Journal of Cardiovascular Disease Research

ISSN:0975 -3583,0976-2833 VOL 14, ISSUE 12 , 2023

Original research article

Approach to learning and its correlation with the academic performance among medical undergraduate students

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Abstract

Objectives: To identify the approach of learning among medical students and to determine its correlation with their university exam scores.
Methodology: Cross sectional study involving 322 medical students. The approach to learning was assessed using including ASSIST questionnaire and academic performance was determined by results of the previous year university examinations.
Results: 322 MBBS students participated in the study, out of whom 71.1% were females and 28.9% were males and females were predominantly deep learners and males were predominantly surface learners and it was found to be statistically significant (p value= 0.008) in comparing gender and approach to learning. Students predominantly used deep and strategic approaches to studying and there was a slight preference for a supporting understanding type of teaching which is related to deep approach. Approaches to learning differ among different phases of MBBS students and also among the academic (regular/ additional) batches. Deep and strategic learners had better percentage marks compared to surface learners and the results of ANOVA test indicated highly significant difference in percentage marks between the different approaches to learning (p<0.001).
Conclusion: The most frequent approach adopted by students being a deep approach is favourable in terms of medical education. The findings suggest a positive correlation between learning approach and academic performance where students with a deep approach achieve a higher performance and vice versa. Therefore it is recommended that motivating medical undergraduates towards a deeper approach of learning would be beneficial to them in achieving the expected long term goals.
Keywords: Approach to learning, Academic performance, Medical undergraduate students

Introduction

Learning is defined as a relatively permanent change in behaviour that occurs through experience. There are different approaches that people adopt when learning [1]. A learning approach is defined as the process which an individual adopts in their quest for knowledge. While the learning approach is an individual characteristic it is also a potentially malleable way of interacting with the learning environment [2]. The quantity and quality of learning is determined by the approach to learning students adopt. The way that students approach learning plays an important role in determining the outcome of any educational endeavour.

Students learn by relying on understanding, by relying on rote memorization and reproducing memorized information, or by a combination of these methods to varying degrees. There are three main approaches to learning: Deep, Surface and Strategic approaches. The idea of Deep, Surface and Strategic approaches to learning has been in existence for many decades and has been a foundation stone in many researches, formulation of theories and practices, mostly in institutions of higher education. Deep Approach learning is an exciting and gratifying challenge in learning. In this approach students focus on significant issues in a particular topic, and relate their previous knowledge to new knowledge. Basically they read wisely, relating the ideas with another subject, examining logic and arguments carefully and critically; then, checking evidence and relating it to conclusion. Those students who adopt this kind of learning have more systematic organization of ideas, and are able to recall and apply easily the ideas or knowledge.

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Learners who adopt Deep Approach intend to understand information better and usually correlate with more positive academic performance [3]. The deep approach is the most appropriate and desirable way of learning that is closely linked to the intellectual processes we would wish to see in all medical students and is the means of life-long learning [4, 5, 6, 7].

In contrast to Deep Approach, Surface Approach is well known for its rote learning process, focusing only on key words and covering many facts by memorization. Learners of this approach tend to rely heavily on notes, jotted down from what is said in lectures. They memorize the notes without making any effort to link different parts of the information, and they try to reproduce these notes in tests and examinations. Apart from that, they tend to focus on and memorize only specific details rather than to understand all parts of information. Their intention is only to complete the task or learning requirements. Basically, those students who adopt this kind of approach are afraid of failure. They feel under pressure and stressed up. They always worry about their works and normally have poor academic performance [3, 7].

There is another approach of learning known as achieving or Strategic Approach. This approach employs both Deep and Surface Approach. Learners organize their time and working space efficiently and choose appropriate readings or tasks that they think will enable them to get the best marks. This approach is very flexible. If time is short or if the assessment requires memorizations, the learners will adopt Surface Approach as the appropriate tool. When more time is available, the learners will use the Deep Approach and develop deeper understanding. Students who adopt this Strategic Approach are fully alert to any assessment requirements and criteria needed. Learners of this approach try to find out what a teacher wants. They then prepare and try to provide all the information or answers required. It is likely that these students are motivated by fear of failure. Those students who apply Strategic Approach will attempt to maximize their performance and grades [3].

