

Learning Approaches and Academic Performance of Undergraduate Medical Students in Pakistan

Zoon Naqvi, Rashida Ahmed (Department for Educational Development, Aga Khan University. Karachi.)

Abstract

Objective: To classify undergraduate medical students according to their learning approaches and to correlate the learning approaches with their academic achievements.

Materials and Methods: A questionnaire to appraise learning approaches of undergraduate medical students was administered and collected at the end of the regular certifying examinations. The responses were analysed through the principal component factor analysis.

Results: The results did not depict formation of demonstrable learning approaches during academic years. However, increased self-awareness about the approaches was indicated by the responses of final year students as compared to the third year students. The correlation of the learning approaches with the scores of the certifying examination and a mock test (consisting of specially developed integrated questions), through multivariate analysis depicted statistically insignificant results.

Conclusion: There was a non-significant relationship between the learning approaches and academic performances and a weak statistical significance between achievement, orientation and performance in certifying examination. It is essential that along with changes in the instructional and assessment strategies awareness should be created in students about various learning approaches (JPMA 50:20, 2000).

Introduction

A simplified model of classification of students' learning approaches recommends categorisation of approaches as superficial deep and strategic¹. Surface approach is motivated by a concern to pass the examinations and the predominant process in acquiring it seems to be rote learning; deep learning is characterised by a keen interest in the subject material, an attempt to understand the material is the motivation behind the approach; whereas strategic approach involves using a combination of surface and deep approach depending on the motivation and task at hand^{1,2}.

Emilia and MulHolland³ and Davis and Sales⁴, report that medical and science students generally score higher on the surface (rote) orientation as compared to the arts students. They suggest that selection of science and medical students, mainly based on academic excellence, incorporates competitiveness in their learning characteristics. Consequently, these students generally adopt a surface approach to rapidly acquire facts necessary to do well in an examination, whereas the same students may use a deep approach if given more time and different circumstances (strategic learners).

Several authors have indicated and advocated significant effect of learning approaches on students' academic performances. Arnold and Feighny⁵, Wells and Higgs⁶ and Cust⁷ have reported a consistent predictive pattern in the relationship between students' learning approaches and performances. The former report, that students scoring high on achievement motivation (efficient study habits and an extrinsic need to succeed) but scoring low on reproducing orientation (rote memory) and globetrotting (a fragmented approach to studying) achieved higher grade-point averages in years 1 2 and 4 than did their counterparts who scored low on achievement motivation and high on reproducing orientation globetrotting.

Coles⁸, and Newble and Clark⁹ showed that traditional curricula support and encourage surface and strategic approaches rather than the deep approach. Coles¹⁰, further reports that the much sought after

integration and elaboration by the medical educators does not necessarily occur because of the way the courses are arranged or because of the clinical attachments but because of the timing of an examination and the effect it has on their study pattern. Accordingly, to classify students of the undergraduate program of the Aga Khan University (AKU) Medical College according to their learning approaches and correlate the resulting characteristics with their academic performances, the present study was conducted.

Background

Students of the undergraduate medical program enter the institution after twelve years of different schooling systems with a mean age of 18 ± 1 years. This program has a 5-year curriculum that stresses development of self-directed learners with problem-solving abilities.

The content of the curriculum hovers on the verge of being integrated. The selection process aims to pick cream of the nation. It is presumed that the students admitted possess a high level of intellectual capabilities to become life long learners with stable learning approaches.

It was further hypothesised that students who use a superficial learning approach perform better in subject oriented recall certifying examinations as compared to those who use a deep approach.

Materials and Methods

The present experimental and correlational study was conducted at AKU, Karachi, in July and September 1997. All students of the third year and fifth year were invited to respond. However, as participation was voluntary, usable responses really became a sample of convenience. One hundred and twenty-six students of third (seventy-five) and final (fifty-one) year participated in the study.

The questionnaire

a) Development of questionnaire

The initial questionnaire, containing a Likert's rating scale (1 to 5, 1 for strongly agree and 5 for strongly disagree) developed for the purpose was pre-tested among a randomly chosen group of 40 students (voluntary participation through student representatives) belonging to the first to fifth years. The students found that it was difficult to answer objectively, due to the response scale and as each question or item could be interpreted differently and each was probing multiple aspects.

A second questionnaire was developed, keeping in view the suggestions made by the students and was derived from the inventory developed by Ramsden".

Input was obtained from faculty and students during the development of questionnaire. The new questionnaire required only yes or no response to simple direct questions.

