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Approaches to Learning and Study Skills among Medical Students in Oman

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ABSTRACT

Effective learning habits have been identified as a significant factor influencing students' academic achievement. The present study was designed to investigate the learning approaches and study skills exhibited by the medical students from academic years MD1, MD2 and MD3 using a validated study skills inventory questionnaire 'Denis Congo Study Skills Inventory' (DCSSI). The study of 255 students revealed that MD2 students generally scored lower in several skill areas compared to MD1 and MD3 students. Specifically, 70.54% of MD2 students scored below 30 in textbook reading, while 60.46% scored below 20 in note-taking skills. In memory skills, 26.35% of MD2 students scored below 30. For test preparation, 22.48% of MD2 students scored below 40, and 27.90% scored below 35 in concentration skills. Additionally, 44.18% of MD2 students scored below 20 in time management. These differences across the groups were statistically significant. The study identified notetaking, textbook reading, and time management as the areas where students needed the most support.

Keywords: *Study Skills, time management, textbook reading*

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INTRODUCTION

Medical education is an extremely challenging endeavor that is intended to educate medical students to become physicians/clinicians. Students are admitted into this degree following stringent selection procedures and strict competition (1). However, after joining the course, students perceive it to be very demanding and strenuous, taking both a mental and physical toll. To satisfy the eligibility requirements for the completion of the degree, students are expected to acquire theoretical and practical knowledge and skills, which enable them to treat and manage patients.

Medical programs are typically structured into preclinical and clinical phases. In the preclinical phase, the curriculum progresses from studying and understanding normal to abnormal conditions and diseases. The clinical phase is primarily focused on education in real-world clinical settings.

The curriculum is delivered through a variety of interactive and innovative instructional activities, strategically aligned with inquiry-based learning to achieve both Course and Program Learning Outcomes. Throughout these phases, students develop five essential skills critical for medical professionals: academic competence, communication, leadership, teamwork, and empathy (2).

Courses within the program are designed using a strategic learning system that emphasizes knowledge acquisition, application, and problem-solving. This approach is rooted in the theory of constructivism, which encourages students to build upon their existing knowledge through active learning and critical thinking.

There are many learning approaches available to students. These approaches are broadly divided into high utility, moderate utility, and low utility learning modalities. Practice testing and distributed practice are categorized as high utility learning approaches. Moderate utility learning approaches include elaborate interrogation, self-explanation, and interleaved practice. Summarizing the subject, underlining or highlighting the text, using mnemonics, and creating images of learned concepts constitute low-utility learning methods (3).

Learning approaches were further classified into deep, strategic, and superficial learning styles. Deep learners demonstrate a higher understanding of the subject, while superficial learners approach the material mainly to avoid failure in examinations (4,5).

Research has shown that medical students' learning styles impact their academic achievements (6-8). Brazilian medical students have shown a preference for sensing, sequential, and visual learning styles (9). Understanding these learning preferences is crucial. Therefore, this study aims to assess the learning styles of medical students at various stages of their education.

METHODS

This cross-sectional institutional-based observational study was conducted among MD1 (Who study the following courses: Chemistry for Medicine, English Language Skills, Orientation to Medical Physics, Cell biology, Biology for Medicine, Bio-Organic Chemistry, Molecular Biology) MD2 (Who study the following courses: Anatomy, Human Physiology, Biochemistry and genetics, Neurobiology, Introduction to Psychology) and MD3 (Who study the following courses: Microbiology & immunology, Pathology, Medical Pharmacology, Behavioral Science in Medicine, Orientation to health care systems) students at the college of medicine and health sciences (COMHS), Sohar, Oman. Approval from the ethics committee was obtained prior to the study.

Convenient sampling was used to invite all medical students, regardless of gender, from MD1, MD2 and MD3 to participate in a survey created using Google Forms. Two follow-up emails were sent as reminders to improve the response rate. A total of 360 students were registered across the three MD years, with 255 students participating in the study, resulting in a response rate of 70.8%.

The students were briefed on the study's objectives. A validated Denis Congo Study Skills Inventory (DCSSI) questionnaire was used for the study (10). The questionnaire comprised of six domains: textbook reading (8 questions), note-taking (5 questions), memory (9 questions), test preparation (13 questions), concentration (10 questions), and time management (6 questions). Responses were collected using a five-point rating scale (5 - always, 4 - usually, 3 - sometimes, 2 - rarely, 1 - never). Students were instructed to carefully consider each question and respond truthfully, selecting the option that best reflects their study habits.