The differences of approaches among students include the aspect of individual thoughts, reactions, interests, preferences, achievements and understanding. Thus, these students have their own style to receive and respond to learning process. Recognition of student's learning approach is important and the focus should be on education because it is a key factor in the formation of an individual [3]. The purpose of the present study is to gain more insight into the relationship between student's approaches to learning and their exam scores [8].

Materials and Methods

- **Study design:** Cross sectional study
- **Place of study:** Conducted at Sree Narayana Institute of Medical Sciences, Ernakulum.
- **Study period:** 4 months (November 2015 to February 2016).
- **Study population:** The participants for this study are IInd, IIIrd and IVth year MBBS students of 2011-2014 academic batches.
- **Sample size:** 322 MBBS students.

Inclusion criteria

- MBBS students who gave written informed consent to participate in the study.
- MBBS students of either sex and irrespective of the academic (regular/ additional) batches were included in the study.

Exclusion criteria

- MBBS students who were not willing to give informed consent.
- Students who remain absent on the day of the study.

Ethical issues: Ethical clearance was obtained from the IRB on 9th February 2016.

A pilot study was conducted at department of Pharmacology on 20 MBBS students (five students from each academic batch who were willing to participate in the study) to validate the ASSIST questionnaire. Students felt that the questionnaire was easy to mark objectively and had no obvious ambiguities and suggestion regarding developing the questionnaire.

Data collection: After obtaining ethical clearance and written informed consent (annexure-1) from students, Participants were briefed as to the objectives of the study, and confidentiality of responses was ensured by maintaining anonymity of responders.

- Learning approach was assessed using Approaches and study skills inventory for students (ASSIST) validated questionnaire (annexure-2).
- The responses to the questionnaire were analyzed according to the scoring system provided by ASSIST questionnaire and each student was given separate scores on deep, strategic and surface approach. The mean score for each approach was calculated and students were identified as deep learners or strategic learners or surface learners based on the score each of them obtained.
- Then each student's learning approach was compared with their academic performance by using

ISSN:0975 -3583,0976-2833 VOL 14, ISSUE 12 , 2023

their previous year university (KUHS) examination marks and percentage.

Assessment tool

ASSIST questionnaire

Entwistle and Ramsden (1982) [9] introduced the Approach to Studying Inventory (ASI), a widely utilized tool for evaluating learning approaches among higher education students. Despite its widespread adoption, ASI has been criticized for limitations related to reliability and validity. To address these concerns, the questionnaire underwent modifications and resulted in the development of the Approach Study Skill for Student (ASSIST). ASSIST was created by Martin and Saljo (1976) [10] in collaboration with Tait, Entwistle, and McCune (1998) [11] as part of the Enhancing Teaching-Learning Environments project in the United Kingdom. This modified version aimed to enhance the instrument's overall effectiveness and address the perceived shortcomings of ASI in assessing students' learning approaches [3].

ASSIST consists of three sections. The first section is a six item measurement of the student's own conception of the term 'learning'. The second section consists of 52 items and students respond to items on a five-point Likert scale where 5=agree, 4=agree somewhat, 3=unsure, 2=disagree somewhat, 1=disagree. These items are designed to measure the three main approaches to learning: deep, strategic and surface apathetic. Each approach to learning comprises of four or five subscales. Each subscale comprises four items. Subscale scores are formed by adding together the responses on the items in that subscale. Scores on the three main approaches are created by adding together the subscale scores which contribute to each approach. The third section of ASSIST is an eight item questionnaire measuring preferences for different types of learning and teaching.

Deep Approach scale contains four subscales which are seeking meaning, relating idea, use of evidence and interest in ideas. Surface Approach scale also includes four items of subscales. The items are lack of purpose, unrelated memorizing, syllabus boundness and fear of failure. The Strategic Approach scale consists of five items, which are organized study, time management, achieving, alertness to assessment demands and monitoring.

The scales are validated and tested for reliability, internal consistency coefficient, Cronbach's alpha for these scales are within acceptable limits.

