

Impact of Gender and Academic Phases on Learning Strategies Among Undergraduate Medical Students and Interns of Bangladesh

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Abstract

Background: The number of female medical students in Bangladesh is increasing, but there is a lack of research on gender-based and academic phase differences in their learning strategies. The aim of this study was to analyze the uses and changes of learning strategies among undergraduate medical students and intern doctors based on their gender and different academic phases.

Method: This descriptive cross-section study was conducted among 840 MBBS students and intern doctors from eight medical colleges in Bangladesh from June 2024 to July 2025. A convenient sampling technique was used for selecting participants. Data were collected by the self-administered, structured MSLQ questionnaire. Learning strategies were compared by gender using an independent samples t-test and across academic phases using one-way ANOVA.

Results: The mean scores for females were higher than those for males across all learning strategies, except for critical thinking. Statistically significant differences ($P < 0.05$) were found in learning strategies among students across different phases and intern doctors.

Conclusion: Gender and academic phases are key determinants of learning strategies. Female students are more engaged in self-regulated learning. Students utilize deep and more applied approaches as they progress to higher phases.

Keywords: Gender, Academic Phases, Learning strategies, Undergraduate Medical Students of Bangladesh.

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Introduction:

Learning strategies define the approaches taken by students to learn their academic content.¹ To develop effective strategies, it is essential to understand and maximize students' potential.² The learning strategies are acquired and dynamic characteristics of learner that divided into two broad domains: cognitive-metacognitive & resource management strategies.^{3,4} Generally, the concept of learning strategies is essential for improving educators' teaching methods based on psychology and pedagogy.⁵

Self-regulated learning varies across academic phases due to different interdisciplinary teaching techniques or academic cultures.⁶ Pintrich and Zusho (2007) show how gender differences influence motivation and the way students manage their own learning.⁷ The female students are generally more structured, methodical, organized, and systematic in their study approach than male students.^{8,9}

In contrast, learning needs are universal regardless of gender, showing a similar level of competency in critical thinking skills.¹⁰ Recent studies show that when students' progress from basic science to clinical settings, they tend to move toward active clinical knowledge rather than rote learning.¹¹

Undergraduate medical education in Bangladesh is structured into four distinct academic phases: Phase 1 (1.5 years), Phase 2 (1.0 year), Phase 3 (1.0 year), and Phase 4 (1.5 years), followed by a mandatory one-year internship.¹²

There is a gap in Bangladeshi undergraduate medical education about the influence of gender and academic phases on learning strategies. This study aims to identify and improve learning strategy patterns for students from basic science to clinical settings.

Methods:

In this descriptive cross-sectional study, total 840 participants were included: 151 (17.98%) in phase 1, 161 (19.17%) in phase 2, 163 (19.40%) in phase 3, 178 (21.19%) in phase 4, and 187 (22.26%) intern doctors. Data

Results:

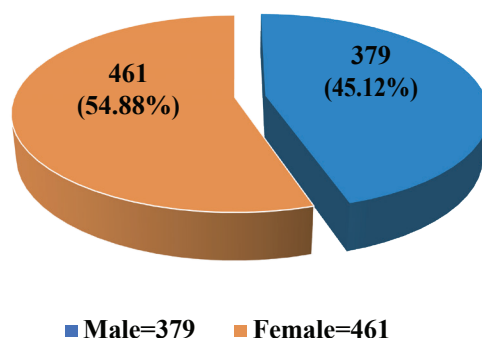


Figure 1 Distribution of the medical students by their gender (n=840)

Figure 1 Pie chart shows the distribution of the student

were collected from four government, three non-government, and one army medical college located in the southwestern region of Bangladesh from July 2024 to June 2025.

A self-administered, structured, Bangla-translated version of the 'Motivated Strategy for Learning questionnaire (MSLQ)' Part B was used, adopted by Khanom and Ahmed (2014).¹³

A convenience sampling technique was used for data collection. Following collection, the data were checked, edited, processed, and analyzed using SPSS version 27. To compare the means of different learning strategies by gender, an independent samples t-test was used, while a one-way ANOVA was performed for academic phase.

according to gender. Out of 840 respondents, 379 (45%) were male and 461 (55%) were female. The male-female ratio was 1: 1.24

Table 1: Comparison of learning strategies between male and female students (n=840)

