

# Learning Strategies And Their Effect On Academic Performance Of Dental Students In Karary University

**Hagir Abd Rahman Mahmoud**

Department of Oral and Maxillofacial Surgery, college of dental and oral medicine, Karary University, Khartoum, Sudan.

E-mail: [hagir3@hotmail.com](mailto:hagir3@hotmail.com)

ORCID: <https://orcid.org/0000-0002-4969-6614>.

**Alaa Abuelgasim Mohamed Ibrahim**

Department of dental public health, dean college of dental and oral medicine, Karary University.

E-mail: [alaaibrahim174.ai@gmail.com](mailto:alaaibrahim174.ai@gmail.com)

**Abstract—Background:** Students' academic achievement is influenced by cognitive and affective factors, including motivation, interest, and the use of various learning strategies. These strategies, which are actions and processes aimed at acquiring information or skills, involve agency, purpose, and instrumentality perceptions by learners. They serve as catalysts in comprehension, acquisition, recall, and the transfer of new knowledge and, in some cases, new abilities.

**Objectives:** The purpose of this study was to determine the effect of different learning strategies on the academic performance of dental students.

**Methods:** This descriptive-analytic study was conducted with the participation of 136 dental students at Karary University, Sudan. The college grade point average (GPA) of students was considered as the academic performance variable. Data were collected using the Motivated Strategies for Learning Questionnaire (MSLQ). Data were analyzed using SPSS version 22.

**Results:** this study includes 136 students. There was no gender difference in the use of learning strategies or GPA. However, females slightly outperformed males in most learning strategy subscales. Time management and rehearsal had the strongest correlation with academic performance, while organization and critical thinking strategies showed no significant relationship with GPA. Students with a D grade had significantly lower scores for mean learning strategies and organization compared to other grades. Significant differences were observed between groups A and D in terms of rehearsal, organization, time and study environment, and peer learning.

**Conclusions:** learning strategies are significant predictors of academic achievement, thus training of the students on the use of the different subscales increases their achievement.

**Keywords—Academic achievement, learning strategies**

## Introduction

The academic success of students is influenced by cognitive and affective factors, such as motivation, and learning strategies. These elements play a crucial role in both education and psychology. Learning strategies, defined as actions undertaken by students to enhance their learning competencies, involve agency, purpose, and instrumentality perceptions. They are an integrated cluster of thoughts, beliefs, emotions, and behaviors that serve as catalysts for comprehension, acquisition, recall, and the transfer of new knowledge and, in some cases, new abilities (1).

Cognitive strategies are related to the cognitive levels in Bloom's taxonomy (2) and involve integrating new information with prior knowledge. These strategies include rehearsal, elaboration, organization, and critical thinking. Elaboration strategies help students retain information in long-term memory by building internal connections between items to be learned. Organization strategies involve selecting appropriate information and constructing connections among the information to be learned (3). Critical thinking, a multifaceted process involving cognitive skills and personal dispositions, is not solely reliant on existing knowledge. These skills, which can be cultivated from a young age, are essential in problem-solving and decision-making. Educators are urged to explicitly teach these skills using collaborative methods and real-world contexts. Assessments should require students to provide logical arguments and evidence. In higher education, teaching these skills is vital as they are central to learning and future employment opportunities (4,5).

Metacognitive strategies involve the arrangement, organization, and evaluation of students' own mental processes to achieve a learning goal. These strategies include monitoring of learning processes, knowledge about cognition, and control of the learning processes. Self-regulated learning is strongly tied to metacognitive skills such as planning, monitoring, evaluation, and focus. Mastering metacognitive knowledge, skills, and attitudes leads to self-directed

study and self-confidence. There's a positive correlation between self-regulated learning and academic success. Metacognitive strategies involve managing, organizing, and assessing own cognitive processes to achieve a learning goal. Self-regulated learning, a key aspect of metacognitive strategies, enables students to plan, monitor, and manage their learning (6,7). Resource management strategies include managing time and study environment, effort regulation, peer learning, and help seeking. These strategies are crucial for academic success as they foster commitment to task completion, regulate the use of learning strategies, facilitate the exchange of ideas and information, and expedite achievement (3).

This study aimed to explore the impact of various learning strategies on the academic achievements of dental students. It offers a deeper understanding of the cognitive and metacognitive learning processes employed by these students. The findings could potentially enhance the quality of the dental program's instruction by guiding staff and policymakers in the dental field to identify and concentrate on the factors that affect students' academic learning and performance.