The new questionnaire was pilot tested among a group of 30 students (who had also completed the first questionnaire). They felt that the questionnaire was not difficult and had no obvious ambiguities.

b) Rationale for items

Arnold and Feighny (1995)⁸ devised descriptors to summarise the items of the inventory. The dimensions and their descriptions are: (1) Achievement motivation efficient study habits driven by an extrinsic need to succeed; (2) Reproducing Orientation - rote memory; (3) Meaning Orientation - a search for deep understanding of the subject plus a need to succeed; (4) Comprehension - a search for connections and relationships in the material; (5) Globetrotting - a fragmented approach to studying; (6) Logic - a stress on rationality rather than intuition to reach conclusions and (7) Improvidence - (lacking foresight for the future, heedless, incautious) undue caution in developing main ideas, grouping them under the above mentioned descriptors.

The questions were developed with an intention of

c) Itemised account of the questions

Questions No. 1 and 2 were designed to gauge students'⁷ reliance on didactic lectures and photocopied handouts about the lecture content for learning and represented the reproducing orientation of Arnold

and Feighny⁸.

Questions No. 3 and 4 assessed students preferences to study alone (decreasing opportunities for discussion).

Questions No. 5 and 6 attempted to test the reliability of the responses to the previous items. The internal reliability alpha for the responses for third year and final year was 0.12 and 0.08 respectively. Questions No. 7 and 8 aimed at finding whether students desired to get a comprehensive understanding of the subjects or were using just a fragmented approach to obtain the basic facts.

Questions No. 9 and 10 attempted to probe the approach of the students towards integrating and applying the concepts to develop an understanding.

Question No. 11 assessed the utilisation of short-term memory (rote learning) for examinations.

Questions No. 13 and 14 probed development of concepts regarding the importance of interactive learning, understanding misconceptions and their need to clarify and strengthen concepts.

Questions No. 15 to 18 attempted at probing students' awareness about the advantages of interactive learning.

Question No. 19 assessed the students' reliance on short-term memory to get through the examinations.

d) Administration of the questionnaire

At the time of administration of the questionnaire, individual items were discussed with students to clarify ambiguities. This demonstrated that the students clearly understood the questions and did not find any ambiguities in the format and language of the items.

e) The rating Scale

The Yes/No system was used because students found answering through this system more comfortable than a Likert's rating scale.

H. Indicators of Academic Performances

a) Certifying Examinations

Scores obtained in the traditional certifying (summative) examinations in the subjects of Medicine, Surgery and Primary Health Care (final year) and Pathology, Pharmacology and Microbiology (third year) were used. The papers contained traditional, subject specific, single best questions.

b) Mock Examinations

Conducted as a separate examination, after the certifying examinations, the mock consisted of specially developed integrated questions requiring a single best answer intending to probe and assess the capability of students to integrate and apply the learnt knowledge.

III. Analysis

For data storage and calculations computer programs Microsoft Excel and Fox Pro, were used.

Whereas for the statistical analysis and graphs SPSS/PC+ and Microsoft Excel were used. The data was analysed in following stages:

1. A principle component factor analysis was done on the students' responses to the individual items in order to explore the empirical relationship to the various approaches by using the principle component analysis.

2. Multivariate analysis was done to determine the relationship between the learning approaches and academic performances. Correlations were computed between the learning approaches and scores obtained in the actual and mock examinations.

3. Internal consistency of the questionnaire was determined by calculation of Cronbach's alpha.

Results

Response Rate

Fifty-five (91%) out of the 58 students of final year responded to the questionnaire with identification. Whereas in third year 51(75%) students out of a total 68 filled the questionnaire, but only twenty-eight

(4 1%) identified themselves. However the responses to each item by the two groups showed a strong correlation of 0.88 ($p=0.01$).