The scoring procedure follows the rule of Likert scale- 1 (disagree) to 5 (agree). Students respond to items on a 1 - 5 scale. Sub-scale scores are formed by adding together the responses on the items in that sub-scale. Scores on the three main approaches are created by adding together the sub-scale scores which contribute to each approach.

University (KUHS) exam Mark sheet obtained from the college Principal office

Statistical analysis: The statistical analysis was performed by using SPSS, version 15. For continuous variables mean and standard deviation was used and for comparing the mean percentage marks between three groups (deep, strategic and surface learners) ANOVA test was used and post hoc test –Bonferroni correction was used for intergroup comparison. For categorical variables, frequency, percentage was calculated and chi- square test was used for finding the statistical significance. A p value of <0.05 was considered as significant.

Observations and Results

A total of 328 MBBS students participated in the study, of which 6 participants were excluded from the data analysis because of incomplete filling of questionnaire so only 322 study participants were included for statistical analysis.

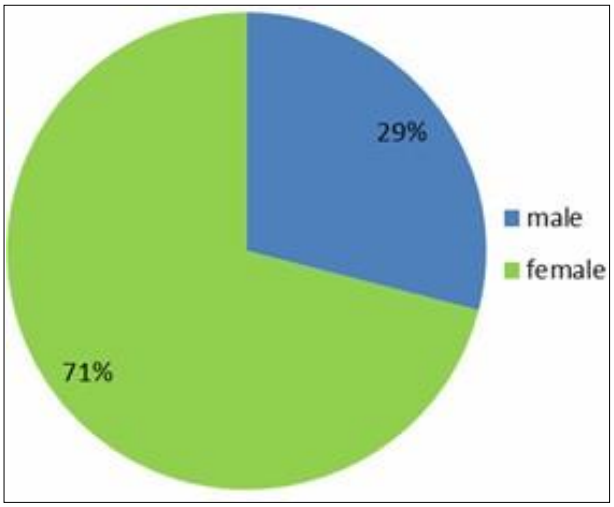

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Fig 1: Gender wise distribution of study participants

Out of 322 study participants, 229 (71.1%) were females and 93 (28.9%) were males.

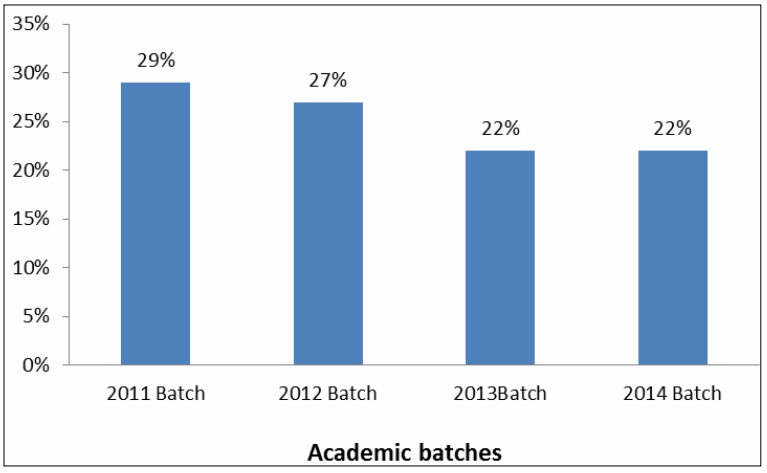

Fig 2: Distribution of study participants according to academic batches

Among 322 study participants 93 (29%) were in final year MBBS belonging to 2011 academic batch, 87 (27%) were in third year MBBS belong to 2012 batch and 71 (22%) were in second year MBBS belong to 2013 batch and 71 (22%) were in second year MBBS belong to 2014 batch.

