Strides Dev Med Educ. 2025 July; 22(1):e1532. doi 10.22062/sdme.2025.200953.1532

Original Article

Relationship Between Learning Approaches and Critical Thinking Disposition Among Medical Students

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Received: 2025 February 22
Revised: 2025 June 23
Accepted: 2025 July 27
Published online: 2025 July 27

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Citation:
Zeidabadi B, Ehsani Nasab M, Rastjoo S, Moqaddasi Amiri M, Ghasemi Nejad Raeini M. Relationship Between Learning Approaches and Critical Thinking Disposition Among Medical Students. Strides Dev Med Educ. 2025 July; 22(1):e1532. doi:10.22062/sdme.2025.200953.1532

Abstract

Background: Effective learning and strong critical thinking are vital for health sciences students navigating an evolving field. This underscores the importance of understanding how their learning approaches relate to their critical thinking tendencies in health sciences education. However, variations in these skills among students and the challenges in applying knowledge in professional settings highlight the need for focused investigation within specific educational contexts.

Objectives: This study evaluated the learning approaches and critical thinking dispositions of medical students at Sirjan University of Medical Sciences to inform educational enhancement.

Methods: This descriptive-analytical study examined critical thinking dispositions and learning approaches among 310 students. Data were collected via questionnaires. Independent samples t-tests and Pearson correlations were used for data analysis.

Results: The mean score for critical thinking disposition indicated a moderate tendency toward critical thinking. Creativity was related to gender ($p < 0.001$), as was the strategic learning approach ($p < 0.001$). Deep and strategic learning approaches showed significant positive correlations with critical thinking disposition ($p < 0.001$). The surface approach showed a weak negative correlation with critical thinking disposition ($p < 0.001$).

Conclusion: Transforming teaching and evaluation approaches may enhance the effectiveness of the deep learning approach. Active and innovative teaching strategies can increase students' motivation and critical thinking skills.

Keywords: Learning Approaches; Critical Thinking Disposition; Deep Approach; Surface Approach; Strategic Approach

Background

Higher education, as a pivotal institution for a nation's comprehensive development, must equip learners with the necessary knowledge, attitudes, and skills while fostering insight that enables lifelong learning and active participation in development and personal growth (1). Consequently, one of the aims of universities is to enhance the quality of education and students' academic success, as poor performance incurs significant financial and intangible costs for both the institutions and the students themselves (2). Research has consistently demonstrated the fundamental role of critical thinking and learning approaches in student success, with the development of these skills during education directly impacting the quality of learning (3). Moreover, lifelong learning necessitates that students and graduates possess critical thinking skills and the ability to learn independently, thereby fostering their continuous professional development and enabling them to emerge as informed, skilled, and actively contributing members of society (4). To this end, focusing on students' learning processes is crucial for improving their educational experience. However, observations at the university level suggest that many

graduates struggle to apply the knowledge they have acquired in professional settings. Furthermore, empirical evidence suggests variations in these skill levels among university students, with some failing to acquire them adequately (3, 5, 6), leading to unforeseen challenges, lack of engagement, and insufficient development of necessary academic capabilities during their studies (7), hindering their ability to utilize knowledge in real-life and professional contexts post-graduation.

This may be due to students memorizing material rather than engaging in meaningful learning (8). For academic and professional success, students must understand their learning and study skills, as well as their academic strengths and weaknesses, learning preferences, and the distinction between surface and deep learning. They should adopt deep, meaningful learning methods (9) and cultivate key skills, such as logical and critical thinking—the abilities to analyze, synthesize, and evaluate (10).

Prior research on this topic, conducted in various countries, along with its findings, highlights the importance of this issue, particularly in higher education. Research evidence suggests that critical thinking and study process strategies, as cognitive variables, make unique contributions (11). However, domestic research on this topic is limited and often examines these variables in isolation. Therefore, it is essential to investigate students' learning approaches and critical thinking dispositions as key factors in the learning process, particularly the inclination towards analytical and critical thought, defined as the intrinsic motivation for critical thinking when facing problems (12).

