CHARACTERISTICS OF SELF-LEARNING TECHNIQUES OF MEDICAL STUDENTS AT HANOI MEDICAL UNIVERSITY AND RELATED FACTORS

Phan Thi Minh Ngoc✉, Vu Quoc Trung, Pho Tuan Vinh
Dang Huy Hieu, Nguyen Minh Hien

Hanoi Medical University

Our research aimed to provide Hanoi Medical University students who experienced a novel study program with insights into ten major self-learning techniques. This descriptive cross-sectional study was conducted among second year to six year general practitioners at Hanoi Medical University, which described the correlation between self-learning techniques and related factors. Among 645 students participating in the research, the most used methods were practice testing (73.95%), highlighting/underlining (71.78%), and rereading (69.3%). Highlighting/underlining used as a primary technique in the average student group was seven times higher than the excellent group (p = 0.000). Excellent students tended to use the elaborative interrogation as the primary technique twice as much as good students. In conclusion, our study showed a correlation between the grade and the effectiveness of the self-learning techniques demonstrated in the theoretical and clinical exams.

Keywords: Self-learning technique, Hanoi Medical University, highlighting, rereading, elaborate interrogation.

I. INTRODUCTION

The self-learning process has an important role in a student's lifelong learning. Numerous studies demonstrated that students' learning outcomes, self-direction, and career values are all positively impacted by self-learning.[1,2] In the health profession, self-learning is crucial for medical students.

The learning techniques of students influence the success of the self-learning process. Studies on the student self-learning process have identified ten primary techniques with varying degrees of effectiveness.[3] First, highlighting, rereading, summarization, keyword memonic, and imagery for text are low-utility techniques because they are not ideal for long-term knowledge retention.[3,4] Second, elaborative interrogation and interleaved practice are moderate utility techniques. Finally, the most effective learning techniques are practice testing and distributed practice, which greatly benefit students' learning outcomes.[3] Therefore, students can achieve higher results by choosing the appropriate techniques.

The medical student's choice of self-learning techniques is related to the study stages, as the medical learning process shifts as students transition from a preclinical to a clinical learning environment.[5] During preclinical years, students spend most of their time in the lecture hall with enormous medical knowledge. As a result, students prioritize techniques that focus on memorizing techniques. Through traditional lectures, information can be passively gathered, thus making students unwilling to experiment with more effective self-learning techniques. Meanwhile, innovative teaching strategies in Hanoi Medical University such as seminar and

Corresponding author: Phan Thi Minh Ngoc
Hanoi Medical University
Email: phanminhngoc@hmu.edu.vn
Received: 17/10/2023
Accepted: 22/11/2023

team-based learning encourage active learning in students, thus leading students to find higher utility techniques.[6,7] Meanwhile, during clinical years, medical students primarily learn in hospitals, where they interact with actual patients and solve practical cases. These different traits may confuse students during transition. Therefore, determining the best self-learning techniques is crucial to adapt to this demanding learning environment.

Several researches on medical students showed how self-learning techniques can impact academic outcomes, in which utilizing better ones leads to improvements in study results.

Ur research aimed to describe the self-learning techniques used by medical students at Hanoi Medical University and the relationship between self-learning techniques and specific characteristics of medical students.

II. METHODS

1. Research subjects

Our study population was general medical students from the second to sixth year at Hanoi Medical University in the first semester of the 2022-2023 school year. This is a convenience sample size with 645 students participating in the study. .

2. Study design and setting

We conducted the cross-sectional survey using a questionnaire on self-learning techniques of medical students based on ten learning techniques evaluated by Dunlosky et al. in December 2022. The online questionnaire was sent to 2nd and 6th years medical students, and research subjects filled in the information. Informed consent was implied, given that study participants received a participant information sheet before the start of the questionnaire. Data were collected online using a REDcap tool, requiring respondents to complete the survey before submitting it.

The variables used in this study are listed below.