## Methodology

The study was a descriptive cross-sectional study conducted at the Faculty of Dentistry, Karary University. The study population consisted of dental students from the 2nd to 5th year. The sample size was estimated to be 180 students, and the questionnaire was distributed online to students via WhatsApp.

The research tool utilized in this study was the Motivated Strategies for Learning Questionnaire (MSLQ) (3), a self-report instrument developed at the University of Michigan. The MSLQ is designed to evaluate students' motivational orientations and their application of various learning strategies within a college course context. It comprises two main scales: the motivation scale and the learning strategies scale, each containing several sub-scales. The learning strategies scale evaluates the use of different cognitive and metacognitive strategies and resource management. The questionnaire consists of a total of 81 items, and students rate themselves on a 7-point Likert scale. The scores for each scale were determined by calculating the average of the item scores within that scale. The mean was then computed for each scale, and the total score for learning strategies was calculated as the mean of the scores of all included factors. The academic performance of students was measured using their Grade Point Average (GPA), a widely accepted measure for assessing undergraduate academic performance, known for its validity and reliability (8).

The collected data was analyzed using SPSS version 22. A test of normal distribution was

conducted, and as the data was found to be normally distributed, parametric tests were used. The student t-test was used to compare mean scores between genders, and Pearson's correlation coefficient was used to correlate the relationship between learning strategies subscales and GPA.

**Ethical Considerations:** Ethical approval for this study was granted by the research ethical committee at the Sudan Medical Specialization Board. And permission to conduct the research was obtained from the dean of the Faculty of Dentistry at Karary University. Students were informed via text message about the purpose of the study and the estimated time required to complete the survey. It was clearly stated that participation was voluntary and anonymous, and they were assured that they could withdraw from the study at any time without any negative repercussions. The data was maintained confidentially. After analyzing the responses, an email was sent to each participant, including their score and suggestions for enhancing their learning strategies.

## Results

The study included a total of 136 students with a response rate of 75.5%, with females making up 60% of the participants. The most frequently observed GPA grade among the participants was grade C, accounting for 37% of the total. The average GPA score was  $3.5 \pm 0.39$  on a scale of 5. When examining the correlations between various learning strategies and gender, no statistically significant differences were found. However, females did score slightly higher on most of the subscales. There were also no significant differences in the mean GPA or the distribution of GPA categories between genders.

The results of the Pearson correlation coefficient indicated weak yet statistically significant positive correlations between academic performance and most of the subscales of learning strategies. The most robust correlation with academic performance was observed with the time and study environment ( $r = 0.26$ ,  $p = 0.002$ ), followed by rehearsal ( $r = 0.241$ ,  $p = 0.005$ ). Interestingly, the use of organization and critical thinking strategies did not show a significant relationship with the GPA.

The correlation between learning strategies and the four GPA grades was examined. Significant correlations were found for overall strategies, rehearsal, organization, self-regulation, time and study environment, and peer-learning (Table 1). A subsequent post hoc test using the Bonferroni procedure revealed that the mean learning strategies score and organization were significantly lower for students with a D grade compared to other grades. It's noteworthy that students with grade A significantly outperformed those with grade D in areas such as rehearsal, organization, time and study environment, and peer learning.

Table 1: Correlations between subscales of learning strategies and GPA

Learning strategies		Pearson's correlation coefficient	Significance
<b>Overall learning strategies</b>		23*	0.002
<b>cognitive</b>	<b>rehearsal</b>	24*	0.005
	<b>elaboration</b>	17*	0.038
	<b>organization</b>	13	0.133
	<b>critical thinking</b>	00	0.944
<b>metacognitive</b>	<b>Self-regulation</b>	19*	0.026
<b>resource management</b>	<b>time and study environment</b>	26*	0.002
	<b>effort regulation</b>	25*	0.003
	<b>peer-learning</b>	20*	0.017
	<b>help seeking</b>	23*	0.006

\*. Correlation is significant at the 0.05 level (2-tailed)

## Discussion

Numerous research on student's learning emphasizes the importance of integrating both motivational and cognitive aspects of academic achievement. This study identified a positive association between the application of learning strategies and academic performance, a connection that has been substantiated in a multitude of studies across diverse educational settings and disciplines, revealing a significant direct correlation between learning strategies and GPA (9–12). However, a study from South Africa found limited correlations between the learning strategies and academic performance (13). These limited correlations between learning strategies and academic performance suggest that learning strategies alone may not be sufficient to predict or improve academic performance. Other factors such as individual student characteristics, teaching methods, course content, and external factors may also play significant roles in academic performance.