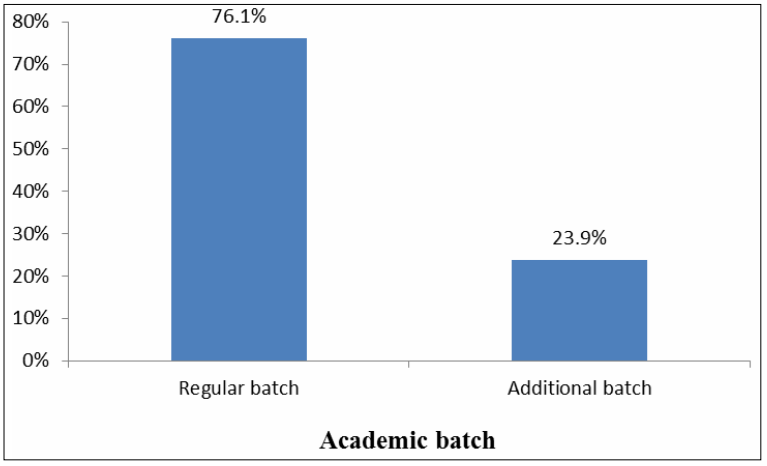

Fig 3: Distribution of study participants according to regular and supplementary/additional academic batch

Out of 322 students 245 (76.1%) were in regular academic batch and 77 (23.9%) were in additional academic batch.

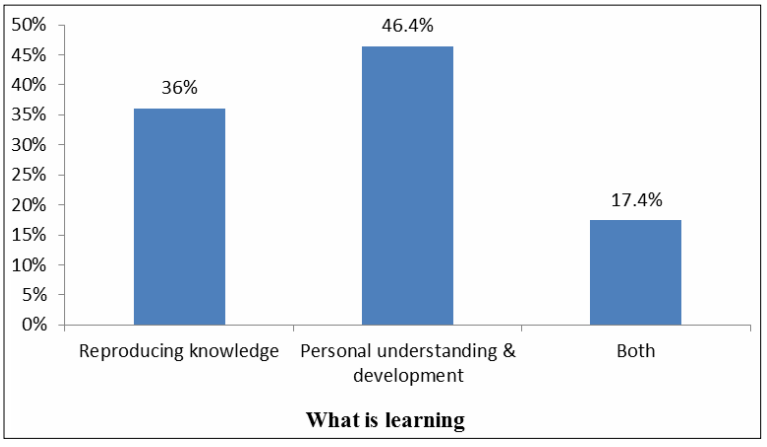

Fig 4: Perception of the study participants on the term 'learning'

Among 322 study participants 150 (46.4%) perceive leaning as personal understanding and development

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and 116 (36%) perceive as reproducing knowledge and 56 (17.4%) perceive learning as both reproducing knowledge and involves personal understanding and development.

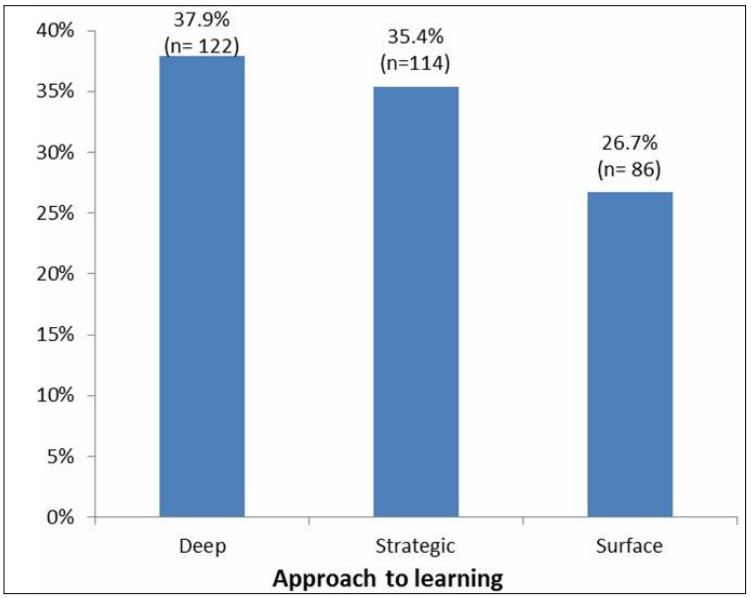

Fig 5: Categorization of study participants based on approach to learning

Among 322 study participants 122 were deep learners (37.9%), 114 (35.4%) strategic learners and 86 (26.7%) surface learners.