Research on critical thinking dispositions in Iran is limited and has predominantly focused on cognitive skills. Existing studies show varied results, with some indicating low to moderate critical thinking dispositions among students at different levels, suggesting a less than satisfactory situation (13-16). Higher education is expected to equip students with critical thinking skills for analytical problem-solving (17). Therefore, insight and awareness of students' learning approaches and their tendency towards critical thinking, and making decisions to improve the teaching-learning process based on this insight, are beneficial (18).

Therefore, considering the present study's aim to investigate the relationship between learning approaches and critical thinking dispositions among medical students at Sirjan University of Medical Sciences, understanding the status and correlation of these factors can assist educational planners in promoting critical thinking and deep learning approaches within this student population.

Objectives

This research aims to evaluate the current state of learning approaches and critical thinking dispositions among medical students at Sirjan University of Medical Sciences, with the intent of informing and enhancing higher education outcomes within the medical sciences.

Methods

Design and Setting(s): This research is a descriptive-analytical study employing a cross-sectional method, aimed at investigating the relationship between learning approaches and dispositions toward critical thinking among students at Sirjan University of Medical Sciences in 2024.

Participants and Sampling: A sample of 310 individuals was recruited for this study using a proportional stratified random sampling method. This sample size was calculated based on considerations similar to those in a prior study (19), with an allowance of 10% for anticipated attrition.

The participants were selected proportionally from the three faculties within the university to ensure representation: approximately 12.26% from the Faculty of Medicine (38 students), 51% from the Paramedical Faculty (158 students), and 36.77% from the Faculty of Nursing and Midwifery (114 students). Students were randomly selected from within each faculty. The inclusion criterion for the study was all undergraduate students who had completed at least one semester of their studies, as well as those who were willing to participate in the research and answer the questions. The exclusion criteria were incomplete questionnaires, first-semester students, guest students, and students who were unwilling to cooperate in the research.

Tools/Instruments: After obtaining the necessary permissions from the faculty and explaining the project's objectives to the students, the confidentiality of the responses was emphasized, and verbal consent was obtained from them. The questionnaires were then distributed among the students by a research assistant at the faculty location and collected upon completion. For data collection, a) the Revised Two-Factor Study Process Questionnaire (R-SPQ-2F) by Biggs et al. (2001), and b) the Ricketts Critical Thinking Disposition Inventory (CTDI) were used.

a) the Revised Two-Factor Study Process Questionnaire (R-SPQ-2F) by Biggs et al. (2001), which includes 32 items, measures three approaches: deep,

surface, and strategic. The deep approach (13 items), strategic approach (11 items), and surface approach (8 items) are measured on a five-point Likert scale, ranging from "strongly agree" to "strongly disagree". The scores for each approach are obtained by summing the scores of the items in that approach. The reliability and validity of the questionnaire have been confirmed in various studies. Cronbach's alpha in the study by Mehdinezhad and Esmaeeli was obtained as 0.84 (20). In this study, the Approaches questionnaire had a Cronbach's alpha of 0.74.

b) The Ricketts Critical Thinking Disposition Inventory (CTDI): The critical thinking questionnaire was designed by Ricketts and has three subscales. The first part includes 11 questions to measure the creativity scale, the second part includes 9 questions regarding the perfectionism scale, and the third part includes 13 questions for the commitment scale, which are scored based on a 5-point Likert scale (strongly disagree to strongly agree) (21). The score of each subscale is obtained by summing the scores of the items related to each subscale, and the total score of the tendency to critical thinking is obtained by summing the scores of the three subscales, which can be determined based on the mean total score, strong, moderate, and weak tendencies. In this way, a score of 135.31 and above describes a strong tendency.