Interpreting Study Skills Effectiveness Scores

Textbook reading score: Scores below 30 suggest a need for enhancement in current textbook reading skills.
Note-taking score: Scores below 20 indicate a need for improvement in note-taking skills.
Memory score: Scores below 30 suggest a need for improvement in memory skills.
Test preparation score: Scores below 40 recommend improvements in test preparation skills.
Concentration score: Scores below 35 suggest a need for improvement in concentration skills.
Time management score: Scores below 20 indicate a need for improvement in time management skills.

Inclusion and Exclusion Criteria

Students enrolled in the MD1, MD2, and MD3 phases during the 2022-23 academic year were included in the study if they consented to participate, while those who declined were excluded. The data was collected and entered in MS Excel and analyzed using SPSS version 25. Descriptive statistics including percentages, means, and standard deviations were calculated. Inferential statistical tests, such as Pearson's correlation and paired t-tests, were conducted to assess associations between domain parameters. A p-value less than 0.05 was considered statistically significant.

RESULTS

A total of 255 students aged between 18 to 21 years participated in the study. The results of the scores obtained for learning preferences among MD1, MD2, and MD3 students revealed high scores for test preparation (MD1: 49.04±4.91; MD2: 45.27±7.45; MD3: 44.80±7.21) and lower scores for note taking (MD1: 19.59±3.17; MD2: 18.50±3.35; MD3: 17.41±3.47) (Table 1 and Figure 1). Regarding textbook reading skills 70.54% (n=91) of MD2 students scored less than 30 when compared with students in MD3 (n=24; 29.26%) and MD1 (n=17; 20.73%). A score of less than 20 in the notetaking skills was observed to be high among MD2 (n=78; 60.46%) students compared with students in MD1 (n=35; 42.68%), and MD3 (n=33; 40.24%). Students who more frequently demonstrated scores below 30 in memory skills were in MD2 (n=34; 26.35%) compared with those in MD3 (n=9; 10.97%) and

MD1 (n=1; 1.21%). Many students in MD2 showed a high frequency of scores below 40 in test preparation skills (n=29; 22.48%), followed by MD3 (n=12; 14.63%) and MD1 (n=0; 0.00%). A noticeable prevalence of scores below 35 in concentration skills was observed among students in MD2 (n=36; 27.90%) compared with students in MD3 (n=12; 14.63%) and MD1 (n=2; (2.43%). Students frequently demonstrated scores below 20 in time management skills in MD2 (n=57; 44.18%) followed by MD3 (n=23; 28.04%), and MD1 (n=21; 25.60%) (Table 2).

Inter group (MD1 vs MD2, MD2 vs MD3 and MD1 vs MD3) comparisons of all the 6 domains were statistically significant ($p<0.05$) with the exception of concentration ($p=0.155$) and time management ($p=0.321$) which were similar among MD2 and MD3 students.

Statistically significant inter-group comparisons (MD1 vs MD2, MD2 vs MD3, and MD1 vs MD3) were observed across all six domains ($p < 0.05$), except for concentration ($p = 0.155$) and time management ($p = 0.321$), which showed no significant differences between MD2 and MD3 students. (Table 3).

Table 1: Students Overall Scores in each Learning Domain

Domains/Student groups	**MD1 (n=82)**	**MD2 (n=129)**	**MD3 (n=44)**
Textbook reading	31.15±3.16	27.74±4.35	26.20±4.84
Note taking	19.59±3.17	18.50±3.35	17.41±3.47
Memory	36.68±3.85	33.43±5.56	33.86±4.89
Test preparation	49.04±4.91	45.27±7.45	44.80±7.21
Concentration	40.32±3.05	37.12±4.64	36.45±4.83
Time management	21.11±4.42	20.41±5.05	19.45±4.54