The study also found no statistically significant differences in the self-reported learning strategies between genders. This aligns with the findings from studies conducted in South Africa (15) and Tehran (9). However, a study from Turkey contradicts these findings, reporting that female students were more effective in selecting and using appropriate strategies than their male counterparts (12).

This research discovered that rehearsal positively influenced academic achievement, supporting the findings of several other studies (9,10,12), which suggests that effective rehearsal strategies can enhance memory retention and understanding, thereby improving academic performance. Despite this, several studies found no correlation between rehearsal and academic success (15,16), moreover, rehearsal was identified as a negative predictor for academic achievement in one study (11). This could occur if too much time was spent on rehearsal at the expense of understanding and internalizing the material, thus it's important to strike a balance between rehearsal and other study techniques to ensure optimal learning outcomes.

This study found a significant relationship between elaboration and academic performance, corroborating previous research (9–11). Yet, some studies found no impact of elaboration on academic performance (15,16). Interestingly, one study suggested that elaboration might negatively affect academic achievement (11). This could be due to variations in individual elaboration strategies, or the potential superiority of other learning strategies for specific materials.

In this study, there was no significant relationship between organization and academic performance. This is in line with a systematic review that suggested organization has the least empirical support in terms of its impact on academic performance (16). However, one study identified organization as a potential indicator of academic achievement (11). This suggests that while the impact of organization on academic performance may vary, it can still be a valuable tool for students when used effectively.

Several studies have identified a positive correlation between academic achievement and critical thinking (9,10,12,16–18). However, this study, along with another study (19), did not find a significant link between critical thinking and academic achievements. These findings suggest that the impact of critical thinking may vary based on factors such as individual learning styles, the nature of the study material, and the learning context. This context can include teaching and assessment methods, classroom environment, and cultural or societal influences. Furthermore, the lack of emphasis on critical thinking, creative reasoning, and problem-solving activities in the curriculum could also be a factor. This suggests that educational models may need to be revisited and reformed to enhance higher order thinking abilities.

Self-Regulated Learning (SRL) is a key factor in academic success. It requires students to be motivationally, cognitively, and behaviorally involved in their learning journey. Numerous studies, including this one, have found a positive correlation between SRL and academic achievement (9,10,12,16,20), which highlights the significant role of self-regulation in academic accomplishment.

The subscale of time and study environment was found to have a significant correlation with academic performance in this study, a finding that is consistent with several other studies (11,13,16,20). Effective time management, encompassing the ability to meet deadlines, prepare for exams, participate in extra-curricular activities, and allow time for reducing stress and relaxation, can significantly boost a student's academic performance. Similarly, the study environment plays a significant role in academic performance. A conducive learning environment can enhance understanding and memory retention, thereby leading to improved academic performance.

The effort regulation is centered around how students handle their academic responsibilities and the level of dedication they exhibit when confronted with challenges or hurdles. It is a key player in academic success as it empowers students to control their impulses, and remain devoted to their academic duties. This study discovered a notable link between effort regulation and the academic performance, which is consistent with numerous other studies that have found a direct connection between it and students' educational outcomes (11,16,20).

It has been observed that peer learning strategies have a significant positive correlation with the Grade Point Average (GPA), a finding that aligns with several other studies (10,20). Additionally, students who maintain positive relationships with their peers are often more engaged and perform better in academic tasks compared to those who face challenges in their peer relationships (22). This can be attributed to the enhanced comprehension students often acquire when they collaborate in groups, gaining the benefits of collective knowledge and experiences. Group activities offer a platform for students to engage in discussions and practice concepts with their peers, thereby refining their understanding.

The significance of help-seeking strategies, which aligns with previous studies (10,20), cannot be overstated. Such strategies in an academic context can aid students in acquiring knowledge, establishing objectives, and enhancing their relationships with peers. Moreover, the act of seeking help can result in the development of skills and knowledge that can be beneficial in future learning situations.

