ORIGINAL ARTICLE

Learning Styles of Postgraduate and Undergraduate Medical Students

Irfan Shukr[1], Roop Zainab[2] and Mowadat H. Rana[3]

ABSTRACT

Objective: To compare learning styles of undergraduate and postgraduate medical students.

Study Design: Observational, comparative study.

Place and Duration of Study: Department of Medical Education, Army Medical College, NUST, Rawalpindi, Pakistan, during February and March 2012.

Methodology: A total of 170 students were divided into two equal groups of undergraduate students of Army Medical College, and postgraduate students of Armed Forces Post Graduate Medical Institute, Rawalpindi. Learning Style Questionnaire (LSQ) was used to assess and categorize the participants into Honey and Mumford classification of learning styles. The responses of each student ranging from 'very strong,' 'strong', 'moderate', and 'low' preference towards activist, theorist, reflector and pragmatist learning styles were compiled. The two groups were compared using SPSS version 17, using Fisher's exact test and the chi-square test. A p-value of < 0.05 was considered significant.

Results: Preferences for all four learning styles were present in both groups. The results reveal an overall statistically significant difference in the 'very strong' preference in learning styles between the two study groups ($p=0.002$). Among the undergraduate students, 45% had a very strong preference for being an activist, whereas in postgraduate students, 38% had very strong preference for reflector, and 35% for theorist. This was statistically significant for activist, and reflector, and attained a p-value of < 0.001, for activist, and of 0.018 for reflector. The most uncommon 'very strong', and 'strong preference' for learning style was pragmatist in both undergraduate and postgraduate students.

Conclusion: Diversity of learning styles at undergraduate and postgraduate level of medical education calls for multiplicity of instructional and assessment modalities to match them. The learning styles amongst the undergraduate medical students are different from the postgraduates. The postgraduates commonly have the reflector learning style while the undergraduates are predominantly activists and theorists.

Key words: *Learning styles. Learning style questionnaire. Undergraduate. Postgraduate. Activist. Reflector. Theorist. Pragmatist.*

INTRODUCTION

Learning styles are stable traits that influence a learner's information processing and thus his cognition in terms of attention, perception and thinking. They even influence a person's learning behaviour in groups, problem solving, and interaction with educators. Largely subconscious, the preferred learning styles tend to vary.[1] Sadler-Smith defined learning style as "a distinctive and habitual manner of acquiring knowledge, skills and attitude through study or experience".[2]

Learners and educators can derive clear benefits by identifying and evaluating an individual's preferred learning style.[3] The commonly referred modes in this regard have their roots in the neuro-linguistic programming (NLP) theory which proposes three learning styles: visual, auditory and kinesthetic. Pask divided the learners into serialistic (analytic) and holistic (gestaltic) types on the basis of their learning styles.[4] Less complex classifications divide learners based on bipolar constructs into convergers and divergers, holists and serialists, and assimilators and accommodators.[5]

Honey and Mumford proposed a classification of learning styles into activists, reflectors, theorists, and pragmatists for all types of learners.[6] Each of these learning styles has its own suitable instructional strategy (Table I). Newble and Entwistle's model of processes of teaching and learning styles has shown a clear link between the two.[7] When matched, they can result in enhanced learning. Valley showed that the use of a single instructional strategy for all types of learning styles undermines the learning process.[8] To enhance the link between the learning styles and instructional strategies, Groat and Musson placed the learning styles of Honey and Mumford within a matrix of bipolar constructs of safety-challenge and concrete-abstract and arrived at similar conclusions.[9]

Honey and Mumford showed that pragmatic learners learn when issues of learning are practical, and concrete.

[1] *Department of Surgery / Medical Education[2], Armed Forces Postgraduate Medical Institute(AFPGMI), Rawalpindi.*

[3] *Department of Medical Education, Army Medical College, NUST, Rawalpindi.*

Correspondence: Prof. Brig. Mowadat H. Rana, 117 A, Westridge I, Rawalpindi Cantt.
E-mail: mhrana786@gmail.com

Received April 26, 2012; accepted July 04, 2012.

