., Luqman, M. & Warriach, I.A. (2013) An exploration of relationship between perceptual learning styles and achievement goals, *International Journal of Biology and Biological Sciences*, 3, 1, pp. 27-35.
- Angus, K.B. & Greenbaum, J. (2003) Position statement on rights of adult readers and learners. *Journal of College Reading and Learning*, 33, pp. 122-130.
- Baykan, Z. & Nacar, M. (2007) Learning styles of first-year medical students attending Erciyes University in Kayseri, Turkey, *Advances in Physiology Education*, 31, pp. 158-160.
- Behlol, M.G. & Anwar, M. (2011) Comparative Analyses of the Teaching Methods and Evaluation Practices in English Subject at Secondary School Certificate (SSC) and General Certificate of Education (GCE O-Level) in Pakistan, *International Education Studies*, 4, 1, pp. 202-211.
- Bitran, M., Zúñiga, D., Pedrals, N., Padilla, O. & Mena, B. (2012) Medical students' change in learning styles during the course of the undergraduate program: from 'thinking and watching' to 'thinking and doing', *Canadian Medical Education Journal*, 3, 2, pp. e86-e97.
- Boström, L. (2011) Students' Learning Styles Compared with their Teachers' Learning Styles in Secondary Schools, *Institute for Learning Styles Research Journal*, 1, pp. 17-38.
- Breckler, J., Joun, D. & Ngo, H. (2009) Learning styles of physiology students interested in the health professions, *Advances in Physiology Education*, 33, 30-36.
- Cortright, R.N., Collins, H.L. & DiCarlo, S.E. (2005) Peer instruction enhanced meaningful learning: ability to solve novel problems, *Advances in Physiology Education*, 29, pp. 107-111.
- Cortright, R.N., Collins, H.L., Rodenbaugh, D.W. & DiCarlo, S.E. (2003) Student retention of course content is improved by collaborative-group testing, *Advances in Physiology Education*, 27, pp. 102-108.
- DiCarlo, S.E. (2009) Too much content, not enough thinking, and too little FUN! *Advances in Physiology Education*, 33, pp. 257-264.
- Dobson, J.L. (2010) A comparison between learning style preferences and sex, status, and course performance, *Advances in Physiology Education*, 34, pp. 197-204.
- Eggen, P.D. & Kauchak, D. (2004) *Educational psychology: Windows on classrooms* (6th ed.). Upper Saddle River, NJ: Merrill Prentice Hall.
- Fleming, N.D. (2006) V.A.R.K Visual, Aural/Auditory, Read/Write, Kinesthetic, New Zealand: Bonwell Green. Mountain Falls.
- Fleming, N.D. (2011) VARK: a Guide to Learning Styles [Online] Available at <http://www.vark-learn.com/english/page.asp?p=questionnaire> [Accessed January 2011].

- Johnson, M. (2009) Evaluation of Learning Style for First Year Medical Students, *International Journal of Scholarship of Teaching and Learning*, 3, 1, pp. 1e-15e.
- Kuh, G. (2008) Diagnosing why some students don't succeed, *Chronicle of Higher Education*, 55, A72.
- Kumar, L.R., Voralu, K., Pani, S.P. & Sethuraman, K.R. (2009) Predominant Learning styles adopted by AIMST University students in Malaysia, *South East Asian Journal of Medical Education*, 3, 1, pp. 37-46.
- Laight, D.W. (2004) Attitudes to concept maps as a teaching/learning activity in undergraduate health professional education: influence of preferred learning style, *Medical Teacher*, 26, pp. 229–233.
- Leite, W.L., Svinicki, M. & Shi, Y. (2010) Attempted Validation of the Scores of the VARK: Learning Styles Inventory With Multitrait-Multimethod Confirmatory Factor Analysis Models, *Educational and Psychological Measurement*, 70, pp. 323-339.
- Lujan, H.L. & DiCarlo, S.E. (2006) Too much teaching, not enough learning: what is the solution? *Advances in Physiology Education*, 30, pp. 17–22.
- Lujan, H.L. & DiCarlo, S.E. (2006) First-year medical students prefer multiple learning styles, *Advances in Physiology Education*, 30, pp.13-16.
- Nuzhat, A., Salem, R.O., Quadri, M.S.A., Al-Hamdan, N. (2011) Learning style preferences of medical students: a single-institute experience from Saudi Arabia, *International Journal of Medical Education*, 2, pp.70-73.
- Pallapu, P. (2007) Effects of Visual and Verbal Learning Styles on Learning, *The Institute for Learning Styles Research Journal*, 1, pp. 34-39.
- Saeed, M. (2007) Education System of Pakistan and the UK: Comparisons in Context to Inter-provincial and Inter-countries Reflections, *Bulletin of Education & Research*, 2007, 29, 2, pp. 43-57.
- Shah, C., Patel, S., Diwan, J. & Mehta, H. (2012) Learning habits evaluation of first M.B.B.S students of Bhavnagar medical college, *International Journal of Medicine and Public Health*, 1,2, pp. 81-86.
- Shukr, I., Zainab, R. & Rana, M.H. (2013) Learning styles of postgraduate and undergraduate medical students, *Journal of the College of Physicians and Surgeons Pakistan*, 23, 1, pp. 25-30.
- Slater, J.A., Lujan, H.L. & DiCarlo, S.E. (2007) Does gender influence learning style preferences of first-year medical students? *Advances in Physiology Education*, 31, pp. 336-342.
- Teunissen, P. Westerman, M. Opportunity or threat: the ambiguity of the consequences of transitions in medical education, (2011) *Medical Education*, 45, pp.51-59.
- Yeo, S.H., Lee, K.W., Chang, B.H., Kang, E., Kang, D.S., Kwak, Y.S., Kim, B.W., Lee, Y.C., Lee, J.M., Cho, H.J. & Chung, J.M. (2006) Learning Styles in Medical School, *Korean Journal of Medical Education*, 18, 1, pp. 31-39.