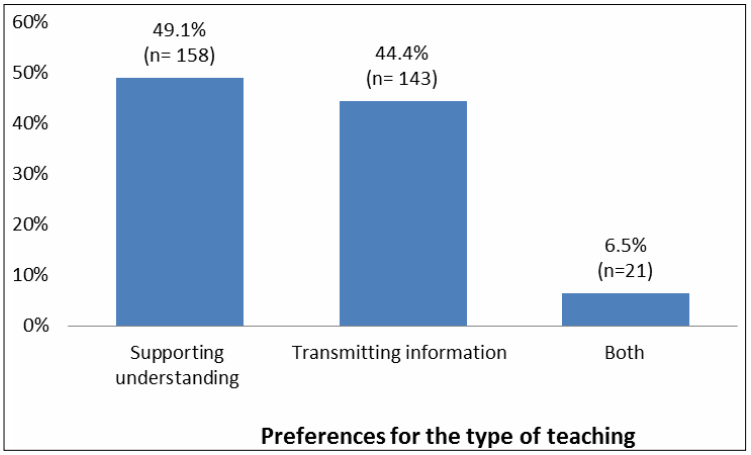

Fig 6: Preference of the study participant to the type of teaching

Among 322 study participants 158 (49.1%) preferred teaching supporting understanding (related to deep approach), 143 (44.4%) preferred transmitting information (related to surface approach) and 21 (6.5%) preferred both the types of teaching.

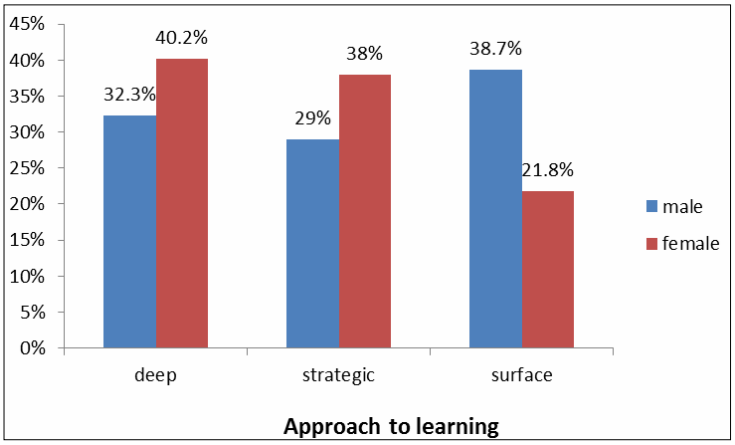

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Fig 7: Gender wise categorization of study participants based on approach to learning

Table 1: Association between gender and approach to learning among study participants

Gender	Deep	Approach to learning Strategic Surface		Total	p value
Male	30 (32.3%)	27 (29%)	36 (38.7%)	93	0.008
Female	92 (40.2%)	87 (38%)	50 (21.8%)	229	
Total	122	114	86	322	

From the figure 7 and table 1: Among the study participants female were predominantly deep learners 92 (40.2%) and among the rest 87 (38%) were strategic learners and 50 (21.8%) were surface learners.
Males were predominantly surface learners 36 (21.8%) and among the rest 30 (32.3%) were deep learners and 27 (29%) were strategic. It was found to be statistically significant (p= 0.008) between gender and approach to learning.

Table 2: Association between approach to learning and preference to type of teaching among study participants

Approach to learning	Preference to type of teaching Related to deep approach	Related to surface approach	both	total	P value
Deep	87 (71.3%)	24 (19.7%)	11 (9.0%)	122	<0.001
Strategic	50 (43.9%)	55 (48.2%)	9 (7.9%)	114	
Surface	21 (24.4%)	64 (74.4%)	1 (1.2%)	86	
total	158	143	21	322	

Deep learners predominantly preferred teaching related to deep approach 87 (71.3%), strategic learners predominantly preferred teaching related to surface approach 55 (48.2%) and surface learners predominantly preferred teaching related to surface approach 64 (74.4%). It was found to be statistically significant ($p< 0.001$) between approach to learning and preference to type of teaching among study participants.