Learning strategies	Gender	Mean	Stdv.	t (df) Cohen's d	p
Rehearsal	Male(n=379)	5.47	1.063	-2.864 (780)	0.004 **
	Female(n=461)	5.67	.984	-.200	
Elaboration	Male(n=379)	5.57	.858	-1.852 (838)	0.064*
	Female(n=461)	5.69	.913	-.128	
Organization	Male(n=379)	5.61	.971	-2.640 (838)	0.008 *
	Female(n=461)	5.79	.963	-.183	
Critical thinking	Male(n=379)	5.05	1.148	0.188 (838)	0.851*
	Female(n=461)	5.04	1.128	.013	
Metacognitive self regulation	Male(n=379)	5.42	.883	-2.256 (838)	0.024 *
	Female(n=461)	5.56	.869	-.156	

Time and study environment management	Male(n=379)	5.23	1.151	-2.229 (838)	0.026 *
	Female(n=461)	5.41	1.112	-.155	
Effort regulation	Male(n=379)	5.14	1.343	-1.227 (838)	0.220*
	Female(n=461)	5.26	1.315	-.085	
Peer learning	Male(n=379)	5.33	1.270	-1.418 (838)	0.157*
	Female(n=461)	5.45	1.255	-.098	
Help seeking	Male(n=379)	5.26	1.125	-1.898 (838)	0.058*
	Female(n=461)	5.41	1.085	-.132	

*p-value is obtained by two samples independent t-test at 95% level of significance,

**p-value obtained by Welch t-test, P-value <0.05 considered as significant

Note: Welch t-test was used for the learning strategies because the score variation between male and female students was not equal. This test is used when the spread of scores in two groups is different, and it helps give more reliable results.

Table 1 shows that there was a significant difference in the mean scores of rehearsal, organisation, metacognitive self-regulation, time and study environment management strategies among the male and female students, but the effect size was small (<0.2). There were no significant differences

in the scores of the other five learning strategies. Here, mean scores of females were higher than males across all learning strategies except critical thinking, where the male mean was 5.05 and the female was 5.04.

Table 2: Comparison of the students by their academic phases with their cognitive and metacognitive strategies.(n=840)

Learning strategies	Academic area	N	Mean±SD	Levene's test based on mean		Comparison of means		
				Statistic	P*	Statistic	P*	
Rehearsal	Phase - 1 ^φ	151	5.66±1.014	6.930	<.001	16.473 ^β	<.001	
	Phase - 2 ^φ	161	5.56±.979					
	Phase - 3 ^φ	163	5.28±1.125					
	Phase - 4 ^φ	178	5.39±.996					
	Intern	187	6.02±.851					
Elaboration	Phase - 1 ^φ	151	5.71±.821	7.451	<.001	11.954 ^β	<.001	
	Phase - 2 ^φ	161	5.53±.806					
	Phase - 3 ^φ	163	5.53±.962					
	Phase - 4 ^φ	178	5.43±1.003					
	Intern	187	5.96±.734					
Organization	Phase - 1	151	5.86±.973	7.517	<.001	13.145 ^β	.001	
	Phase - 2 ^φ	161	5.52±.933					
	Phase - 3 ^φ	163	5.54±1.051					
	Phase - 4 ^φ	178	5.54±.997					
	Intern	187	6.05±.781					

Critical thinking	Phase - 1 [¶]	151	4.86±1.190	7.575	<.001	29.508	β	<.001
	Phase - 2 [¶]	161	4.79±.964					
	Phase - 3 [¶]	163	4.70±1.136					
	Phase - 4 [¶]	178	5.04±1.137					
	Intern	187	5.71±.9537					
Metacognitive self -regulation	Phase - 1 [¶]	151	5.48±.825	5.145	<.001	21.828	β	<.001
	Phase - 2 [¶]	161	5.33±.903					
	Phase - 3 [¶]	163	5.27±.861					
	Phase - 4 [¶]	178	5.41±.900					
	Intern	187	5.94±.725					

* = Two-sided significance level, α = F value of one-way ANOVA, β = Test statistic value of welch ANOVA

[¶]=Dunnnett t test (2 sided) done to compare the mean agreement of the students of phase with the mean agreement of intern.

NB: For each strategy, mean scores and standard deviations (Mean $\pm$ SD) are reported, alongside results from Levene's test for homogeneity of variances and Welch's ANOVA for mean comparisons.

Table 2 shows significant differences ($P < 0.05$) in cognitive and metacognitive learning strategies among students across different phases and internships. Here, a clear progression in the use of cognitive and metacognitive learning strategies

across academic phases is seen. Interns consistently show the highest mean scores, compared by Dunnnett's post hoc test. It suggests a maturation of self-regulated learning behaviours developed over time.