Activists learn in an environment of new, varied and continued activity. Reflectors learn best when learning activity provides them opportunity to think and reflect upon what is being taught. Theorists learn when they have time to analyze and synthesize ideas.[7,8]

A major challenge in undertaking research on learning styles is measuring and identifying learning styles through the use of reliable, sensitive and specific psychometric tools. The two most robust psychometric tools advocated, measuring the Honey and Mumford's and Kolb's learning styles are the Learning Style Inventory (LSI), and the Learning Style Questionnaire (LSQ). The validity and reliability of LSQ varies in different studies but has been found to be higher than LSI.[11-13] LSI has a higher predictive validity. LSQ is largely considered a useful and a more potent tool to measure the learning styles of students from diverse backgrounds. Kappe *et al*. showed that data generated by the use of LSQ can be effectively used to generate appropriate and matching learning activities and instructional strategies.[13]

An exhaustive literature search revealed that a study of the learning styles of postgraduate and undergraduate medical students in Pakistan has never been attempted so far. A comparison of learning styles of these two groups at different stages of their profession has also not, hitherto, been reported elsewhere. Such a comparison is crucial in the wake of a longstanding concern that medical students here are surface learners who tend to rote memorise. This approach to learning is indeed a barrier in a profession that demands problem solving skills, regular update of knowledge and highly professional attitudes. One of the first steps towards changing the superficial/surface learners into deep learners is to assess their learning styles and then to modify them. It is also important to identify any shifts or changes in learning styles amongst the medical students during their undergraduate and postgraduate years.

The aim of this study was to identify and compare the learning styles of undergraduate medical students with postgraduate trainees.

METHODOLOGY

The study was conducted on postgraduate students of Armed Forces Post Graduate Medical Institute and the undergraduate students of Army Medical College, Rawalpindi in February and March 2012.

It is an observational, comparative design. The students were divided into two groups. Group 1 consisted of 85 undergraduate students of the final year class of Army Medical College. Group 2 consisted of 85 postgraduate students of Armed Forces Post Graduate Medical Institute, in their first two years of training in various specialties. Group 2 students were former graduates of Army Medical College. Both the groups were sampled using convenient sampling technique.

Learning Style Questionnaire (LSQ) was used to assess and categorize the participants into Honey and Mumford classification of learning styles.[6,10]

The two groups of students were assessed separately after taking their consent. Each group was assembled in a hall, where the authors explained the purpose and aim of the study. The format of LSQ was explained, and necessary clarifications were made to address the queries raised by the participants. The participants were given the choice to either enter their personal identification data or to leave the form anonymous. An informed consent was sought after a re-assurance that the individual data gathered will remain confidential and will not be shared with their respective training institutions. Each group was given 30 minutes to fill the questionnaire.

The questionnaire of each student was analyzed and used to measure their very strong tendency, strong tendency, moderate tendency, and low tendency towards a particular learning style.

The scores were analyzed for each student to categorize him or her to one of the four learning styles described by Honey and Mumford: activist, reflector, pragmatist, and theorist.[10]

The responses of the undergraduate and postgraduate learners were assessed on the basis of their preferred (very strong preference, strong preference, moderate preference and low preference). The scores assigned to each category were compiled.

The two groups were compared using Statistical Package for Social Sciences (SPSS) version 17, using Fisher's exact test and the chi-square test. A p-value of < 0.05 was considered significant. The gender distribution was measured as proportion and percentages.

RESULTS

There was a slight preponderance of male participants in both groups, but the difference was not statistically significant ($p = 0.53$, Figure 1).

Preferences for all four learning styles were present in both groups (Table II).

The results revealed an overall statistically significant difference in the 'very strong' preference in learning styles between the two study groups ($p = 0.002$).

A marked statistical difference was seen in a very strong preference for two of the four learning styles in the undergraduate versus postgraduate students. Among the undergraduates, 45% students had very strong preference for being activist, whereas in postgraduate students, 38% students had very strong preference for reflector, and 35% for theorist. This was statistically significant for activist and reflector, and attained a p-value of less than 0.001 for activist, and p-value of 0.018 for reflector (Table II).

