A cross-sectional comparative study to determine the factors contributing to the academic performance of the high performers and low performers in 2nd year medical students

Yogeeta Sushant Walke*, Lois James Samuel, Laveena Vasant Bandodkar

ABSTRACT

Background: MBBS course content is extensive and requires immense and strenuous effort on the part of the medical students to complete it. Some students excel in their academics while others strive to pass and some even drop out. If the factors contributing to the excellent academic performance could be identified, these factors then can be incorporated to upgrade the struggling medical students. Hence, early identification of low achievers and the factors responsible for their poor performance is crucial. We undertook this study to identify the various factors influencing the academic performance of these two groups of students.

Methods: We identified the top thirty percentile and bottom 30 percentile students in the subject of pharmacology based on their third semester examination marks. All the 62 students opted to participate in the study, and their informed consent was taken. They were then given the questionnaire and allowed to answer in a stress free atmosphere.

Results: Factors which were statistically significant in contributing to the good performance of high achievers were the use of reference books from the library, learning from other sources such as patients, avoiding repetition of mistakes made in the past, proper time management skills, and having immense intrinsic motivation to study.

Conclusion: Through our study, we identified important factors contributing to high performance in academics, and we concluded that students should incorporate all the factors in a well-coordinated manner rather than focusing on any single factor. If executed, appropriately it will definitely upgrade their academic performance and prevent undesirable failures.

Keywords: High achievers, Low achievers, Academic performance, Learning strategies
Medical students are known to be very talented and highly motivated, but there are some who succumb to the excessive pressures and set a challenge to the educators. Such students require more attention and special help from the faculty. The issue of failures and drop out cannot be left unaddressed as it is associated with many unfavorable consequences. First, the student may suffer substantial personal or financial hardship as a result of exam failures. Second, there is a burden on the faculty and the university, with unnecessary time spent on meeting and advising the struggling students and setting additional exams. Third, there is societal loss when a sponsored student drops out.

Hence, early identification of low achievers and the factors responsible for their poor performance is important to implement interventional programs in the medical curriculum. Thus, we undertook this study to identify the various factors influencing the academic performance of the high achievers as well as the low achievers.

**METHODS**

We identified thirty top percentile and bottom thirty percentile students in the subject of pharmacology based on their third semester terminal marks. There were 31 students in each group. These students were invited to participate in the study. The study protocol was explained to them in detail. All 62 students opted to participate in the study, and their informed consent was taken. They were then given the questionnaire and allowed to answer in the stress free atmosphere (Appendix 1). They were given adequate time to answer the questionnaire.

**Ethical aspects**

Approval for conducting the study was obtained from the Institutional Ethical Committee of the Goa Medical College, Bambolim Goa.

**Collection of data**

The completed questionnaire were collected from all 62 students.

They were allowed to respond in their own time and privacy was ensured. The participation was entirely voluntary.

**RESULTS**

Following are the results in tabulated form obtained after analyzing the feedback form.

Table 1 shows 55% of good performers used mind maps to aid their studies, whereas only 29% of poor performers used mind maps.

Table 2 shows 100% of good performers made use of library facilities to aid their studies, whereas only 81% of poor performers made use of library facilities.

Table 3 shows 97% of good performers learned from other sources as well, whereas only 61% of poor performers learned from other sources.

Table 4 shows good performers had 100% attendance, whereas poor performers had only 87% of attendance.

Table 5 shows 90% of good performers preferred self-study, whereas only 74% of poor performers preferred self-study.

Table 6 shows 52% of good performers revised weekly, whereas only 45% of poor performers revised weekly.

Table 7 shows 65% of good performers felt that they had good short-term memory, whereas only 42% of poor performers felt so.

Table 8 shows 52% of good performers felt that they had average long-term memory, whereas only 45% of poor performers felt so.

Table 9 shows 97% of good performers were motivated to study, whereas only 84% of poor performers were motivated to study.

Table 10 shows 45% of good performers were home sick, whereas 19% of poor performers were home sick.

**DISCUSSION**

Although the academics in the medical field is challenging, some students perform extremely well while others struggle. A challenge for medical educators is to identify factors that lead to student success in medical school and beyond. Through our study, we have made an effort to identify various factors contributing to their academic performance.

To keep at par with the academic schedule, it is necessary to study and to prepare notes regularly, but in our study we did not find any significant difference between the two groups. 34% of the good performers studied for >2 hrs per day, whereas only 16% of poor performers studied for 2-4 hrs.