Table 1. Lists of variables in the research

Variable group	Variables	Description
Personal information	Year of Birth	Age
	Gender	Male/Female
	Year of studying	Second-year student, Third-year student, Fourth-year student, fifth-year student, sixth-year student
	Major	Medicine, Dentistry, Traditional Medicine, Preventative Medicine, Public Health, Laboratory Medicine Technique, Nursing, Nutrition, Optometry

Variable group	Variables	Description
Information about academic characteristics and results	Clinical study	preclinical students/clinical students
	Clinical examination	Have already taken the clinical examination/ have not taken the clinical examination
	Average clinical clerkship score of the earliest three times	Percentage per group
	GPA for the last school year	Percentage per group
	Satisfaction of the academic results	Yes/No
Information on learning technique	Self-learning techniques	Elaborative interrogation Self-explanation Summarization Highlighting/underlining Keyword mnemonic Imagery for text Rereading Practice testing Distributed practice Interleaved practice Others
	Primary self-learning technique	Choose one of the self-learning techniques listed above
	Satisfaction with the learning method	Yes/No

3. Data Analysis

After being cleaned, data was analyzed by Stata software version 15.1. Descriptive statistics were adopted to examine student characteristics: Absolute and relative frequency for categorical variables. Fisher's Exact test was run to test the association between two variables with less than five observations each. The odds ratio (OR) was used to determine some of the factors associated with self-learning techniques and main self-learning techniques. $p<0.05$ was considered statistically significant.

4. Ethics approval

Respondents thoroughly explained the purpose of the survey, participated voluntarily, and had the right to refuse to participate in the study or choose not to answer any question in the questionnaire. All personal information of research subjects is kept confidential and is used only for research purposes.

III. RESULTS

1. Participant characteristics

Table 2. Participant characteristics

	N	%
Gender (N=645)		
Male	332	51.47
Female	313	48.53
School year (N=645)		
Second	249	38.6
Third	217	33.64
Fourth	73	11.32
Fifth	40	6.2
Sixth	66	10.23
Clinical study (N=645)		
Clinical students	502	77.83
Preclinical students	143	22.17
Clinical examinations (N=502)		
Have undergone clinical examinations	196	39.04
Have not undergone clinical examinations	306	60.94

Six hundred forty-five students completed the survey at Hanoi Medical University from the second to the sixth year. Percentage of students by academic year: The highest was the second-year students, accounting for 38.6%, and the second highest was the third-year students, with 33.64%. And the lowest was the fifth-year students, accounting for 6.2%. The percentage of students in the fourth year was 11.32%, and in the sixth year was 10.23%. Most students have experienced clinical practice (77.83%). The proportion of students who have taken the clinical exams among those who have studied for clinical practice is 39.04%.