#### Conclusion:

The study found no significant differences in the use of various learning strategies between genders, although females scored slightly higher on most

subscales. There were also no significant differences in the mean GPA or the distribution of GPA categories between genders. A weak but statistically significant positive correlation was found between academic performance and most learning strategy subscales, with the strongest correlations seen with time and study environment management, and rehearsal. However, organization and critical thinking strategies showed no significant relationship with GPA. When examining the correlation between learning strategies and GPA grades, significant correlations were found for overall strategies, rehearsal, organization, self-regulation, time and study environment, and peer-learning. Notably, students with a D grade had significantly lower scores for mean learning strategies and organization compared to other grades, and in terms of rehearsal, organization, time and study environment, and peer learning, students with grade A demonstrated significantly higher scores compared to those with grade D.

#### Limitations:

The ability to generalize the findings of this study is limited due to the use of a non-random sample. Additionally, the reliance on students' self-reports to gather data may have introduced potential bias. This is because students might be more prone to biases related to self-enhancement, self-presentation, and social desirability.

#### References

1. Boekaerts M, Zeidner M, Pintrich PR. Handbook of self-regulation [Internet]. Elsevier; 1999
2. Dong FM. Teaching Learning Strategies: Connections to Bloom's Taxonomy. J of Food Science Edu. 2014 Oct;13(4):59–61.
3. Pintrich PR. A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ). 1991 [cited 2023 Nov 27]; Available from: <https://eric.ed.gov/?id=ED338122>
4. Lai ER. Critical thinking: A literature review. Pearson's Research Reports. 2011;6(1):40–1.
5. Davies M. Critical thinking and the disciplines reconsidered. Higher Education Research & Development. 2013 Aug;32(4):529–44.
6. Cera R, Mancini M, Antonietti A. Relationships between metacognition, self-efficacy and self-regulation in learning. Journal of Educational, Cultural and Psychological Studies (ECPS Journal). 2013;4(7):115–41.
7. El-Adl A, Alkharusi H. Relationships between self-regulated learning strategies, learning motivation and mathematics achievement. Cypriot Journal of Educational Sciences. 2020;15(1):104–11.

8. Westrick PA. Reliability estimates for undergraduate grade point average. *Educational Assessment*. 2017;22(4):231–52.
9. Diseth Å, Kobbeltvedt T. A mediation analysis of achievement motives, goals, learning strategies, and academic achievement. *Brit J of Edu Psychol*. 2010 Dec;80(4):671–87.
10. Nabizadeh S, Hajian S, Sheikhan Z, Rafiei F. Prediction of academic achievement based on learning strategies and outcome expectations among medical students. *BMC medical education*. 2019;19:1–11.
11. Ahmed O, Uddin MK, Khanam M. Motivation and learning strategies as strong predictors of academic achievement. *Indian Journal of Psychology and Education*. 2016;6(1):120–32.
12. Simsek A, Balaban J. Learning strategies of successful and unsuccessful university students. *Contemporary Educational Technology*. 2010;1(1):36–45.
13. Hamid S, Singaram VS. Motivated strategies for learning and their association with academic performance of a diverse group of 1st-year medical students. *African Journal of Health Professions Education*. 2016;8(1):104–7.
14. Ningrum RK, Kumara A, Prabandari YS. The relationship between self-regulated learning and academic achievement of undergraduate medical students. In: *IOP Conference Series: Materials Science and Engineering* [Internet]. IOP Publishing; 2018 [cited 2023 Nov 27]. p. 012155. Available from: <https://iopscience.iop.org/article/10.1088/1757-899X/434/1/012155/meta>
15. Klingsieck KB, Fries S, Horz C, Hofer M. Procrastination in a distance university setting. *Distance Education*. 2012;33(3):295–310.
16. Broadbent J, Poon WL. Self-regulated learning strategies & academic achievement in online higher education learning environments: A systematic review. *The internet and higher education*. 2015;27:1–13.
17. Karagöl İ, Bekmezci S. Investigating Academic Achievements and Critical Thinking Dispositions of Teacher Candidates. *Journal of Education and Training Studies*. 2015;3(4):86–92.
18. Akpur U. Critical, reflective, creative thinking and their reflections on academic achievement. *Thinking Skills and Creativity*. 2020;37:100683.
19. Shirazi F, Heidari S. The relationship between critical thinking skills and learning styles and academic achievement of nursing students. *The journal of nursing research*. 2019;27(4):e38.
20. Stegers-Jager KM, Cohen-Schotanus J, Themmen APN. Motivation, learning strategies, participation and medical school performance. *Medical Education*. 2012 Jul;46(7):678–88.