Table 3: Comparison of the students by their academic phases with their resource management strategies. (n=840)

Learning strategies	Academic area	N	Mean $\pm$ SD	Levene's test based on mean		Comparison of means		
				Statistic	P*	Statistic	β	P*
Time and study environments	Phase - 1 [¶]	151	5.17 $\pm$ 1.124	2.945	.020	26.560	β	<.001
	Phase - 2 [¶]	161	5.03 $\pm$ 1.158					
	Phase - 3 [¶]	163	5.01 $\pm$ 1.056					
	Phase - 4 [¶]	178	5.34 $\pm$ 1.049					
	Intern	187	5.98 $\pm$.993					
Effort regulation	Phase - 1 [¶]	151	4.99 $\pm$ 1.444	3.342	.010	22.341	β	<.001
	Phase - 2 [¶]	161	4.90 $\pm$ 1.352					
	Phase - 3 [¶]	163	4.87 $\pm$ 1.221					
	Phase - 4 [¶]	178	5.25 $\pm$ 1.209					
	Intern	187	5.89 $\pm$ 1.149					
Peer learning	Phase - 1	151	5.25 $\pm$ 1.447	14.159	<.001	18.891	β	<.001
	Phase - 2 [¶]	161	5.17 $\pm$ 1.391					
	Phase - 3 [¶]	163	5.22 $\pm$ 1.262					
	Phase - 4 [¶]	178	5.32 $\pm$ 1.204					
	Intern	187	5.93 $\pm$.827					
Help -seeking	Phase - 1 [¶]	151	5.30 $\pm$ 1.234	4.465	.001	12.506	β	<.001
	Phase - 2 [¶]	161	5.25 $\pm$ 1.016					
	Phase - 3 [¶]	163	5.00 $\pm$ 1.081					
	Phase - 4 [¶]	178	5.36 $\pm$ 1.169					
	Intern	187	5.72 $\pm$.903					

* = Two-sided significance level, α = F value of one-way ANOVA, β = Test statistic value of welch ANOVA

φ = Dunnett t test (2 sided) done to compare the mean agreement of the students of phase with the mean agreement of intern.

NB: For each strategy, mean scores and standard deviations (Mean $\pm$ SD) are reported, alongside results from Levene's test for homogeneity of variances and Welch's ANOVA for mean comparisons.

Table 3 reveals statistically significant differences ($P < 0.05$) in students' use of resource management strategies—including time and study environments, effort regulation, peer learning, and help-seeking—across academic phases. Interns consistently show the highest mean scores, compared by Dunnett's post hoc test. It suggests a maturation of self-regulated learning behaviours developed over time.

Discussion:

Study finding showed that among all (840) respondents, male were 379 (45%) and female were 461 (55%). The male-female ratio was 1: 1.24. The percentage of female medical students was more in comparison to male. As reported by Akhter et al. (2024), Over a ten-year span, admission to various government, non-government, and armed forces medical colleges in Bangladesh was 55.21% for female students and 44.79% for male students¹⁴.

In our study there were significant differences in mean scores of rehearsal, organization, metacognitive self-regulation, time, and study environment management strategies among the male and female students, but the effect size was small (<0.2). There were no significant differences in the scores of the other five learning strategies. These results partially coincided with the findings of Bidjerano (2005), where critical thinking, peer learning, and help-seeking strategies were not significant¹⁵. Here, mean scores of females were higher than males across all learning strategies except critical thinking, where the male mean was 5.05 ± 1.14 and the female mean was 5.04 ± 1.12 . This may be due to greater engagement of female students in self-regulated learning. The results were almost similar to the result of Balam (2015), where only peer learning's mean score of males (4.26 ± 1.49) was higher than female (3.92 ± 1.71)⁸. According to Simsek and Balaban (2010), female students used a greater number of learning strategies compared to male students¹⁶.

In this study significant variations were found in learning strategy across academic phases, markedly during the internship period. The results suggest a progression across surface-to-deep strategies of self-regulated learning.