Table 1. Responses to the Questionnaire

Third year	n=51 Means	standard deviation	Final Year means	n=53 standard deviation
Question 1	0.45	0.374	0.68	0.396
Question 2	0.89	0.278	0.898	0.27
Question 3	0.278	0.24	0.36	0.322
Question 4	0.31	0.278	0.52	0.396
Question 5	0.372	0.332	0.506	0.392
Question 6	0.522	0.406	0.534	0.398
Question 7	0.278	0.24	0.33	0.298
Question 8	0.338	0.312	0.49	0.388
Question 9	0.882	0.3	0.912	0.252
Question 10	0.702	0.41	0.796	0.352
Question 11	0.232	0.156	0.272	0.232
Question 12	0.4	0.356	0.52	0.396
Question 13	0.556	0.406	0.71	0.388
Question 14	0.474	0.394	0.65	0.4
Question 15	0.346	0.33	0.506	0.392
Question 16	0.902	0.272	0.782	0.36
Question 17	0.776	0.368	0.752	0.374
Question 18	0.588	0.408	0.52	0.396
Question 19	0.604	0.408	0.476	0.384

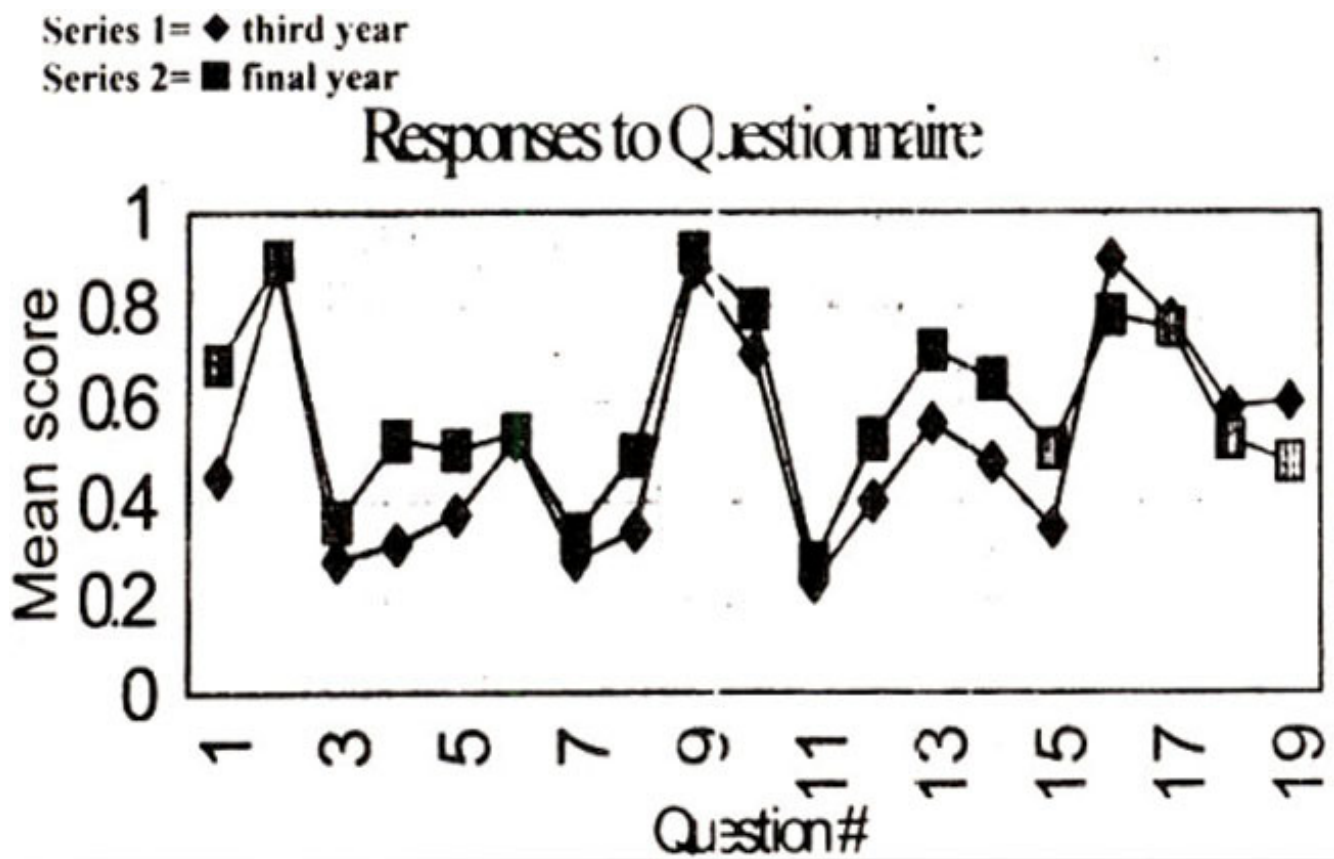
1 was scored for the correct answer and 0 for the incorrect answer according to the key.

Individual comparison of responses to each item by the two groups (Table 2 and Figure)

Table 2. Principle Component Analysis.