Table I: Educational activities linked with learning styles.

Learning style	Learns best when	Learns least when
Activist	Involved in problem based learning, case based learning, clinical rotations.	Listening to lectures passively.
	Group assignments.	Individual library / internet searches
	Hands-on experience as member of a health team.	Participating in academic research, and theoretical tasks.
	Interactive, task-based ward rounds, bedside teaching, implementation of clinical decisions, practicum, patient - management.	Collecting evidence, drawing guidelines.
Reflector	Member of a health team as observer, developing creative solutions, Self critique and analysis.	Repetitive group tasks / implementation of clinical decisions made by others, Repeated term / surprise tests, and examinations.
	Rotations in endoscopy units, surgery theatres, ITC, CCU and diverse / innovative settings.	Running OPDs, Emergency duties, mundane chores, ward routines.
	History taking which includes clinical decision making.	Busy out-patients.
	Assisting in therapeutic interventions.	Independent decision-making, in early part of training.
Theorist	Active member of health team from beginning of training.	Independent history taking, and interacting with patients without guidance.
	Shadowing consultants, therapeutic, and intervention teams.	Wandering in ward without structured, and clear assignments.
	Actively participating in discussions about clinical decision-making.	Doing without prior observation, or demonstration.
	Participating in interactive discussions.	Lack of diversity of mode of information transfer, or assessment tools used.
Pragmatist	Activity based experiential learning, hands on training, PBL.	Routine outpatient duties, departmental administrative, non-academic tasks etc (when there is lack of link between activity, and assessment).
	Observing, or assisting patient management from day one. Structured, well organized learning activities such as workshops, symposia, group discussions.	Unsupervised, unstructured learning activities.
	Skills lab, mentoring, shadowing, psychomotor skills under direct supervision.	Lectures, meetings.

Table II: Comparison of learning styles of undergraduate, and postgraduate students.

Learning styles	Two groups				p-value
	Undergraduate		Postgraduate		
	n = 85	%	n = 85	%	
Very strong preference					
Activist	38	45	14	16	< 0.001
Reflector	18	21	32	38	0.018
Theorist	21	25	30	35	0.132
Pragmatist	08	09	07	08	0.787
Strong preference					
Activist	12	14	20	24	0.116
Reflector	25	29	16	19	0.107
Theorist	26	31	33	39	0.259
Pragmatist	21	25	16	19	0.353
Moderate preference					
Activist	14	16	23	27	0.094
Reflector	19	22	22	26	0.591
Theorist	24	28	09	11	0.004
Pragmatist	27	32	31	36	0.518
Low preference					
Activist	20	24	29	34	0.128
Reflector	20	24	14	16	0.250
Theorist	15	18	12	14	0.529
Pragmatist	30	35	30	35	0.999

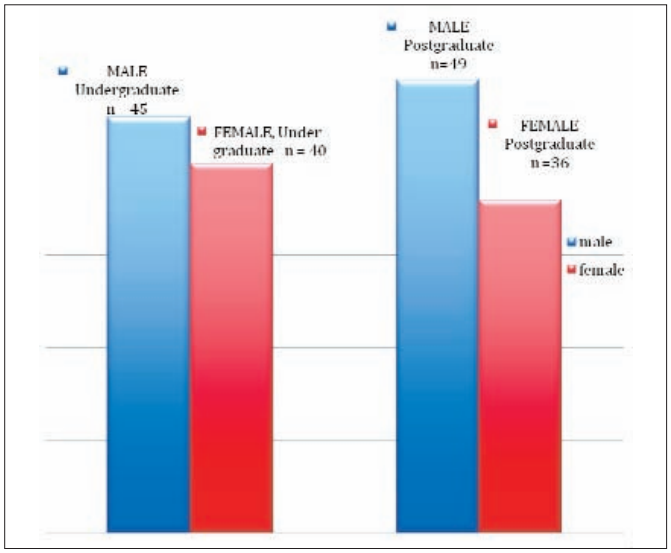

Figure 1: Comparison of learning styles of undergraduate and postgraduate students.