2. Characteristics of self-learning technique usage by medical students

a. General features

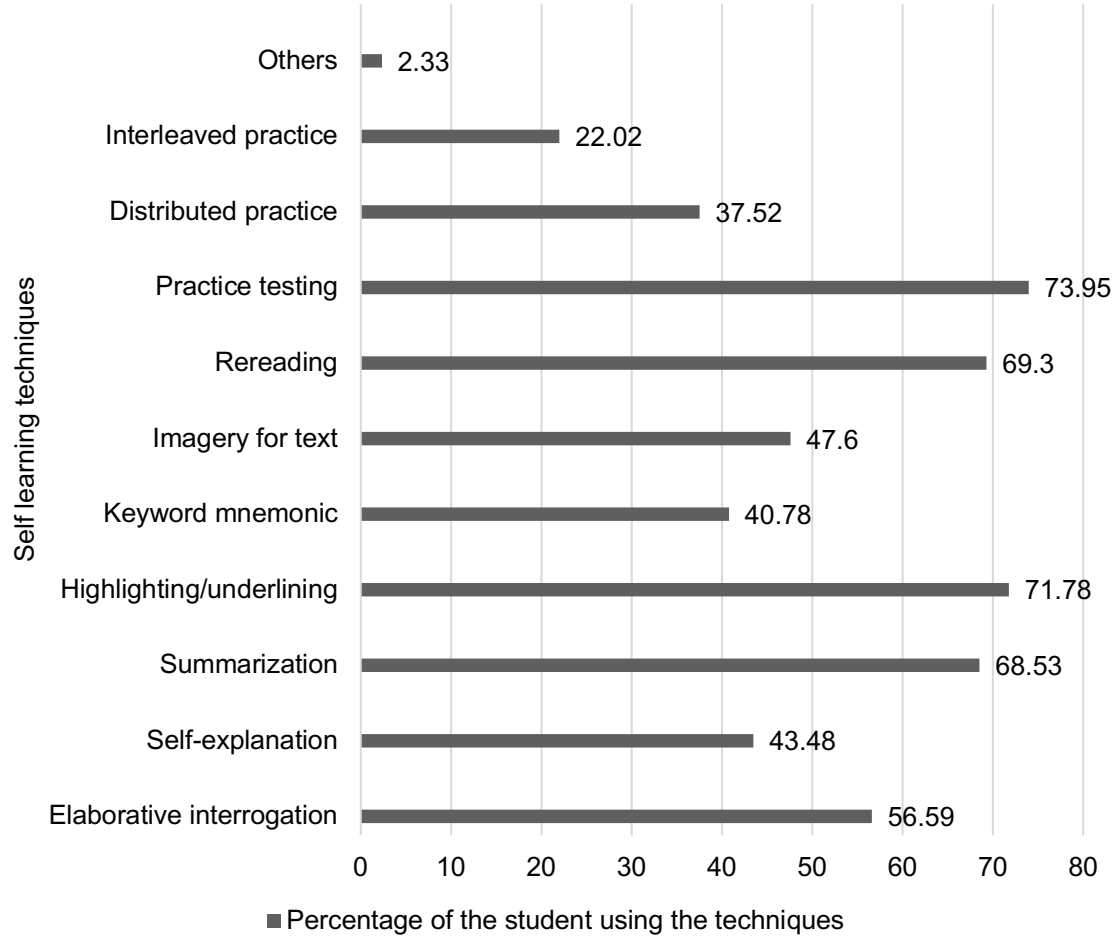

Chart 1. Medical student learning techniques

The four techniques most used by medical students were practice testing (73.95%), highlighting/underlining (71.78%), rereading (69.3%), and summarization. (68.53%). Among the ten techniques above, the interleaved practice was used the least (22.02%). The number of students using other methods were elaborative interrogation (56.59%), self-explanation (43.88%), keywords mnemonic (40.78%), imagery for text (47.6%), and distributed practice (37.52%).

b. Relationship between self-learning techniques and academic characteristics

We found a correlation between learning technique and academic ranking in students of excellent, good, and average ranking, especially in 2 techniques: Highlighting/underlining and Elaborative interrogation.

Table 3. Correlation between primary learning technique & academic ranking

Primary Self-learning technique		Academic ranking					
		Excellent (N)	Average (N)	Good (N)	Average (N)	Excellent (N)	Good (N)
Highlighting/ underlining	Yes	8	25	93	25	8	93
	No	108	47	364	47	108	364
OR (95% CI)		0.14 (0.05 - 0.35)		0.48 (0.27 - 0.86)		0.29 (0.12 - 0.62)	
P		0.0000		0.0065		0.007	

Average students tended to use highlighting/ underlining seven times more often than excellent students (OR = 0.14; p = 0.000). Students with average academic ranking tended to use highlighting/underlining as a primary technique two times more than good students (OR = 0.48; p = 0.0065). Good students tended to use the technique as the primary technique four times more than excellent students; the difference was statistically significant (OR = 0.29; p = 0.0007).

Table 4. Correlation between primary learning technique & academic ranking

Primary self-learning technique		Academic Ranking		OR (95% CI)	p
		Excellent (N)	Good (N)		
Elaborative interrogation	Yes	24	52	2.03 (1.14 – 3.55)	0.0083
	No	92	405		

About the elaborative interrogation technique, we found out that excellent students tended to use the elaborative interrogation technique as the primary learning technique twice as much as good students (OR = 2.03; p = 0.0083)