The study found significant differences in rehearsal strategy across academic phases. Interns relied less on this strategy during their clinical exposure, suggesting surface strategies decline in the advanced phase due to more adoption of a deeper learning approach, aligned with the study of Biggs (1987).⁹

Similarly, interns use elaboration strategies much more than the students of earlier stages, due to increasing connection of theoretical knowledge with clinical exposure, as noted by Weinstein and Mayer (1983).¹⁷

The organizational strategy showed significant differences across academic phases. Early students use external organisation tools (e.g., outlining, clustering) more than interns. Interns rely on internal organisation processes for their clinical reasoning. This aligns with the findings of Prinrich (1991) and Weinstein and Mayer (1983), where they found organisational strategies peak in content-heavy phases and become more internalised later.^{4,17}

The critical thinking strategy showed significant differences across all academic phases, where interns differ from all other phases. This may be due to progressive development in applying knowledge, analysing problems, and evaluating solutions in a later phase. The similar theme mentioned by Halpern (1998) matched with this study.¹⁸

The metacognitive self-regulation strategy showed significant differences across all phases, where interns differ from all earlier phases. This may be due to planning, monitoring, and adaptive strategies growing as students advance. Prinrich (1991) and Dunn et al. (2012) found that metacognitive skills develop with experience.^{4,19}

Time and study environment management strategies also changed in our study, with interns showing more independence in scheduling and setting up their workspaces. A previous study by Pintrich (1991) found that students' progress from preclinical to clinical phases with their management strategy, autonomy and responsibility.⁴

Due to the increased demands of real-world work and time-sensitive tasks, the self-motivated, time-sensitive effort regulation techniques were more prominent during the internship. A similar suggestion is reflected in the study of Printrich (1991) and Dunn et al. (2012).^{4,19}

Peer learning became more purposeful and goal-orientated in clinical settings, from textbook discussion to collaborative case-based clinical discussion for achieving group goals and individual accountability. This study aligned with Slavin (1996), who showed that effective peer learning in advanced ages is not only for sharing information but also for positive interdependence, individual accountability, and fostering group goals.²⁰

The use of help-seeking strategies showed significant differences across academic phases, where interns differ from all earlier phases. Initial hesitation is seen in earlier-phase students, whereas in interns, they actively seek guidance from seniors or supervisors for clinical decision-making. According to Ames (1982), a student's decision to seek help is shaped by several factors, such as their confidence in understanding the material, their own belief, feeling safe to ask questions, and whether the learning environment encourages or discourages help-seeking.²¹

These factors are partially relevant for students in later phases and interns, where help-seeking becomes a purposeful and necessary part of the learning process.

Limitations:

The use of convenience sampling and self-reported MSLQ scores may introduce selection and response biases. Additionally, as data were limited to the southwestern region of Bangladesh, the findings may not be fully generalizable.

Conclusion:

In this study female students had higher learning strategy scores than male students. A significant variation was observed in the clinical phase, transitioning from rote learning toward active knowledge construction. These findings highlight the need for curriculum reform based on self-regulated and self-paced learning. Furthermore, this study assists in phase-specific interventions, where gender remains an observational finding.

Recommendations:

The medical curriculum should be reformed from teacher-centered rote learning to student-centered, self-regulated, and self-paced learning, where the teacher acts as a mentor. Male students should be encouraged to adopt more diverse learning strategies. Academic interventions should be phase-specific and pedagogical, where the basic science phase prepares students for future active applied knowledge construction in clinical settings.

Authors' statements:

Ethical approval:

Ethical approval was obtained from the Institutional Review Board of the Centre for Medical Education. Verbal consent was obtained from all participants before data collection, with assurances of confidentiality, anonymity, and voluntary participation.

Acknowledgement:

The author would like to express sincere gratitude to all the faculty members of the Centre for Medical Education (CME). The author also extends appreciation to all the medical students and interns who participated in and contributed to this study.

Funding:

The authors disclose that no financial funding was received for the research, authorship, or publishing of this article.

Conflict of interest:

The authors state that they have no financial or personal relationships that could inappropriately influence this work.

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1. Dr. Md. Ashraful Kabir: primarily responsible for the drafting of the article.
2. Dr. Kazi Khairul Alam: Conceptualization and data analysis
3. Professor Dr. Mohammad Shadrul Alam: Review and supervision.
4. Dr. Md. Abdal Miah: Helps in questionnaire preparation and correction of article.
5. Dr. Biplab Kumar Das: Conceptualization and data collection.
6. Dr. Mohammad Abu Sayeed Talukdar: Providing access

to necessary resources and creating figures and tables.

