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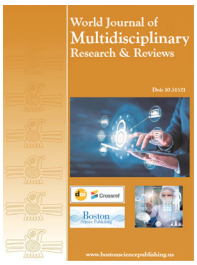

The Relationship Between Mnemonic Awareness and Academic Performance Among Students

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A R T I C L E I N F O

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KEYWORDS:
MA: Mnemonic acronyms
MCQ: multiple-choice questions
ML: Mnemonic Learning
MM: mnemonic methods
MTL: Medial Temporal Lobe
TALM: Teacher Assisted Learning Mnemonics

A B S T R A C T

Background: There are numerous approaches to help students increase their knowledge and comprehension of a subject. The purpose of this study was to assess how well student-based mnemonic formation using multiple-choice questions (MCQ) stimulated training and comprehension of biochemistry concepts.

Methods: From a variety of medical universities, medical students were willingly chosen. They were presented with mnemonics that had already been validated using prior-oriented mnemonics. Students were asked feedback questions about their use of mnemonics. Statistics: Results were presented as percentages using descriptive statistics.

Result: In conclusion, while mnemonics serve as valuable memory aids, their current use among medical students appears limited in depth and pedagogical support. To cultivate deeper learning, medical education must go beyond superficial memorization and adopt a more holistic approach—one that teaches students not only how to remember, but how to understand, apply, and critically engage with the knowledge they acquire.

Conclusion: The lack of deep learning testing in the mnemonics may indicate that the students did not acquire the higher levels of comprehension anticipated, but this is frequently a challenging conclusion to draw, especially since it is unrealistic to expect students to produce mnemonics that test higher order cognitive skills on their first attempt.

Highlights

High Awareness, Low Formal Training: While 80% of students are familiar with mnemonics, only 10% reported being taught about them in their curriculum, indicating a major gap between awareness and formal instruction.

Acronyms Dominate Mnemonic Use: Among the types of mnemonics used, acronyms were the most popular (70%), followed by visual imagery (50%), showing a preference for simpler, easily recallable formats.

Positive Perception, Inconsistent Use: Although 85% of students found mnemonics helpful and 80% would recommend them to peers, only 40% reported using them regularly, suggesting underutilization.

Perceived Academic Benefits with Room for Depth: 70% of students observed improved memory retention, and 60% noted some academic improvement; however, 50% believed the study of mnemonics lacks depth, highlighting a need for more comprehensive integration.

Challenges Limit Effectiveness: Common barriers included forgetting the mnemonics (40%), time required to create them (30%), and difficulty in formulating them (20%), underscoring the need for guided training and curriculum support.

Graphical Abstract:

- Category Estimated Response (%) Familiar with mnemonics 80% Taught in curriculum 10%
- Types of mnemonics used Acronyms (70%), Visual (50%), Others (30%) Regular usage 40%
- Perceived helpfulness 85%
- Memory retention improvement 70%
- Recommendation to peers 80%
- Useful subjects Anatomy (60%), Biochemistry (50%)

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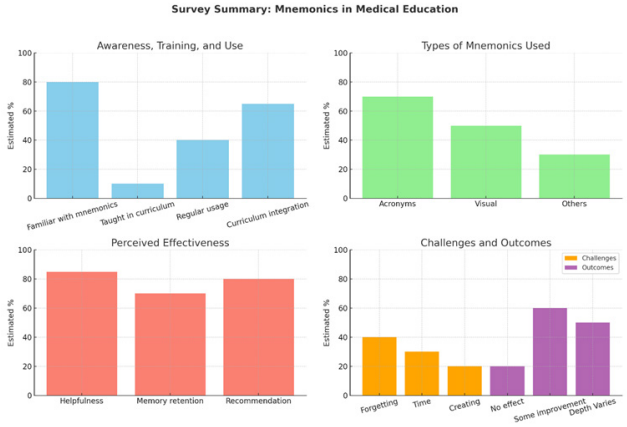
- Impact on performance No effect (20%), Some improvement (60%)
- Challenges Forgetting (40%), Time (30%), Creating (20%)
- Curriculum integration 65%
- Depth of study Varies (50%)



Introduction

Memory is one of the core components of human cognition. Memory is critical for learning new information and allows one to plan for the future. The sense of self is defined, in part, by one's ability to remember past events. It is understandable, therefore, that few brain disorders are feared more than Alzheimer's disease, the quintessential disorder of memory loss. The medial temporal lobes have been linked to memory since the seminal early reports on patient [1].