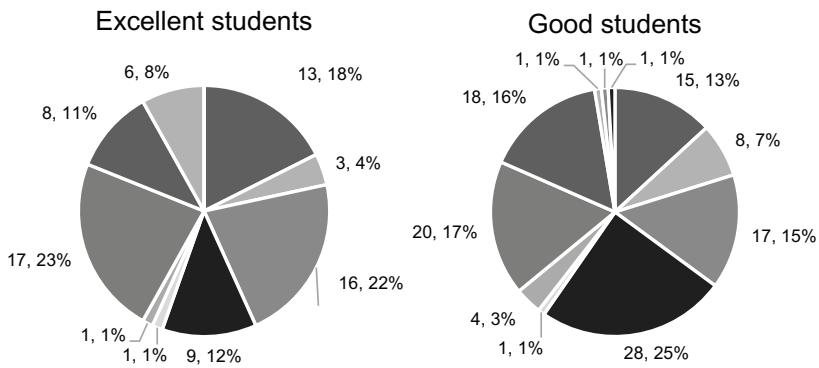

Chart 2a. Relationship between primary learning techniques and clinical clerkship performance

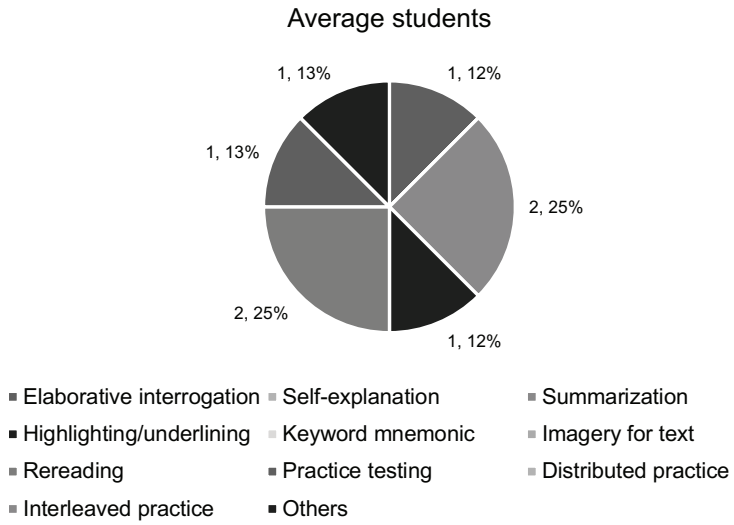

Chart 2b. Relationship between primary learning techniques and clinical clerkship performance

In the excellent clinical examination scores group, the percentage of students using the rereading technique (22.97%) and summarization (21.62%) was the largest. In the good clinical examination scores group, highlighting/ underlining had the highest percentage of usage (24.56%). There were few students with average clinical examination scores. These students used elaborative interrogation (1), summarization (2), highlighting/underlining (3), rereading (3), and practice testing (4) as primary learning techniques.

IV. DISCUSSION

The research findings demonstrate a positive correlation between high utility (distributed practice) and moderate utility (interleaved practice) techniques with grades. Conversely, increased usage of low-utility techniques (e.g., highlighting) is linked with lower test scores. These results are consistent with Dunlosky et al.'s assessment.[3]

Our study discovered that highlighting/ underlining use has the strongest association with grades. In particular, the percentage of medical students with average grades using highlighting as the main method was seven times higher than that of the excellent group ($p = 0.000$). This technique's ineffectiveness has been echoed in much of the literature. Research by Fowler and Barker in 1974 has found no difference in total scores on a test between passive reading and difference highlighting techniques.[8] A Study by Hoon also in 1974 showed that while underlining during reading took up more time, it didn't increase comprehension.[9] Furthermore, later research implied that highlighting could be detrimental since students who had underlined performed worse on inference .[10] Thus, we suggest that highlighting should not be used as the main self-learning method, and students should spend time consolidating knowledge using more effective methods. While highlighting does little to improve comprehension, it may hurt performance on problems that require inference.[3]

Through our research, we found that the excellent and good students use elaborative interrogation. In particular, the percentage of

students with excellent scores using elaborative interrogation as the main technique was 2,032 times higher than that of the good group. This trend also appeared in students who have undergone clinical assessment, where the percentage of students with excellent clinical scores using elaborative interrogation was 1.25 times higher than that of the good group. As we can see, a profound and detailed understanding of the materials can be one of the factors that differentiate between good and excellent students. In previous studies, elaborative interrogation is considered a potent strategy used by high-achieving students.[11] In addition, students with higher prior knowledge benefit more from elaborative interrogation.[12] These results prove that higher-knowledge learners are better equipped to use this technique effectively, which might explain our finding.