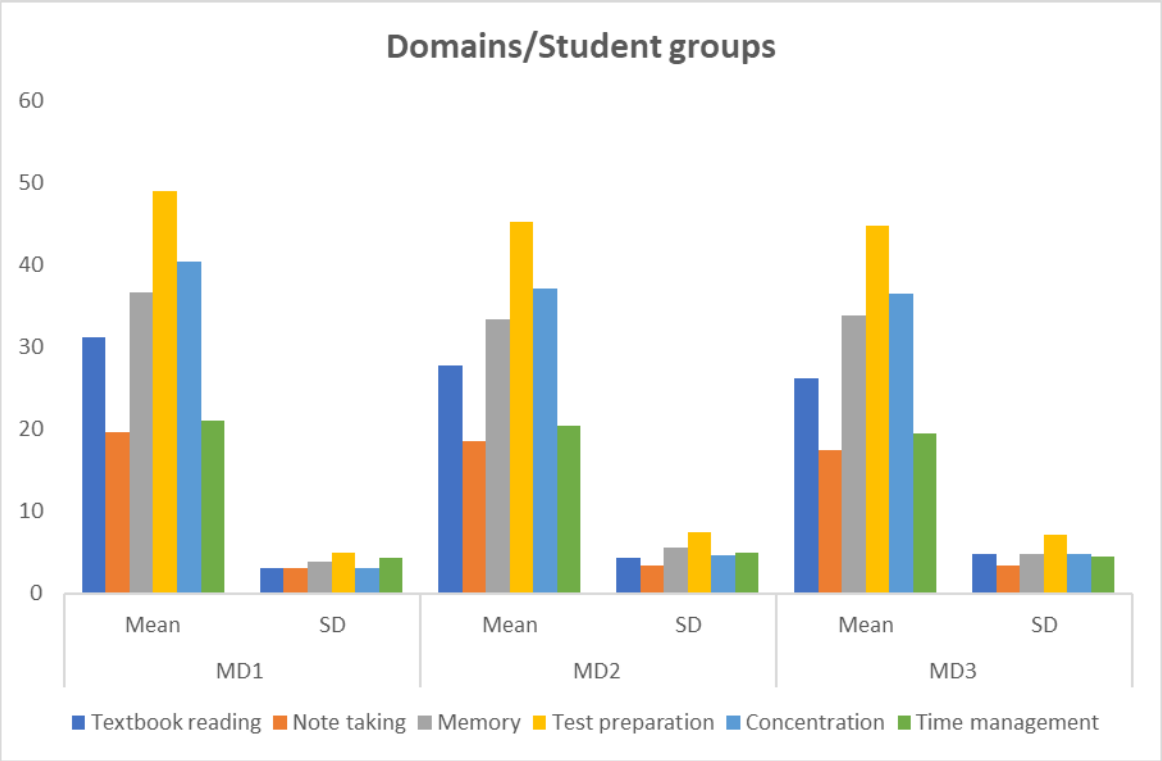

Figure 1: Showing the score patterns in different domains across different year students.

Table 2: Study participants with lower than recommended scores in each learning domain

Student group / Evaluation criteria based on domains	Textbook reading	Notetaking	Memory	Test preparation	Concentration	Time management
	Number of students with scores <30 n (%)	Number of students with scores <20 n (%)	Number of students with scores <30 n (%)	Number of students with scores <40 n (%)	Number of students with scores <35 n (%)	Number of students with scores <20 n (%)
MD1 (n=82)	17 (20.73)	35 (42.68)	1 (1.21)	0 (0.00)	2 (2.43)	21 (25.60)
MD2 (n=129)	91 (70.54)	78 (60.46)	34 (26.35)	29 (22.48)	36 (27.90)	57 (44.18)

MD3 (n=44)	24 (54.54)	33 (75)	9 (20.45)	12 (27.27)	12 (27.27)	23 (52.27)

Table 3: Intergroup comparison of each domain

Study group/domain	**Scores (n=82)**	**p-value (MD1 Vs MD2)**	**Study group/domain**	**Scores (n=129)**	**p-value (MD2 Vs MD3)**	**Study group/domain**	**Scores (n=44)**	**p-value (MD1 Vs MD3)**
Textbook reading (MD1)	31.15 ±3.16	0.000	Textbook reading (MD2)	27.74 ±4.35	0.001	Textbook reading (MD3)	26.20±4.84	0.000
Notetaking (MD1)	19.59 ±3.17	0.000	Notetaking (MD2)	18.50 ±3.35	0.000	Notetaking (MD3)	17.41±3.47	0.002
Memory (MD1)	36.68 ±3.85	0.000	Memory (MD2)	33.43 ±5.56	0.000	Memory (MD3)	33.86±4.89	0.000
Test preparation (MD1)	49.04 ±4.91	0.000	Test preparation (MD2)	45.27 ±7.45	0.042	Test preparation (MD3)	44.80±7.21	0.001
Concentration (MD1)	40.32 ±3.05	0.000	Concentration (MD2)	37.12 ±4.64	0.155#	Concentration (MD3)	36.45±4.83	0.000
Time management (MD1)	21.11 ±4.42	0.000	Time management (MD2)	20.41 ±5.05	0.321#	Time management (MD3)	19.45±4.54	0.015

DISCUSSION

Classroom teaching and learning is a formal method of delivering any curriculum to the students pursuing education. However, students utilize many other methods of acquiring the knowledge of the subject to ensure higher academic grades and become successful in their chosen profession (11). Therefore, it is important to understand the students' learning preferences, especially those pursuing medical degrees. There are several methods available for assessing the learning preferences of students like the Honey and Mumford's learning style questionnaire (12, 13). The present study utilized DCSSI to analyze the students' learning preferences.

Effective study habits are crucial indicators of academic performance and play a unique role in students' success. Undergraduates in medical college face the significant challenge of managing a vast volume and breadth of information. This compels students to develop efficient and advantageous study strategies. Choosing the right learning techniques is especially important for success in medical school (14).