Table 3: Association between different academic batches and their approach to learning

Batch	Approach to learning				p value
	Deep	Strategic	Surface	Total	
2011 batch	30 (32.3%)	27 (29%)	36 (38.7%)	93	<0.001
2012 batch	37 (42.5%)	23 (26.4%)	27 (31%)	87	
2013 batch	23 (32.4%)	36 (50.7%)	12 (16.9%)	71	
2014 batch	32 (45.1%)	28 (39.4%)	11 (15.5%)	71	
Total	122	114	86	322	

Among 2011 batch has predominantly surface learners 36 (38.7%), 2012 batch has predominantly deep learners 37 (42.5%), 2013 batch has more of strategic learners 50 (50.7%) and 2014 batch are predominantly deep learners 32 (45.1%). It is found to be statistically significant ($p< 0.001$) between different academic batches and their approach to learning.

Table 4: Association between regular or supplementary/additional academic batches and approach to learning

Academic batch	Approach to learning				p value
	Deep	Strategic	Surface	Total	
Regular	102 (41.6%)	91 (37.1%)	52 (21.2%)	245	<0.001
Supplementary/ additional	20 (26%)	23 (29.9%)	34 (44.2%)	77	
Total	122	114	86	322	

Regular batch students are predominantly deep learners 102 (41.6%) and among the rest 91 (37.1%) are strategic and 52 (21.2%) are surface learners. Supplementary batch students are predominantly surface learners of 34 (44.2%) and the rest 23 (29.9%) are strategic and 20 (26%) are deep learners. It is found to be statistically significant ($p< 0.001$) between regular or supplementary/additional academic batches and approach to learning.

Table 5: Comparison of mean percentage marks of university examination among different approaches to learning

Approach to learning	Frequency	Mean % marks	SD
Deep	122	69.2	6.36
Strategic	114	68.8	4.7
surface	86	62.2	6.6

Among deep learners the mean percentage marks is 69.2% (SD 6.36), strategic learners 68.8% (SD 4.7) and surface learners 62.2% (SD 6.6).

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Table 6: Difference in percentage marks between groups (approaches to learning) by one way ANOVA

Sum of squares		Degree of freedom	Mean square F		p value
Between groups	2946.947	2	1473.473	42.006	< 0.001
Within groups	11189.800	319	35.078		
total	14136.747	321			

The results of ANOVA test indicated highly significant difference in percentage marks between the different approaches to learning (p<0.001).

Table 7: Multiple comparisons between different approaches to learning and the academic performance in university examination

Approach to learning	Approach to learning	Mean difference	p value
Deep approach	Strategic	0.38384	1
	Surface	7.01301	< 0.001
Strategic approach	Deep	-0.38384	1
	Surface	6.62918	< 0.001
Surface approach	Deep	-7.01301	< 0.001
	Strategic	-6.62918	< 0.001

Multiple comparisons done by post hoc test (Bonferroni correction) revealed that the students' of deep approach has better performance in academic percentage marks compared to strategic approach but it is not statistically significant (p= 1) and compared with surface approach it is statistically significant (p<0.001). In strategic approach students have better performance in academic percentage marks compared with surface approach and it is statistically significant (p<0.001).

Discussion

In the present study students were found to be adopting more of deep and strategic approaches than the surface approach and majority of students preferred the type of teaching that supported understanding. This finding had confirmed the results of similar studies conducted earlier by Subasinghe [1], Abraham RR [5], Dart BC [12], Naqvi Z [13] and Ova [14]. This is a favourable finding in terms of medical education since it involves critical analysis of new ideas, linking them to already known concepts and principles and using the knowledge saved in that way for problem solving in unfamiliar contexts [1]. A deep approach is very much essential to learn medicine as the subject demands more of understanding and application than mere recall [5].

In the present study females were more compared to males. Females were found to adopt more of deep learning and males are predominantly surface learners. This could be one of the reasons why deep learners were more in the present study. In contrast to the above finding the study conducted by Subasinghe [1], gender did not show a significant effect on selecting the approach since more or less equal proportions of males and females were included in both approaches except for a very slight female predominance and gender did not have a significant effect on the approach to learning and these results are comparable to the findings of Kumar and Sethuraman [15] and Shankar P [2].