Increasingly, however, the field has moved from a region-based understanding of memory function to a network-based approach. The network approach maintains the importance of MTL (Medial Temporal Lobe) structures while highlighting the relevance of their interactions with cortical structures like the angular gyrus and posterior cingulate cortex, among others [1].

Like other areas of medicine, biochemistry is a constantly evolving field of study. Not just the concepts, but also the methods of instruction are always evolving. It is acknowledged that student input on teaching and evaluation strategies and the resulting methodology modifications are crucial for undergraduate medical education [2].

For a long time, we have a propensity to employ mnemonics as part of the modified teaching (TALM: Teacher Assisted Learning Mnemonics) program [3].

We have made the decision to solicit input on our teaching methodology and analysis pattern in order to make improvements. There aren't many studies on medical students' opinions of teaching methods and assessment techniques carried out in India [4].

Medical students in particular are frequently referred to as "strategic learners," but in practice, many of them become superficial learners out of necessity when confronted with the seemingly endless amount of material in today's curriculum [5].

A study shows that task's apparent enormity may encourage learning, but once the exam or assessment task is finished, a lot of what is learned can be quickly forgotten. In the second experimental session, we saw that participants in the mnemonic training condition had much better memory performance, and this improvement was noticeably larger than that of participants in the active and passive control groups. A 6-week mnemonic training period using the loci technique can implant this superior-memory connection profile in naïve controls [6].

A study conducted by Radović shows that mnemonic acronyms (MAs) significantly aid in accelerating the learning of procedural steps, supporting earlier research on their effectiveness in enhancing memory for verbal item order. However, consistent with previous studies, such as Hambrick et al. (2018), the use of MAs did not yield improvements in task completion times or error rates. As a result, the hypothesis that MAs could function as process mnemonics—enhancing procedural execution speed and accuracy—was not supported. While MAs effectively facilitate the initial learning phase, their influence appears limited to recall enhancement rather than task performance optimization [7].

A study conducted by Jozefowicz, the study concluded that Students under mnemonic conditions had superior immediate recall in a number of academic domains, including science, math, social sciences, and English, when contrasted with direct instruction, free study, and other control conditions. Students with learning difficulties and other disabilities found success with the keyword, keyword–pegword, and reconstruction expansion mnemonic methods (MM) [8].

When Mnemonic Learning (ML) used experimentally with kids that have particular learning requirements, mnemonic procedures are incredibly effective, according to a quantitative synthesis of empirical research on the subject. Additionally, it was discovered that learning outcomes are comparable across curriculum areas, experimental settings, grade levels, and impairment circumstances. Additionally, it was discovered that mnemonic images used into prose learning problems had significant trained transfer effects. The research report's author had nothing to do with the results. Lastly, whether the study recorded classroom applications or real experimental, laboratory research, the results were significant, indicating that laboratory research can be a reliable indicator of classroom effects [9].

A research by Di Santo has demonstrated the advantages of using memory strategies on working memory tasks, which are especially noticeable in the more difficult exams when items were committed to memory in sequential sequence. The performance of the control subjects was impressive in the tasks where items were presented in a grid, indicating that the grid presentation offers itself a simple useful spatial organization of the material to be kept in working memory. The performance of the subjects who had been exposed to mnemonic techniques was largely beyond any reasonable definition of a "complex memory span" in all of the tasks. If the right tactics are used, there is still more space for improvement [10].