A score of 108.91 to 135.30 indicates a moderate tendency, and a score of 108.90 and below indicates a weak tendency towards critical thinking. Ricketts (2003) administered the critical thinking disposition questionnaire to 60 second-year agricultural students in order to normalize it. The reliability coefficients for the subscales were reported as follows: creativity subscale, 0.75; perfectionism subscale, 0.57; and commitment subscale, 0.86. Furthermore, given that this scale was developed based on the original work by Fasion (1990), its construct validity has also been confirmed (21). The reliability and validity of the Ricketts Critical Thinking Disposition Inventory (CTDI) have been evaluated in Iran; Pakmehr et al. investigated the psychometric properties of the Persian version of the CTDI among high school students in Mashhad (22). In this study, the Critical Thinking Dispositions Questionnaire demonstrated a Cronbach's alpha of 0.65.

Data Analysis: In this study, data analysis was performed using SPSS Statistics version 20. Both descriptive and inferential statistics were employed to analyze the collected data. Descriptive statistics included frequencies, percentages, means, and standard deviations. Before inferential analysis, the normality of the data was assessed using the Kolmogorov-Smirnov test. Upon confirming normality, inferential analyses were conducted using independent-samples t-tests and Pearson's correlation coefficient. The significance level for all tests was set at 0.05.

Results

Participants in this study were 310 students from Sirjan University of Medical Sciences. The mean age of the participants was 19.5 years (SD = 0.9), and the sample consisted of 237 females (76.5%) and 73 males (23.5%) students

The mean score for critical thinking disposition was 117.35 ± 13.15, indicating a moderate level of critical thinking disposition. Independent samples t-tests revealed no significant difference in critical thinking disposition between males (mean = 115.48 ± 14.26) and females (mean = 117.91 ± 12.78) ($p = 0.189$). Regarding the components of critical thinking disposition, the mean commitment score for males was 47.43 ± 10.53, and for females, it was 47.91 ± 6.34, with no significant gender difference found ($p = 0.722$). For perfectionism, the mean scores were 28.85 ± 3.68 for males and 28.48 ± 4.67 for females, with no significant gender difference observed ($p = 0.547$). However, a significant difference emerged for creativity, with males scoring a mean of 38.61 ± 6.38 and females scoring a mean of 41.58 ± 6.53 ($p < 0.001$), indicating that females demonstrated significantly higher creativity scores than males. Concerning learning approaches, the most common approaches among students, based on the mean scores, were the deep approach (mean = 46.30 ± 6.49), followed by the strategic approach (mean = 38.92 ± 5.05), and then the surface approach (mean = 26.74 ± 5.38). No significant difference was found between the mean surface approach scores for males (mean = 26.86 ± 5.62) and females (mean = 26.71 ± 5.31) ($p=0.83$). However, a significant difference was observed for the strategic approach ($p < 0.001$), with females scoring higher (mean = 39.52 ± 4.91) than males (mean = 36.94 ± 5.05). Finally, no significant difference was found between the mean deep approach scores for males (mean = 46.07 ± 7.19) and females (mean = 46.36 ± 6.29) ($p=0.743$) (Table 1).

Table 2 presents the correlations between learning approaches and critical thinking disposition among the participating students. The results reveal a significant positive relationship between both deep and strategic learning approaches and critical thinking disposition. Specifically, students who adopt deep and strategic

learning approaches demonstrate a greater propensity for critical thinking.

A significant correlation ($r = 0.608$, $P < 0.001$) was observed between the deep learning approach and critical thinking disposition. Similarly, a positive and significant correlation ($r = 0.544$, $P < 0.001$) was found between the strategic learning approach and critical thinking disposition. Conversely, the surface learning approach demonstrated a significant negative correlation ($r = -0.051$, $P < 0.001$) with critical thinking disposition.

In addition to critical thinking disposition, table 2 also displays correlations between learning approaches and other variables such as commitment, perfectionism, and creativity. The findings indicate that deep and strategic learning approaches are positively associated with commitment and creativity, while the surface approach exhibits a negative relationship with these variables. Specifically, the correlation between Strategic Approach and Creativity was further analyzed by gender. The correlation coefficient for males was 0.394 ($p = 0.001$), and for females, it was 0.483 ($p < 0.001$), suggesting a stronger positive relationship between strategic approach and creativity in females.