It was found that in the present study approach to learning varies with different phases of MBBS students. This finding differed from the study done by Hisham M Mirghani [16], the surface approach to learning was mostly preferred among first and second year medical students, and the least preferred among students in the final clinical years. Emilia and MulHolland [17] stated that 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).

In the present study regular academic batch students were predominantly of deep learners and most of the additional batch students had adopted surface learning. Similar finding were noticed by Subasinghe [1] where the students were categorized in to high and low academic achievers depending on their results. Thus all students who passed the exam at first attempt were considered high achievers, whereas those referred in at least one subject were considered low achievers. Most of the high achievers were found to be deep learners and low achievers were found to be surface learners. Compared to deep learners, a greater proportion of surface learners had shown a low academic performance.

Deep and strategic learners had better percentage marks compared to surface learners. This finding had confirmed the results of similar studies conducted earlier. The result of the study was in agreement with the studies of Subasinghe [1], Ova [15], Gijbels *et al*. [18], Harputlu [19], Kek [20] and Tarabashkina [21]. These studies reported that deep learning students performed better than surface learning students in academic activities at higher institutions of learning. The findings of this study were, on the other hand, not in harmony with some other studies conducted earlier. The study conducted by Trigwell and Prosser [22] did not find any positive correlation between a deep learning approach and quantitative difference in learning outcome, though difference was observed in qualitative aspect of the learning outcome. And also Leiden

ISSN:0975 -3583,0976-2833 VOL 14, ISSUE 12 , 2023

et al. [23] had reported low, non-significant positive correlations between learning approaches and performance and have concluded that learning approaches are inadequate predictors of academic performances.

This study suggests that motivating medical undergraduates towards a deeper approach to studying would essentially benefit them in achieving the expected long term goals in their career as medical professionals. This could be done through lectures, workshops on learning approaches, etc. They should be targeted towards helping the individual student in discovering their approach to learning, guiding them towards a deeper approach and letting them experience the benefits.

Conclusion

The most frequent approach adopted by students being a deep approach is favourable in terms of medical education. The findings suggest a positive correlation between learning approach and academic performance where students with a deep approach achieve a higher performance and vice versa. Therefore it is suggested that motivating medical undergraduates towards a deeper approach to studying would be beneficial to them in achieving the expected long term goals.

Limitation of the study

Our study was cross sectional rather than longitudinal**.** Thus no firm conclusions can be drawn regarding changes in learning approaches over time.

As this is an observational study no effort was taken to help the student to adopt the appropriate approach to bring quality learning among students.

Even though we found that there is difference in adopting different approach to learning among different phases of MBBS students no effort was taken to identify the reason for shift in approach to learning.

Implication of the study

Based on the findings of the study, it is suggested that the study have some implications for teaching and learning among medical students at undergraduate level.

- It is found that students learning approach (deep, strategic and surface) influence academic performance significantly.
- For identifying students at risk because of ineffective learning strategies and so that appropriate actions can be taken to help them become better learners.
- For assisting individual academics who are concerned in monitoring and improving the effectiveness of their teaching.
- For observing the outcomes and experience of learning.

Recommendations

Based on the findings of this study, the following recommendations were made for the improvement of students' learning approaches and academic performance among undergraduate medical students.

- This study suggests that motivating medical undergraduates towards a deeper approach to studying would essentially benefit them in achieving the expected long term goals in their career as medical professionals. This could be done through workshops on learning approaches, implementation of problem based learning. They should be targeted towards helping the individual student in discovering their approach to learning, guiding them towards a deeper approach and letting them experience the benefits.
- Longitudinal follow up of learning approaches will help in understanding the factors influencing learning approaches over a period of time. This could be taken up as further research in this field.

Acknowledgement

The completion of each task is accompanied by acquisition of knowledge and wisdom. I take this opportunity to express my gratitude to all the individuals who are directly or indirectly involved in conduct of this project. I express my sincere thanks and gratitude to Mrs. Harsha, Assistant professor of Biostatistics and clerical staffs of college principal office and non-teaching staff members of Department of Pharmacology, Sree Narayana Institute of Medical Sciences, Ernakulam for their constant encouragement and support.

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