Good performers, as well as poor performers appropriately, used their holidays for academic gains. Most students preferred self-study irrespective of the group which they belonged to. Self-study followed by discussion with friend or group would have enhanced their academic performance. Good performers revised their academic subject either weekly or monthly depending on the availability of time. Regular revision of topic helps to remember the subject better. Students from both the group referred to previous
One of the important factors among the good performers was use of mind map as a learning aid. The mind map is a visual depiction of an idea or a topic in a well-coordinated and categorized manner. The brain finds mind map fascinating, hence easy to grasp and assimilate. The mind map enables student to understand the comprehensive matter at a glance. The mind map is a visual depiction of an idea or a topic in a well-coordinated and categorized manner. The brain finds mind map fascinating, hence easy to grasp and assimilate. The mind map enables student to understand the comprehensive matter at a glance. 55% of the Good performers used the mind map as a learning aid.

Table 1: Comparison of learning strategies.

<table>
<thead>
<tr>
<th>Learning strategy</th>
<th>Good performers (n=31) (%)</th>
<th>Poor performers (n=31) (%)</th>
<th>Chi-square</th>
<th>df</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regular study</td>
<td>Yes 10 (32)</td>
<td>No 21 (68)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regularly prepares notes</td>
<td>Yes 9 (29)</td>
<td>No 22 (71)</td>
<td>0.842</td>
<td>1</td>
<td>0.7716</td>
</tr>
<tr>
<td>Referred to previous question papers</td>
<td>Yes 22 (71)</td>
<td>No 9 (29)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mind map</td>
<td>Yes 17 (55)</td>
<td>No 14 (45)</td>
<td>3.24</td>
<td>1</td>
<td>0.0716</td>
</tr>
<tr>
<td>Mnemonics</td>
<td>Yes 17 (55)</td>
<td>No 14 (45)</td>
<td>0.0662</td>
<td>1</td>
<td>0.7969</td>
</tr>
<tr>
<td>Guidance from faculty or senior students</td>
<td>Yes 20 (65)</td>
<td>No 11 (35)</td>
<td>0.2681</td>
<td>1</td>
<td>0.6046</td>
</tr>
<tr>
<td>Library</td>
<td>Yes 31 (100)</td>
<td>No 0</td>
<td>4.613</td>
<td>1</td>
<td>0.0317</td>
</tr>
<tr>
<td>Learn from other sources</td>
<td>Yes 30 (97)</td>
<td>No 1 (3)</td>
<td>9.73</td>
<td>1</td>
<td>0.0018</td>
</tr>
<tr>
<td>Attendance</td>
<td>Yes 31 (100)</td>
<td>No 0</td>
<td>2.405</td>
<td>1</td>
<td>0.1209</td>
</tr>
</tbody>
</table>

Table 2: Comparison of learning strategy - minimum hours of study.

<table>
<thead>
<tr>
<th>Learning strategy</th>
<th>Good performance (%)</th>
<th>Poor performers (%)</th>
<th>Chi-square</th>
<th>df</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minimum hrs of study</td>
<td>&lt;2 hrs 20 (66)</td>
<td>&gt;4 hrs 2 (5)</td>
<td>3.92</td>
<td>2</td>
<td>0.14</td>
</tr>
<tr>
<td>Study during holidays</td>
<td>&lt;2 hrs 10 (32)</td>
<td>&gt;4 hrs 11 (36)</td>
<td>3.0989</td>
<td>2</td>
<td>0.21</td>
</tr>
</tbody>
</table>

Table 3: Comparison of learning strategy - mode of study.

<table>
<thead>
<tr>
<th>Learning strategy</th>
<th>Good performance (%)</th>
<th>Poor performers (%)</th>
<th>Chi-square</th>
<th>df</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preferred mode of study</td>
<td>Self-study 28 (90)</td>
<td>Study with friend 3 (10)</td>
<td>3.4902</td>
<td>2</td>
<td>0.17</td>
</tr>
<tr>
<td></td>
<td>Study in a group 0</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 4: Comparison of learning strategy - revision of topics.

<table>
<thead>
<tr>
<th>Learning strategy</th>
<th>Good performance (%)</th>
<th>Poor performers (%)</th>
<th>Chi-square</th>
<th>df</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Revise the topics</td>
<td>Daily 1 (3)</td>
<td>Weekly 16 (52)</td>
<td>1.42</td>
<td>2</td>
<td>0.49</td>
</tr>
<tr>
<td></td>
<td>Monthly 14 (45)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5: Comparison of learning strategy - memory.

<table>
<thead>
<tr>
<th>Learning strategy</th>
<th>Good performance (%)</th>
<th>Poor performers (%)</th>
<th>Chi-square</th>
<th>df</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Short-term memory</td>
<td>Average 8 (25)</td>
<td>Good 20 (65)</td>
<td>3.615</td>
<td>2</td>
<td>0.16</td>
</tr>
<tr>
<td></td>
<td>Excellent 3 (10)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-term memory</td>
<td>Average 16 (52)</td>
<td>Good 13 (42)</td>
<td>13.572</td>
<td>2</td>
<td>0.0011</td>
</tr>
<tr>
<td></td>
<td>Excellent 2 (6)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 6: Comparison of resource management - time of study.