Results of comparison of associated learning styles, which included strong, moderate, and low preferences for learning styles were at variance with very strong preference. There was no statistically significant difference amongst the two groups concerning majority of these associated learning styles. However, 28% undergraduate students had 'moderate' preference for theorist, as compared to 11% postgraduate students. This was of statistical significance, and attained a p-value of 0.004 (Table II).

The most uncommon 'very strong', and 'strong preference' for learning style was pragmatist in both undergraduate, and postgraduate students (Table II).

The sequence of 'very strong' preference for learning style in undergraduates was activist, theorist, reflector and pragmatist. In postgraduates students the sequence was reflector, theorist, activist and pragmatist (Table II).

DISCUSSION

To the best of our knowledge, this comparative study of Honey and Mumford's approach to learning styles of undergraduate and postgraduate medical students is the first of its kind being reported in literature. Using the Learning Styles Questionnaire (LSQ), this study of 170 such students show the presence of all the four learning types namely activists, theorists, reflectors and pragmatists across both the study groups. While, there are no studies focusing on medical students alone, learners from various other professions and at different levels support the presence of these learning styles across cultures and educational standards.[14-17] This highlights the strength of Honey and Mumford's classification of learning styles.

Various authors have emphasized that the true purpose of identifying these diverse learning styles is to have matching teaching strategies and appropriate assessment methods. The presence of four different learning styles (in variable proportions) in a class shows that having a single teaching methodology for an entire MBBS class or a postgraduate group will be inappropriate. The results of this study show that such an approach would at best serve only sixty percent of the learners, that too if the teaching activity is designed for the commonest learning style in the class. The results in both the groups support a use of diverse modes of information transfer (MITs). Such an approach is likely to have maximum 'yield' in terms of transfer of knowledge, skills and attitudes amongst health professionals. Table I proposes a list of MITs that can be used to cover a diverse group of learning styles in a given group of undergraduate or postgraduate students.

The most interesting finding of this study is a statistically significant difference in the learning styles of the two study groups i.e. undergraduates (group 1) and the postgraduates. While the undergraduates are predominantly activists, the postgraduates are reflectors.

This clear divide cannot be compared with other studies, as there are none on medical students that the authors could find in their literature search. However, comparing this data with other studies, elsewhere, shows that the most common learning style amongst professional learners is reflector and pragmatist. This difference could be explained on account of social and cultural factors and the peculiarities of the educational system as compared to other regions of the world. While, the NLP approach towards learning styles emphasizes a genetic and an early developmental neuroplasticity as the basis of learning styles, other theorists have emphasized the role of learning milieu, assessment methods, and curricular design on preferred approaches to learning.[4,6] It is, therefore, safe to assume that the statistically significant difference in the learning styles of undergraduates and postgraduates could be attributable to the vast difference in curricular philosophies, learning milieu, modes of information transfer and assessment methods employed at these two levels of training. While, the Pakistan Medical and Dental Council (PMDC) continues to emphasize spiral and horizontal integration of basic, preclinical, and clinical sciences, the traditionalists and old guard continues to give fewer opportunities to inspire the desirable learning styles of activists or reflectors.

This study shows that amongst the undergraduate medical students, the most preferred learning style is activist. Almost sixty percent of the learners in an undergraduate class (group 1) are activists (using 'very strong' and 'strong' preference). The postgraduates (group 2) most commonly are reflectors. There is a significant difference between the two groups in these two styles. While, there is no data to compare these

results amongst the medical students, most other studies on non-medical learners and professionals show the learners at various stages to be mostly reflectors and pragmatists.[14-17]

The difference in the results between our group of undergraduate medical students and learners elsewhere could be cultural. De Vita's study of the impact of cultures and social factors supports this explanation. He showed that the learning styles tend to vary according to cultural and ethnic background of learners.[18]

Interestingly, the study population of undergraduates was different from most learners around the world as they were largely activists. This difference could be on account of the size of the population, the peculiarities of the institution they were studying in, or the curricular demands. As the study group 1 belonged to the final year class of MBBS, it could also reflect the demands on a medical student at this particular stage of education. The results may, therefore, not be representative of medical students at other stages of learning.