Methods

Study Design

This research employed a **quantitative descriptive survey design** to explore medical students' familiarity, usage, and perceptions of mnemonics as a learning tool. The objective was to evaluate how mnemonics are incorporated into their study routines, their perceived effectiveness, and the potential challenges encountered.

Participants

The study sample consisted of **medical students** from a selected institution. Participation was voluntary, and respondents were assured anonymity and confidentiality. A total of 51 students responded to the questionnaire.

Instrument

Data was collected using a **self-administered structured questionnaire** developed by the researcher. The questionnaire contained **13 closed-ended, it is circulated among medical students and semi-open-ended questions** designed to assess:

- Awareness and formal education about mnemonics
- Types of mnemonics used
- Frequency and contexts of usage
- Perceived helpfulness and academic impact
- Challenges faced in creating or using mnemonics
- Attitudes toward curricular integration of mnemonic strategies

The questions included multiple-choice items (with options like "Yes/No/Maybe," Likert scale responses such as "Strongly Agree" to "Strongly Disagree," and "Select all that apply") as well as prompts for specific examples or elaboration.

Data Collection

The survey was distributed electronically via (Google Forms/email/learning platform please specify), and participants were given 1-month time to respond. Clear instructions were provided to ensure consistent interpretation of the questions.

Data Analysis

Responses were compiled and analysed descriptively. Frequencies and percentages were used to summarize responses for each question. Insights were drawn by comparing trends across items—such as perceived usefulness versus actual use frequency—and identifying notable themes in open-ended responses. The data was then interpreted to provide insights on student engagement with mnemonic strategies in medical education.

Results and Discussion

Question 1. Are you familiar with the concept of mnemonics?

What it asks: Determines basic awareness of what mnemonics are.

Responses: Most respondents answered **"Yes"**.

Insight: This suggests that students are generally aware of mnemonics, even if they haven't been formally introduced to them in their curriculum.

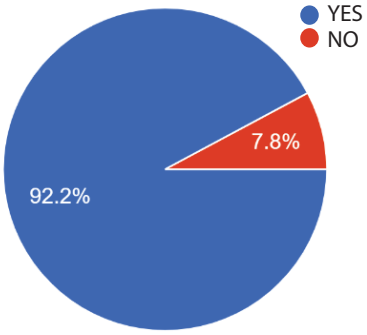


FIGURE 1: Familiarity with the concept of mnemonics.

QUESTION 2. Have you ever been taught about mnemonics as a learning tool in your medical curriculum?

What it asks: Assesses whether mnemonics are part of formal medical training.

Responses: Only **one respondent** said **"Yes"**.

Insight: Despite high awareness, formal teaching of mnemonics appears **minimal**. This might indicate a gap in instructional methods within the curriculum.

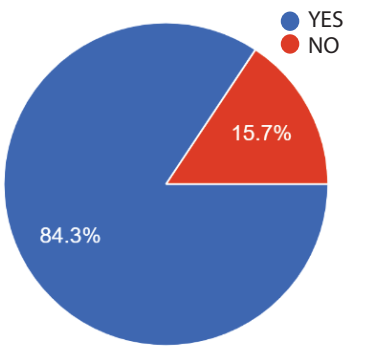


FIGURE 2: Mnemonics as a learning tool in your medical curriculum.

QUESTION 3. Which of the following types of mnemonics have you used in your studies? (Select all that apply)

What it asks: Identifies which mnemonic techniques students use, like:

Acronyms (e.g., "SOAP" for medical notes)

Rhymes or Songs

Visual imagery

Chunking

Method of Loci, etc.

Responses: Acronyms were the most common.

Some used visual imagery.

One student used multiple types (Acronyms, Rhymes, Visual imagery).

Insight: Students tend to use simple and familiar formats like acronyms. More complex types are less explored, possibly due to lack of training.