7. Dr. Kanika Roy: Providing access to necessary resources and manuscript drafting.

8. Dr. Md. Kamrul Islam: Helps in data collection.

9. Dr. Mohammad Saiful Islam, Providing review and update.

References:

1. Bickerdike A, O'Deasmhunaigh C, O'Flynn S, O'Tuathaigh CM. Learning strategies, study habits and social networking activity of undergraduate medical students. *International Journal of Medical Education*. 2016;7(1):230–236. Retrieved from doi:10.5116/ijme.576f.d074 on November 5, 2025.
2. Suleiman IB, Okunade OA, Dada EG, Ezeanya UC. Key factors influencing students' academic performance. *Journal of Electrical Systems and Information Technology*. 2024;11(1):1–18.
3. Duncan TG, McKeachie WJ. The making of the motivated strategies for learning questionnaire. *Educational Psychologist*. 2005;40(2):117–128.
4. Pintrich PR, Smith DAF, García T, McKeachie WJ. A manual for the use of the Motivated Strategies for Learning Questionnaire (MSLQ). Ann Arbor (MI): University of Michigan, National Center for Research to Improve Postsecondary Teaching and Learning (NCRIPTAL); 1991. p. 1–87.
5. Wegner C, Minnaert L, Strehlke F. The importance of learning strategies and how the project 'kolumbus-kids' promotes them successfully. *European Journal of Science and Mathematics Education*. 2013;1(3):137–143.
6. Virtanen P, Nevgi A. Disciplinary and gender differences among higher education students in self-regulated learning strategies. *Educational Psychology*. 2010;30(3):323–347.
7. Pintrich PR, Zusho A. Student motivation and self-regulated learning in the college classroom. In: Perry R, Smart JC, editors. *The scholarship of teaching and learning in higher education: An evidence-based perspective*. Dordrecht: Springer; 2007. p. 731–810.
8. Balam EM. Learning strategies and motivation of graduate students: Is gender a factor? *Institute for Learning Styles Journal*. 2015;1(1):1–9.
9. Biggs JB. Student approaches to learning and studying: Research monograph. Hawthorn (Australia): Australian Council for Educational Research; 1987. p. 1–152.
10. Marni S, Aliman M, Suyono, Roekhan, Harsiati T. Students' critical thinking skills based on gender and knowledge group. *Journal of Turkish Science Education*. 2020;17(4):544–560.
11. Ensminger DC, Hoyt AE, Chandrasekhar AJ, McNulty JA. Changes in study strategies of medical students between basic science courses and clerkships are associated with performance. *Journal of Education and Learning*. 2013;2(4):77–86. doi:10.5539/jel.v2n4p77
12. Bangladesh Medical and Dental Council (BMDC). Curriculum for Undergraduate Medical Education in Bangladesh. Dhaka: BMDC; 2021.
13. Khanom M, Ahmed O. The translated Bangla version of the Motivated Strategies for Learning Questionnaire. Dhaka: Department of Psychology, University of Dhaka; 2014.
14. Akhter N, Talukdar MHK, Alam MKK, Khan MKA, Mujahid AA. Extent of feminization of medical education in Bangladesh: A document. *Bangladesh Journal of Medical Education*. 2024;15(1):49–56. Retrieved from <https://doi.org/10.3329/bjme.v15i1.70949> on April 5, 2025.
15. Bidjerano T. Gender differences in self-regulated learning. In: *Annual Meeting of the Northeastern Educational Research Association*; 2005 Oct 19–21; Kerhonkson, NY. p. 1–8.
16. Simsek A, Balaban J. Learning strategies of successful and unsuccessful university students. *Contemporary Educational Technology*. 2010;1(1):36–45.
17. Weinstein CE, Mayer RE. The teaching of learning strategies. *Innovation Abstracts*. 1983;5(32):1–4.
18. Halpern DF. Teaching critical thinking for transfer across domains: Dispositions, skills, structure training, and metacognitive monitoring. *American Psychologist*. 1998;53(4):449–455. Retrieved from doi:10.1037/0003-066X.53.4.449 on April 9, 2025.
19. Dunn KE, Lo WJ, Mulvenon SW, Sutcliffe R. Revisiting the motivated strategies for learning questionnaire: A theoretical and statistical reevaluation of the metacognitive self-regulation and effort regulation subscales. *Educational and Psychological Measurement*. 2012;72(2):312–331. Retrieved from DOI: 10.1177/0013164411413461 on April 5, 2025.
20. Slavin RE. Research on cooperative learning and achievement: What we know, what we need to know. Center for Research on the Education of Students Placed at Risk. 1995;1(1):1–18. Retrieved from DOI:10.1006/ceps.1996.0004 on April 25, 2025.
21. Ames R, Lau S. An attributional analysis of student help-seeking in academic settings. *Journal of Educational Psychology*. 1982;74(3):414–423. Retrieved from <https://doi.org/10.1037/a0026838> on January 26, 2025.