The postgraduates (group 2), were found to be largely reflectors. If the two options of 'very strong' and 'strong' are combined, then more than two-third of postgraduates in the study population were reflectors. Theorists closely follow this learning style. This finding is in line with other studies which show that the two most common learning styles amongst postgraduates are reflectors, and theorists.[14-17]

Surprisingly, the teaching and assessment techniques at the undergraduate and postgraduate levels do not match the two commonest learning styles of the students.[19] There is a particularly clear disconnect at the undergraduate level where the predominantly activist learners who are likely to benefit from clinical activities, hands-on-training and can learn best as active members of the health team from the very beginning, are made to spend the best of their first four years in dissection halls, lecture theatres, labs and libraries.

The postgraduates, however, appear to be at an advantage. The newly implemented Residency Programme and Structured Training Programme (STP) of College of Physicians and Surgeons, Pakistan (CPSP) is far more supportive of reflective and theorist learning styles. These STPs give postgraduates a chance to be an active and a potent member of the health team, who is involved in active clinical decision-making, and is made in-charge of the therapeutic process from the very first year of training. His active shadowing of his supervisor, interactions with senior trainees, fellow members of the health team, and maintaining of e-log books reflecting his completion of well defined clearly listed tasks, are all supportive of the reflective and theorist learning styles. It is safe to conclude that the postgraduate training is more sensitive and responsive to individual learning styles as compared to the teaching and training opportunities available to the undergraduate students.

The study shows a significant difference in the two groups in the preferred learning style of reflectors. The postgraduates are more likely to be reflective learners as compared to the undergraduates. This takes them closer to the learning style seen most commonly amongst learners in the rest of the world.[14-17] This could well be on account of the above mentioned difference in the MITs and teaching and assessment methodologies adopted for undergraduate students and the ones in use for postgraduates (group 2). This shift could also be on account of the difference in the learning philosophies and curricula of undergraduate and postgraduate studies in Pakistan. While, the PMDC decides the learning objectives and assessment processes for the undergraduates, the Structured Training Programmes/ Residency Programmes for the postgraduate medical students of Pakistan are the domain of the CPSP. Both the institutions follow different curricular philosophies. This may be a contributory factor in the difference and a shift in the preferred learning style amongst the postgraduates. Barton has adequately demonstrated the link between the learning styles and the teaching processes, thus supporting the relationship that exists between learning styles of our study population and the institutions governing their curricular philosophies.[20]

The surprising finding in this study was the lowest preference for pragmatist as a learning style. An objective or a theoretical comparison of the four learning styles might prompt that medical students at all stages, particularly once they qualify as doctors, would have this as the commonest learning preference. This suggests that our current curricular philosophies and training programme at both undergraduate and postgraduate level do not encourage this learning style. Most other learners in the world tend to have reflector and pragmatist as the commonest learning styles. While, this difference could be sociocultural, the shift of postgraduates to pragmatist learning style highlights the importance of STPs in influencing the preferred learning styles amongst learners. The most uncommon learning style is pragmatists, with only one-third in undergraduates and one-fifth in postgraduates (n = 34 in undergraduates, n = 23 in postgraduates).

This study shows that the Honey and Mumford learning styles can be effectively used to map a class and to design a teaching strategy. This study provides such a mapping of an undergraduate and a postgraduate class. In order of frequency, the study suggests activist-theorist-reflector-pragmatist model for undergraduate students and a theorist-reflector-activist-pragmatist model for the postgraduates.