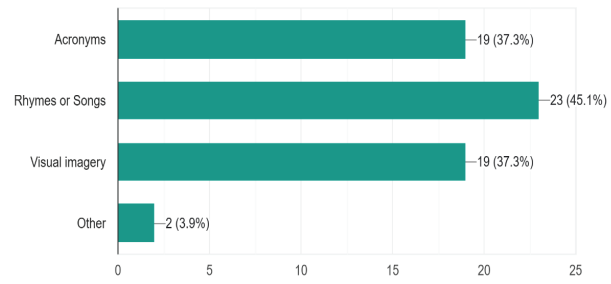


FIGURE 3: Types of mnemonics.

QUESTION 4. Do you know any medical mnemonics that you use regularly?

What it asks: Looks for examples or acknowledgment of personal use.

Responses: Some gave specific examples like "MATTVILPHLY" or "SLTPTTCH".

Others said **"No"**.

Insight: A few students have developed or memorized standard mnemonics for regular use. This also shows active engagement and possible self-initiative.

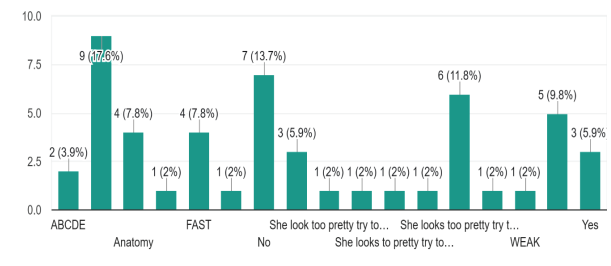


FIGURE 4: Medical mnemonics that you use regularly.

QUESTION 5. Do you think mnemonics are helpful in learning complex medical content?

What it asks: Gauges the perceived value of mnemonics in understanding or recalling complicated subjects.

Responses: Most chose "Agree" or "Strongly agree". One was "Neutral".

Insight: Students largely believe in the effectiveness of mnemonics, especially in content-heavy fields like medicine.

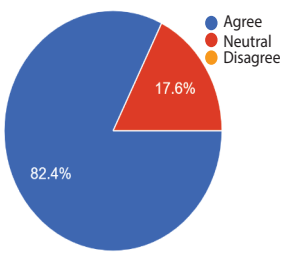


FIGURE 5: Mnemonics are helpful in learning complex medical content.

QUESTION 6. How often do you use mnemonics in your studies?

What it asks: Examines frequency of mnemonic use in everyday learning.

Responses: Ranged from "Rarely" to "Very Frequently". One said "Occasionally".

Insight: There's variation in usage, likely due to individual study preferences, subject matter, or familiarity with different mnemonic methods.

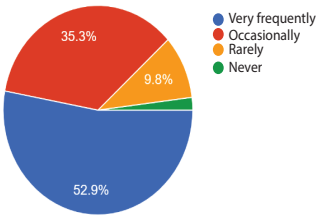


FIGURE 6: How often do you use mnemonics.

QUESTION 7. Do you feel that using mnemonics improves your memory retention for medical topics?

What it asks: Focuses on effectiveness—whether mnemonics actually enhance memory.

Responses: Majority said "Strongly agree".

One respondent was "Neutral".

Insight: Strong agreement supports the view that mnemonics can be a valuable memory aid, especially when learning large volumes of material.

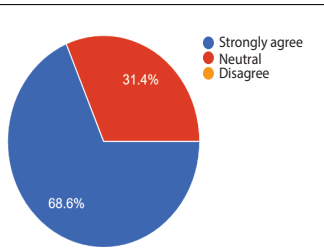


FIGURE 7: Using mnemonics improves your memory.

QUESTION 8. Would you recommend the use of mnemonics to other medical students?

What it asks: Measures students' willingness to promote the technique to peers.

Responses: Most said "Yes", with one "Maybe".