When assessing clinical grades, techniques that are considered low utility (summarization, highlighting, and rereading) and moderate utility (self-explanation) are used more by students with excellent grades. Rereading (22.97%) and summarization (21.62%) are the main self-learning techniques used by excellent students. This highlights that effective learning techniques can differ depending on the learning stages (preclinical and clinical stages). While exams in the preclinical stage focus on memorization, clerkship assessment requires communication skills and clinical reasoning besides theoretical knowledge. The transition from preclinical to clinical stages is challenging for medical student, and more research is required to suggest effective learning techniques during clerkship.

There were limitations in our research. First, our survey had not excluded other confounding factors affecting the self-learning process such as financial conditions, living conditions, self-motivation, etc. Secondly, our research only described how medical students were studying and compared their grades in a short period of time, hence our conclusions on techniques' effectiveness were modest. In addition, the questionnaire, based on Dunlosky et al.'s research, had not been validated and could be limited for Vietnamese students.

V. CONCLUSION

Overall, there is a correlation between the grade and the effectiveness of the self-learning method shown in both the theoretical and clinical exams, except for rereading, a low-utility method widely used among high-scoring students. We suggest that medical schools consider introducing high utility methods and how to apply them to students.

REFERENCES

1. Lee S, Kim DH, Chae SM. Self-directed learning and professional values of nursing students. *Nurse Educ Pract*. 2020; 42: 102647. doi:10.1016/j.nepr.2019.102647.

2. Tran TL, Tran DL. Academic achievement and its associated factors among the first and second-year medical students of the course 2012-2018 at Hue University of Medicine and Pharmacy. *J Med Pharm*. Published online May 2016: 85-94. doi: 10.34071/jmp.2016.2.12.

3. Dunlosky J, Rawson KA, Marsh EJ, Nathan MJ, Willingham DT. Improving Students' Learning With Effective Learning Techniques: Promising Directions From Cognitive and Educational Psychology. *Psychol Sci Public Interest*. 2013; 14(1): 4-58. doi:10.1177/1529100612453266.

4. Leonard S, Stroud MJ, Shaw RJ. Highlighting and taking notes are equally ineffective when Reading paper or eText. *Educ Inf Technol*. 2021; 26(4): 3811-3823.

doi:10.1007/s10639-021-10448-9.

5. J. Barbosa. The impact of students and curriculum on self-study during clinical training in medical school: a multilevel approach | BMC Medical Education | Full Text. Published January 13, 2017. Accessed January 8, 2023. https://bmcmededuc.biomedcentral.com/articles/10.1186/s12909-016-0846-3.

6. Frame TR, Cailor SM, Gryka RJ, Chen AM, Kiersma ME, Sheppard L. Student Perceptions of Team-based Learning vs Traditional Lecture-based Learning. *Am J Pharm Educ*. 2015; 79(4). doi:10.5688/ajpe79451.

7. Zeng HL, Chen DX, Li Q, Wang XY. Effects of seminar teaching method versus lecture-based learning in medical education: A meta-analysis of randomized controlled trials. *Med Teach*. 2020; 42(12): 1343-1349. doi:10.1080/0142159X.2020.1805100.

8. Fowler RL, Barker AS. Effectiveness of highlighting for retention of text material. *J Appl Psychol*. 1974; 59: 358-364. doi:10.1037/h0036750.

9. Hoon PW. Efficacy of Three Common Study Methods. *Psychol Rep*. Published online 1974.

10. Peterson SE. The cognitive functions of underlining as a study technique. *Read Res Instr*. 1992; 31: 49-56. doi:10.1080/19388079209558078.

11. Wood E, Hewitt KL. Assessing the impact of elaborative strategy instruction relative to spontaneous strategy use in high achievers. *Exceptionality*. 1993; 4:65-79. doi:10.1207/s15327035ex0402_1.

12. Woloshyn VE, Pressley M, Schneider W. Elaborative-interrogation and prior-knowledge effects on learning of facts. *J Educ Psychol*. 1992; 84:115-124. doi:10.1037/0022-0663.84.1.115.