Questions Factors	1	2	3	4	5	6	7	8
Memorise Lecture Notes (1)							45	
Memorise Textbooks (2)							77	
Studying Alone (3)	86							
Studying with Partner (4)								
Informative Lectures Notes (5)								78
Lecture Notes for Course (6)						-83		
Studying from Textbooks (7)					-52		49	
Consulting Several Books (8)		81						
Integrating Concepts (9)				66				
Building Relationship				70				
Revision Time (11)		68						
Visualise Textbooks (12)				-53				
Interactive (13)			83					
Enquiring (14)			84					
Reading before a Class (15)		67						
Deep Approach (16)					83			
Comprehensive Learning -1 (17)	47					46		
Comprehensive Learning -2 (18)						50		
Studying to Achieve in Examinations (19)					49			53
Cronbach's alpha	0.41	0.58	0.70	0.29	0.11	0.26	0.20	0.23

Note: all values have been multiplied by 100 and values less than 35 have not been included () indicate the question number.



Figure

depicts increase in positive responses of the final year students as compared to third year. An obvious change is seen in responses to Question No. 1 (memorising lecture notes) and Question No. 19 (studying just before examination). Majority of final year students do not memorise lecture notes whereas majority of the third year students do not study just before examinations. The increased number of responses with identification from the final year class as compared to those from third year also shows development of confidence in the out going students.

Approaches to Learning

For third year students only a group factor analysis for learning approaches could be performed, as it was possible to correlate the learning approaches of the third year students to their performances in the certifying examinations and integrated questions due to small number of identified response to the questionnaire.

Principle-component exploratory factor analysis (Table 2) with rotation extracted eight factors through eigenvalue-one criterion and screen plot indicated that learning approaches dimensions can be further reduced by combining factors 1, 2 and 5 achievement as motivation - a combination of efficient study habits and an extrinsic need to succeed, factor 7 for reproducing orientation - rote memory or surface approach. Factor 4, 3 and 6 for comprehension - a search for connections and relationships in the material and factor 8 for globetrotting - a fragmented approach to studying. The variance for the 8 factors was 70.6% for final year and 68.4% for third year. Nevertheless, the internal reliability alpha was very low for all the factors except Factor 3.

Learning Approaches and Academic Performance

Exclusion of ambiguous (though before filing out the questionnaire the students had felt that the questions were clear) and mutually exclusive questions depicted that a very small portion of the students had a clear understanding of their learning approaches. Most of the students' responses to the questionnaire indicated presence of a mixed or strategic approach, reported by Leiden et al², and Paul,

Bojanczyk and Lanphear¹², which is a combination of achievement, extrinsic and circumstantial motivation (adapting strategies as appropriate to succeed in examinations).
Multivariate analysis, (Table 3)

Table 3. Coefficients through Multivariate Analysis.

Factors		1	2	3	4	5	6	7	8
Examination	Correlation	-0.13	0.30	0.12	0.05	-0.13	0.04	0.20	0.16
	P value	0.35	0.03	0.40	0.73	0.36	0.77	0.15	0.25
Integrated	Correlation	-0.12	-0.00	-0.03	-0.07	0.18	0.00	0.30	0.11
	P value	0.40	0.96	0.81	0.60	0.20	0.96	0.03	0.42

revealed that none of the correlations reached statistical significance.

Table 3 further depicts that correlation of Factor 2 (Achievement Orientation 2) with the certifying examinations and Factor 7 (Surface Approach) with the integrated questions were different from the overall pattern. However, the correlation coefficient was still very small. The value of Alpha was 0.58 for Factor 2 showing some correlation and consistency in the response. But for Factor 7 the value of Alphas was .26, indicating a weak correlation and internal reliability within the responses of the students. Hence correlation of the scores with learning approaches was considered unlikely other than between achievement and examination orientation could be a possibility. Correlation of academic performances with learning approaches could not be demonstrated.

Discussion

Answers to the questionnaire in the present study indicate students' employment of strategic approach towards learning. As analysis of responses to each item separately shows that students memorise facts as well as form concepts and can increasingly do so if required.

The traditional examinations by and large test recall and could be responsible for memorisation of facts handed out in lectures. This becomes the prime objective for learning, as students are confident that examination questions will be directed towards testing the knowledge delivered and acquired during specified lectures.