Insight: Students are generally positive about recommending mnemonics, suggesting peer-to-peer promotion could work well if formal instruction is lacking.

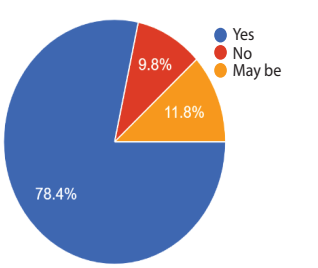


FIGURE 8: Would you recommend the use of mnemonics.

QUESTION 9. In which subjects or topics do you find mnemonics most useful?

What it asks: Determines subject areas where mnemonics have the most impact.

Responses: Common subjects: Biochemistry, Anatomy, Physiology, Microbiology.

One respondent selected all mentioned areas.

Insight: Mnemonics are **especially helpful in memorization-heavy subjects**. This insight can guide educators on where to emphasize mnemonic strategies.

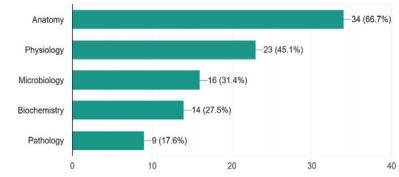


FIGURE 9: Finding mnemonics most useful.

QUESTION 10. Have you noticed any improvement in your academic performance (e.g., exam scores) after using mnemonics?

What it asks: Explores actual impact on performance.

Responses: Ranged from "No change" to "Some improvement", and even "Significant improvement".

Insight: Mnemonics may enhance academic performance, but the effect can vary. Formal training might increase their effectiveness.

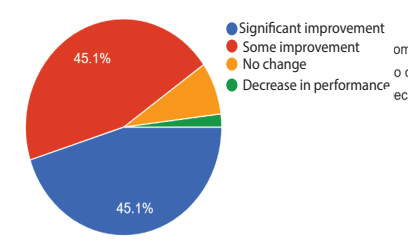


FIGURE 10: Any improvement in your academic performance.

QUESTION 11. What challenges do you face when using mnemonics?

What it asks: Identifies barriers to effective use.

Responses included:

- Forgetting the mnemonic
- Time-consuming to create
- Difficulty in making them

One chose "All the above"

Insight: These challenges show that **mnemonics aren't always easy to use**, and training or guidance could improve usability and effectiveness.

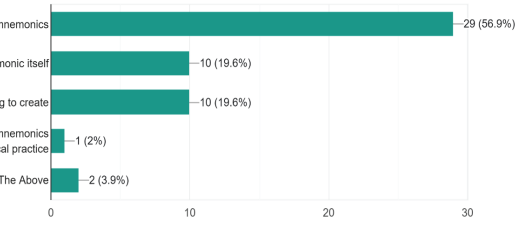


FIGURE 11: Challenges While Using Mnemonics.

QUESTION 12. Do you think your medical institution should integrate more mnemonic-based learning strategies into the curriculum?

What it asks: Gathers student opinion on curriculum development.

Responses: Most answered **"Yes"**, with one saying **"Maybe"**.

Insight: There's a strong demand for **structured, mnemonic-based learning**. Institutions might consider incorporating it into lectures, tutorials, or assessments.

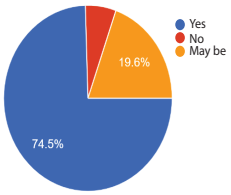


FIGURE 12: Mnemonic-based learning strategies.

QUESTION 13. Does the study of mnemonics lack depth?

What it asks: Asks if students think the exploration of mnemonics is superficial or inadequate.

Responses:

Some said **"Yes"** or **"Not Sure"**.

Others said **"No"**.

Insight: Students have mixed views. Some may find the material shallow, suggesting a need for more in-depth exploration and application of mnemonic techniques.

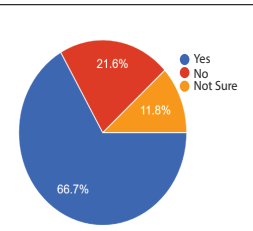


FIGURE 13: Does the study of mnemonics lack depth.