Table I, can be used to then draw appropriate teaching methods for diversifying the MITs. Gibbs had shown that such an approach to student learning can have a positive qualitative impact.[21]

CONCLUSION

There are diverse learning styles operative at undergraduate and postgraduate level of medical education. This calls for multiplicity of instructional and assessment modalities to match them. While the postgraduates commonly have the reflector learning style, it is much less amongst the undergraduates. The latter are predominantly activists and theorists. The most desirable learning style for medical professionals i.e. pragmatists and reflectors are the ones least common amongst the undergraduate learners. The relatively higher preference for reflectors at the postgraduate level could be on account of the newly introduced STPs and Residency Programe of CPSP.

Limitations of the study: While this is the first ever study that compares learning styles of a statistically significant number of undergraduate and postgraduate medical students (85 in each group), both the groups belonged to military institutions with their own peculiarities. The findings may, therefore, be difficult to generalize with students from civil, public and private training facilities.

REFERENCES

1. Horner D. Expectations of the student. In: Graves D. The hidden curriculum in business studies. Chichester: *Higher Education Foundation;* 1983.
2. Sadler-Smith E. Learning styles and instructional design. *Innovat Educ Train Int* 1996; **33**:185-93.
3. Holden R, McGrath J. Shadowing for self development. *J Further Higher Educ* 1992; **16**:40-9.
4. Pask G. Learning styles and strategies. *Br J Educ Psychol* 1076; **46**:4-11.
5. Kolb DA. Experiential learning experience as a source of learning and development. London: *Prentice Hall;* 1984.
6. Honey A, Mumford P. A manual of learning styles. Maidenhead: *Peter Honey Learning*; 1992.
7. Newble D, Gordon M. Learning style and approaches: implications for medical education. *Med Educ* 1986; **20**:162-75.
8. Valley K. Learning styles and courseware design. *Assoc Learn Tech J* 1997; **5**:42-51.
9. Groat A, Musson T. Learning styles: individualizing computer based learning environments. *Assoc Learn Tech J* 1996; **3**: 53-62.
10. Honey P, Mumford A. Learning style questionnaire. Using your learning style. Maidenhead: *Open University Press;* 1986.
11. Willcoxson L, Prosser M. Kolb's learning inventory (1983): review and further study of validity and reliability. *Br J Educ Psychol* 1996; **66**:247-57.
12. Wilson D. An investigation of Kolb's learning style inventory. *Leadership Organ Dev J* 1986; **7**:3-15.
13. Kappe FR, Boekholt L, Rooyen D, van der Flier H. A predictive validity study of the learning style questionnaire (LSQ) using multiple, specific learning criteria. *Learn Indiv Diff* 2009; **19**: 464-7.
14. Nasir SAN, Mohammad S. The learning styles of early adult students from different cultural backgrounds in Malaysia [Internet]. 2009. Available from: http://www.ou.nl/Docs/Campagnes/ICDE2009/Papers/Final_paper_550abdulnasir.pdf
15. Lesmes-Anel J, Robinson G, Moody S. Learning preferences and learning styles: a study of Wessex general practice registrars [Internet]. 2001. Available from: http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1314048/pdf/11462316.pdf
16. Mariam W. Learning styles and retention and achievements on a two-year A-level programme in a further education college [Internet]. 2003. Available from: http://www.voced.edu.au/content/ngv37758
17. Halstead A, Martin LM. Learning and thinking styles: a tool for engaging engineering students with their studies [Internet]. 2001. Available from: http://www.hull.ac.uk/engprogress/Prog1Papers/CoventryHalstead.pdf
18. De Vita GD. Learning styles, culture and inclusive instruction in the multicultural classroom: a business and management perspective. *Innov Edu Teach Int* 2001; **38**:165-74.
19. Peterson ER, Rayner SG, Armstrog SJ. Herding cats: in search of definitions of cognitive styles and learning styles [Internet]. 2009. Available from: www.elsinnews.com
20. Graf S, Chien LT. Supporting teachers in identifying students' learning styles in learning management systems: an automated student modeling approach. *J Educ Tech Soc* 2009; **12**: 3-14.
21. Barton A. An exploration of teacher sensitivity to learning styles of students: a need for development [Internet]. 2012. Available from: www.uwispace.sta.uwi.edu/dspace/handle/2139/12377.