<table>
<thead>
<tr>
<th>Resource management</th>
<th>Good performers (n=31) (%)</th>
<th>Poor performers (n=31) (%)</th>
<th>Chi-square</th>
<th>df</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time of study</td>
<td>Early morning 10 (32)</td>
<td>Evening and late at night 21 (68)</td>
<td>0.0783</td>
<td>1</td>
<td>0.77</td>
</tr>
</tbody>
</table>
aid while only 29% of poor performers used mind map, but this difference was statistically not significant. According to Solso, mnemonics are techniques or devices, either verbal or visual in nature which facilitates to improve the storage and recall of new information.\textsuperscript{3} Mnemonics have been proven to be extremely effective in improving memory.\textsuperscript{14,15} In mnemonic strategies, previously learnt information is correlated with the new information to facilitate storage and recall.\textsuperscript{16} According to Thompson when new information is integrated into the existing cognitive units, it enables the learner to achieve quicker learning by providing retrieval cues.\textsuperscript{17} 55% of good performers made use of mnemonics for their studies, whereas 61% of poor performers used mnemonics for their studies. Though a higher number of poor performers made use of mnemonics, they neither studied systematically nor revised the topics regularly, so the advantage of using mnemonics was lost. Students who performed better either received guidance from faculty or senior students. Since the portion is vast, student may not be able to comprehend the topic and hence a regular guidance from faculty or senior students may go a long way to improving their academic performance.

In our study, 100% of the good performers availed the library facility while only 81% of the poor performers did so. The difference between the two groups was statistically significant. This is in coherence with the study conducted by Wong and Webb, who found a positive correlation between the use of library and achievement of higher grades.\textsuperscript{18} Good performers also learnt from other sources such as patients. Clinical topics cannot be learned only by studying lecture notes and books. It has to be integrated with clinical knowledge. This integration helped them to understand and remember the topic better. Good performers also learnt from their past mistakes. Failure was not a deterrent, but a motivator to improve their academic performance.

Regular lecture attendance improves academic performance.\textsuperscript{19} Chan et al., Rodgers, Kirby and McElroy, and Dolton et al. found a positive and significant relationship between class attendance and academic performance.\textsuperscript{20-23} Regular attendance to course lectures and early revision were found to be important factors for improvement of student’s performance.\textsuperscript{24,25} In our study, we did not find any statistically significant difference between the two groups. We did not find any correlation between performance and attendance. The majority of the students in both the group regularly attended lectures. This could be due to university

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### Table 7: Comparison of resource management - others.

<table>
<thead>
<tr>
<th>Resource management</th>
<th>Good performance (%)</th>
<th>Poor performers (%)</th>
<th>Chi-square</th>
<th>df</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Time spent on watching television, internet, etc.</td>
<td>&lt;2 hrs</td>
<td>2-4 hrs</td>
<td>4 hrs</td>
<td>&lt;2 hrs</td>
<td>2-4 hrs</td>
</tr>
<tr>
<td>Time spent on travelling</td>
<td>21 (98)</td>
<td>10 (32)</td>
<td>0</td>
<td>21 (68)</td>
<td>7 (23)</td>
</tr>
<tr>
<td>Time spent on social function</td>
<td>12 (38)</td>
<td>3 (10)</td>
<td>5 (16)</td>
<td>20 (65)</td>
<td>6 (19)</td>
</tr>
</tbody>
</table>

### Table 8: Comparison of motivation to study.

<table>
<thead>
<tr>
<th>Motivation</th>
<th>Good performers (n=31) (%)</th>
<th>Poor performers (n=31) (%)</th>
<th>Chi-square</th>
<th>df</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Motivated to study</td>
<td>Yes</td>
<td>30 (97)</td>
<td>26 (84)</td>
<td>1.6607</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>1 (3)</td>
<td>5 (16)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Table 9: Comparison of dealing with non-academics - duration of sleep.

<table>
<thead>
<tr>
<th>Dealing with non-academics</th>
<th>Good performers (n=31) (%)</th>
<th>Poor performers (n=31) (%)</th>
<th>Chi-square</th>
<th>df</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Duration of sleep before exams</td>
<td>&lt;2 hrs</td>
<td>2-4 hrs</td>
<td>&gt;4 hrs</td>
<td>&lt;2 hrs</td>
<td>2-4 hrs</td>
</tr>
<tr>
<td>Language barrier</td>
<td>2 (6)</td>
<td>29 (94)</td>
<td>3 (10)</td>
<td>28 (90)</td>
<td>0</td>
</tr>
<tr>
<td>Home sick</td>
<td>14 (45)</td>
<td>17 (55)</td>
<td>6 (19)</td>
<td>25 (81)</td>
<td>3.6167</td>
</tr>
</tbody>
</table>