Question	Summary of Responses	Key Insight
1. Are you familiar with the concept of mnemonics?	Most respondents answered 'Yes'.	Students are generally aware of mnemonics.
2. Have you ever been taught about mnemonics in your curriculum?	Only one respondent said 'Yes'.	Formal teaching of mnemonics is minimal.
3. Types of mnemonics used	Acronyms were most common; some used visual imagery.	Simple formats are preferred; complex methods less explored.
4. Regular use of medical mnemonics	Some gave examples; others said 'No'.	Some students actively use standard mnemonics.

5. Helpfulness of mnemonics	Most chose 'Agree' or 'Strongly agree'.	Mnemonics are seen as effective learning tools.
6. Frequency of use	Responses ranged from 'Rarely' to 'Very Frequently'.	Usage varies by individual preference and familiarity.
7. Memory retention improvement	Majority said 'Strongly agree'.	Mnemonics support better memory retention.
8. Recommendation to peers	Most said 'Yes', one said 'Maybe'.	Students are willing to promote mnemonic use.
9. Useful subjects for mnemonics	Subjects included Biochemistry, Anatomy, etc.	Mnemonics help most in memorization-heavy subjects.
10. Academic performance impact	Varied from 'No change' to 'Significant improvement'.	Mnemonics may enhance performance, varies by student.
11. Challenges using mnemonics	Forgetting, time-consuming, difficulty making them.	Barriers exist that could be addressed with training.
12. Curriculum integration	Most answered 'Yes', one said 'Maybe'.	Strong demand for structured mnemonic learning.
13. Depth of study in mnemonics	Responses mixed—'Yes', 'No', 'Not Sure'.	Some feel the topic is not deeply explored.

Conclusions

The purpose of this study was to investigate medical students' awareness, frequency of use, perceived efficacy, and difficulties associated with mnemonic methods. The results show a notable disparity in promoting deep learning among students, even if they also show that mnemonics are commonly acknowledged and valued for their ability to help with memory retention. Only a small percentage of participants had received formal training on how to utilize mnemonics effectively, despite the fact that the majority were aware of them and recognized their value, especially in disciplines like anatomy, physiology, biochemistry, and microbiology that need a lot of memory.

The use of simple mnemonic formats such as acronyms was far more common than more cognitively demanding strategies like the Method of Loci or complex imagery. This reliance on surface-level tools points to a pattern of rote memorization rather than meaningful integration of knowledge.

Moreover, students reported challenges such as forgetting the mnemonic itself, the time investment required to create them, and difficulty in formulating useful ones. These issues indicate that, while mnemonics may support short-term recall, they often fail to encourage a deeper understanding of medical concepts. In fact, the tendency to use mnemonics as a quick fix rather than a bridge to comprehension may inadvertently hinder critical thinking and conceptual clarity.

The mixed responses to whether the study of mnemonics lacks depth further underscore this concern. Some students expressed uncertainty or dissatisfaction with the level of depth provided in their current educational experience. This suggests that mnemonics are often introduced or used in isolation—devoid of a broader pedagogical framework that encourages reflection, analysis, and application.

Encouragingly, most students supported the integration of mnemonic-based strategies into the curriculum, indicating a willingness to engage with these tools more meaningfully if guided appropriately. However, to move beyond shallow learning, it is crucial that educational institutions do not merely promote the use of mnemonics but embed them within context-rich, active learning environments that connect memory aids to clinical reasoning and problem-solving.

In conclusion, while mnemonics serve as valuable memory aids, their current use among medical students appears limited in depth and pedagogical support. To cultivate deeper learning, medical education must go beyond superficial memorization and adopt a more holistic approach—one that teaches students not only how to remember, but how to understand, apply, and critically engage with the knowledge they acquire.

Conflict of Interest: None

Ethical Consideration: None

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