Likewise, the study investigated and designed by Paul, et al¹² showed that medical students at the United Arab Emirates University preferred teacher-structured learning experiences dealing with concrete and applied tasks, rather than abstract tasks. The cultural and geographical setting of this study is close to Pakistan's cultural and other influential factors. According to Irvine and York¹³ culture and ethnicity are frameworks for the development of learning styles and preferences.

Furthermore, Ernilia and MulHolland³ and Davis and Sales⁴, report that science and medical students, selected mainly on the basis of academic excellence, are strategic learners. Generally they adopt a surface approach to rapidly acquire the facts necessary to do well in an examination, whereas if given more time and different circumstances they too use a deep approach.

Nevertheless Arnold and Feighny⁵, have prompted a revised model of how learning approaches relate to performance. This model incorporated students' initial scores on learning approaches as elements that influence students' perceptions of the educational context. In turn these perceptions have an impact on students' selections of learning approaches that are associated with performance. Contrarily, Leiden et al², who have reported low, nonsignificant positive correlations between learning styles and

performance and have concluded that learning styles are inadequate predictors of academic performances.

Another very strong and influential confounding factor on the results of the present study could be that the questionnaire was not designed according to the traditional Likert's Scale of Measurement, however, Steinnborg and Bandaranayake¹⁴, report that when they compared the short Yes or No, Questionnaire to the standard LASI (Lancaster's Approaches to Study Inventory) they found to significant differences in the findings of the two inventories.

This brings the discussion to an important point where it can be said that learning styles and approaches of the students are important but still these behaviours automatically correct themselves if it is realised that an important component of learning is that the topic or concept studied should be understood.

Irvine and York¹³ advocate that although cultural backgrounds do effect the learning styles, yet cultural practices are learned behaviours that can be unlearned and modified.

Still further when these academic performances were correlated with the learning approaches, no aemonstrable stable learning approach was identified in both the groups.

Whatever irregular patterns of learning behaviour which emerge after factor analysis showed very little nonsignificant relationship between the learning approaches and the academic performances, except for a weak statistically significant correlation between achievement orientation and performance in the certifying examination. Hence, it seems that these students are generally unaware of their cognitive tendencies and become strategic learners.

Using the results positively and taking the bultural background of the students into consideration, it is recommended that along with introducing changes in the instructional and assessment strategies, efforts should be made to create an awareness in the students about various learning approaches.

Reference

- 1.Newble DI, Hejka EJ, Whelan A. The approaches to learning of specialist physicians. *Med. Educ.*, I 990;24: It) 1-9.
- 2.Leiden Li, Crosby RD, Folmer H. Assessing learning styles inventories and how well they predict academic performances. *Acad. Med.*, I 990;65:395-401.
- 3.Emilia O, MulHolland H. Approaches to learning of students in an Indonesian medical school. *Med. Educ.*, 1991 ;25:462-70.
- 4.Davis JEC, Sales GD. Dental and life science students. A comparison of approaches to stttdy and eoursc perceptions. *Mcd. Edne.*, 1996;30:453-59.
- 5.Arnold L, Feighny MK. Students general learning approaches and performances in medical school. A longitudinal study. *Acad. Med.*, 1995;70:715-22.
- 6.Wells D, Higgs ZR. Learning styles and learning approaches of first and foftrlh semester baccalaureate degree nursing students. *J. Nurs. Edu.*,1990;29:385-90.
- 7.Ctst J. A relational view of learning: implications for nurse education. *Nurs. Edu.* Today, 1996;16:256-66.
- 8.Coles CR. Differences between conventional and probleta based curricula in their students approaches to studying. *Med. Edttc.*, 1985J9:308-9.
- 9.Newble DI, Clarke RM. The approaches to learning of students in a traditional and in an innovative problem-based medical school. *Med. Edu.*,1986;20:267-73.
- 10.Coles CR. Elaborated learning in nndergraduate medical education. *Med. Edne.*, 1990;24: 14-24.
- 11.Ratnsden P. The Lancater's approaches to sttadying and course perceptions questionnaire. Oxford, England, Educational Methods Unit, 1983.
- 12.Paul S, Bojaneyk M, Lanphear JH. Learning preferences of medical students. *Med. Ethic.*, 1994;28: 180-86.

13.Irvine JI, York DI. Learning styles and culturally diverse students. A literature review. In Banks JA, Banks CAM. Simon ad Schuster Memillon (eds) Handbook of research on multicultural education. USA, 1995, pp. 484-97.

14.Steinnborg M, Bandaranayake RC. Medical stttdetttts approaches to ststdying Med. Teacher, 1996;18:229-35.