### Table 10: Comparison of dealing with non-academics - others.

<table>
<thead>
<tr>
<th>Dealing with non-academics</th>
<th>Good performers (n=31) (%)</th>
<th>Poor performers (n=31) (%)</th>
<th>Chi-square</th>
<th>df</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Language barrier</td>
<td>Yes</td>
<td>2 (6)</td>
<td>3 (10)</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>29 (94)</td>
<td>28 (90)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Home sick</td>
<td>Yes</td>
<td>14 (45)</td>
<td>6 (19)</td>
<td>3.6167</td>
<td>1</td>
</tr>
<tr>
<td>No</td>
<td>17 (55)</td>
<td>25 (81)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

\textsuperscript{df: Degree of freedom, n: Number of students}
rule of minimum 75% attendance to qualify to answer the final examinations.

Good performers felt that they had good long term memory. There was a statistically significant difference between the two groups as far as their impression about their own long term memory was concerned; many high performers felt that they were blessed with good long-term memory. Academic success requires effective time management skills. Students who do not utilize their time efficiently are unable to master the content. Therefore, the onus lies on the faculty to provide the assistance and support in time management. This will enable them to utilize their study time more efficiently and effectively which ultimately will improve their academic performance. According to Artino et al., intrinsic motivation and self-efficacy play a pivotal role in achieving academic goals. Homesickness and language barriers negatively influence students’ academic achievements. Salamonson et al., conducted a study among 1st year nursing students; they noticed a direct correlation between low English test scores and low academic grades among students with English as second language.

According to our study, factors which were statistically significant in contributing to good performance of high achievers were reference books from the library, learning from other sources such as patients and avoidance of repetition of mistakes made in the past, proper time management skills and having immense intrinsic motivation to study.

CONCLUSION

Our study revealed that some poor performers in spite of their sincere effort to study were unable to achieve good results. The reason could be their inability to coordinate all the contributing factors appropriately. Some were unaware of the use of mind maps while some others did not avail of the library facility also some others were lacking in their sincere effort to study were unable to achieve good performance. The reason could be their inability to coordinate all the contributing factors appropriately. Some were unaware of the use of mind maps while some others did not avail of the library facility also some others were lacking in their sincere effort to study were unable to achieve good performance.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES


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APPENDIX I

Questionnaire

A. Learning strategies
   1. Do you have regular disciplined study schedule for academics?
      (a) Yes
      (b) No
   2. Do you regularly prepare notes?
      (a) Yes
      (b) No
   3. What is your minimum daily hours of study? (Specify in hours).
   4. How many hours do you study during holidays? (Specify in hours).
   5. What is your preferred mode of study?
      (a) Self study
      (b) Study with another friend
      (c) Group study
   6. How frequently do you revise the topics?
      (a) Daily
      (b) Weekly
      (c) Monthly
   7. Do you refer to previous question papers?
      (a) Yes
      (b) No
   8. Do you do mind mapping of the topic?
      (a) Yes
      (b) No
      (c) If yes do you do it for (i) few topics (ii) most of the topics
   9. Do you use other techniques like mnemonics?
      (a) Yes
      (b) No
   10. Do you take guidance from faculty/senior students?
       (a) Yes
       (b) No
   11. How often do you refer books from the library?
       (a) Never
       (b) Sometimes
       (c) Always
   12. Do you learn from other sources like from:
       (a) Patients
       (b) Mistakes
   13. How is your lecture/practical attendance?
       (a) Regular
       (b) Irregular
   14. How would you rate your memory?
       (a) Short-term memory: (i) Average (ii) Good (iii) Excellent
       (b) Long-term memory: (i) Average (ii) Good (iii) Excellent

B. Resource management
   1. What is your preferred time for studies?
      (a) Early morning
      (b) Evening
      (c) Late at night
   2. What are your time management techniques?
      (a) In college
      (b) At home
      (c) While travelling
3. How much time is spent on watching TV, internet, etc? (Specify in hours).
4. How much time is lost in travelling? (Specify in hours).
5. Do your family members support you in your studies?
   (a) Yes
   (b) No
   (c) If yes give details about it
6. How much time do you spend on social function in a month? (Specify in hours).
7. Time devoted to religious activities in a week? (Specify in hours).

C. Motivation
1. Are you motivated to study?
   (a) Yes
   (b) No
   (c) If yes what is your source of motivation? (i) Intrinsic motivation (ii) Extrinsic motivation
2. Do exam results motivate you to study better?
   (a) Yes
   (b) No

D. Dealing with non-academic problems
1. How many hours do you sleep during exams? (Specify in hours).
2. Do you have Language barrier?
   (a) Yes
   (b) No
3. Do you feel homesick studying away from home?
   (a) Yes
   (b) No
4. How do you overcome distractions from friend?
5. How do you handle stress?