Understanding the most effective study habits for medical school is crucial. Early identification of the study habits linked to success can help students reach their full potential and achieve proficiency during both the pre-clinical and clinical years. This, in turn, will aid / assist them in the residency selection process (15, 16).

At COMHS, the primary academic goal has always been to enhance student success. A study revealed that medical students are significantly impacted by academic burnout and deeply engaged in literary adaptation. Those with greater intellectual flexibility experience less academic burnout, greater engagement in learning, and improved academic performance.

Examining academic adaptability and strategies to enhance study habits can help medical schools foster these skills and increase student commitment (17). Previous research indicated that most medical students prefer studying from lecture handouts that reflect the instructor's teachings (18).

Furthermore, students with higher GPAs show a greater enjoyment of learning (85.52% vs. 83.80%) and more frequently utilize textbooks (12.50% vs. 6.66%) compared to their lower GPA peers (19). Another study also emphasized that internal motivation is a key factor in developing self-regulation strategies and achieving better academic performance among medical students (20).

Learning is a complex process, and no single study method is suitable for every situation. Innovative study skills and techniques have been reported worldwide as effective for enhancing student learning. Study skills or strategies are methods applied to learning, crucial for academic success, essential for achieving good grades, and beneficial for lifelong learning (21).

Study skills are a significant factor influencing students' academic performance. Bloom posits that study skills are a prerequisite for educational success (22). Students' study practices vary

based on their habits, interest in the subject, and the type of learning they have followed throughout their schooling.

In their study on medical students, Nagaraj and Pradeep identified major deficiencies in study skills, particularly in planning and time management, followed by issues with concentration and note-taking skills (22).

Nourian et al. assessed the study habits and skills of medical students and interns using a general information questionnaire and a specially developed, validated questionnaire on study skills. They found that medical students struggled with time management, concentration, reading speed, note-taking, study habits, and comprehension (24).

According to Nouhi et al., the major defects in the study skills of the students were planning and time management followed by concentration and note taking skills (25).

Similar to the studies discussed, the results in the present study showed that the majority of the students lacked skills in notetaking, textbook reading and time management. However, the students demonstrated good memory, test preparation, and concentration study skills.

MD1 students consistently scored higher in these areas compared to their MD2 and MD3 counterparts. The authors attribute this, in part, to the higher confidence often associated with the early stages of medical training. Additionally, the curriculum at this institution aligns more closely with subjects that MD1 students have already encountered in their secondary education.

Conversely, MD2 students may have struggled due to their exposure to entirely new medical concepts. This transition can be challenging for many students.

A recurrent theme in the literature indicates that female medical trainees generally outperform their male counterparts. Some key scientific reasons for this include higher levels of self-regulation, intrinsic motivation, and more effective study habits. Females tend to be more organized and consistent in their study routines, leading to better time management and the use of deep learning strategies. This approach enhances their understanding of complex content and improves information retention. They also demonstrate high levels of intrinsic motivation, setting high standards for themselves and putting in the increased effort needed to achieve their goals. Additionally, females often score higher in emotional intelligence, which enhances their collaborative, communication, and problem-solving skills, as well as their empathy and stress management—qualities that are essential in medical education (25-27).

Research has demonstrated that having a structured plan and maintaining focus can significantly enhance learning among medical students (23).

To address these challenges, it is recommended that medical schools integrate periodic intervention workshops into their curriculum, focusing on the development of essential academic skills. These workshops should include effective textbook reading techniques, such as SQ3R (Survey, Question, Read, Recite, Review), OK5R (Overview, Key Ideas, Read, Record, Recite, Review, Reflect), and 3R (Read, Recite, Review). Additionally, students should be taught note-taking strategies like the Cornell method and time management

techniques such as the Pomodoro Technique. These foundational skills facilitate the transfer of information from short-term to long-term memory, leading to improved retention resulting in overall student performance throughout their medical school journey (26-27).

CONCLUSION

The present study identified significant challenges among students in notetaking, textbook reading, and time management, with MD1 students consistently scoring higher in these areas compared to their MD2 and MD3 counterparts. To address these challenges, it is recommended that medical schools incorporate periodic intervention workshops focused on developing academic skills into their curriculum.

Integrating these foundational skills into the curriculum will equip students with the tools they need to excel academically, ultimately improving their performance throughout their medical education journey.

Limitations: One of the primary limitations of this study is that it only included students from the first three years of the 5-year MD program at COMHS. Conducting the study across all five years would have provided a larger sample size, potentially yielding more accurate results.

Future research should aim to analyze both current and past data to better assess the effectiveness of the interventions over time.

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