Discussion

Research on medical students' learning approaches suggests that while deep learning often correlates with better outcomes, surface, strategic, and deep approaches are present to varying degrees. These approaches are influenced by both educational environments and individual factors, resulting in diverse patterns across universities globally.

Contrasting patterns emerge when examining learning approaches among medical students. Iranian studies (23-25) often indicate a preference for deep learning. However, other Iranian research (20, 26) and some international studies (27) suggest a stronger tendency towards surface learning. Conversely, strategic learning was dominant in other international research (28-30), while deep learning was prominent in another (31). These varied findings highlight the context-specific nature of learning approach adoption in medical education.

Since learning approaches are influenced by the characteristics of the teaching-learning environment and the student's characteristics and perceptions of that situation (32). According to Ramsden (cited in Byrne et al.) (28), factors such as previous educational experiences, students' study orientation, and the characteristics of the educational context and situation, such as teaching and evaluation methods and curriculum, are effective in shaping students' learning approaches. Of course, among the factors that affect learning approaches, the characteristics of the educational situation, particularly teaching and evaluation methods, have the greatest impact on learning approaches (31). Additionally, Entwistle (33) demonstrated the interactive effects on students' learning within the framework of a theoretical model. In this model, he stated that educational and teaching methods directly influence learning approaches.

Teaching and assessment methods significantly influence medical students' learning approaches, with a deep learning approach linked to better outcomes (34-36). Strategies promoting deep learning include group work and qualitative assessments. However, the significant presence of surface and strategic approaches suggests that current methods may inadvertently encourage them, possibly due to traditional lectures and score-focused evaluations.

This study found a significant difference ($p < 0.001$) only in the strategic learning approach between genders, with females scoring higher, aligning with some prior research (20) but contrasting with others (34). The lack of significant gender differences in surface and deep approaches suggests that shared educational context and students' perceptions of it are primary influences on these approaches. Given the uniform curriculum, teaching, and evaluation methods for both male and female students, the absence of significant gender variation in surface and deep learning is logical.

The study found that medical students' critical thinking disposition was average, consistent with Shokornia et al. (37). International research shows varied critical thinking tendencies among university students, with many exhibiting a low disposition (38, 39). Similarly, nurses (40) and other student populations (41, 42) often exhibit a hesitant disposition, highlighting the need for interventions such as problem-based learning (40). The educational environment has a significant influence on critical thinking (43, 44), which is also closely linked to educational quality and student performance (45, 46).

Research (47, 48) highlights the effectiveness of modern teaching techniques in improving these skills. Thus, the relatively lower disposition in this study likely stems from the educational methods employed.

The study found no significant gender difference in critical thinking disposition among students, consistent with other research (38, 39, 49). However, one study reported slightly higher scores for males (50). This lack of difference likely reflects the shared educational

environment and methods for both genders. The prevalent use of traditional lecture-based teaching, which often neglects explicit instruction in critical thinking (13), may contribute to students' moderate disposition towards critical thinking. Modern approaches, such as the flipped classroom, are suggested to better cultivate this skill (51), particularly in medical education. This study found no significant gender differences in the use of deep and surface learning approaches; however, female students were significantly more likely to favor the strategic approach. Other research on gender and learning approaches is inconsistent; one study found no difference (26), while another reported females using the surface approach more (31). Researchers (52) suggest cultural context and societal expectations may explain these discrepancies, highlighting the need for further cross-cultural research.

The study reveals a positive and significant correlation between learning approaches and critical thinking disposition, particularly between strategic and deep approaches and this disposition. This aligns with prior research (11, 14, 53) highlighting a link between deep learning and critical thinking. The significant association is logical given the shared characteristics of these learners. Strategic learners, who consciously control their cognitive processes (54), also show a strong relationship with critical thinking disposition, as both involve metacognitive reflection.

This study's reliance on self-report questionnaires presents a common limitation due to potential response bias, as students' perceptions may not fully represent their actual critical thinking abilities or behaviors. Additionally, the cross-sectional design prevents the establishment of causality; while correlations were found between critical thinking disposition and learning approaches, the direction of influence remains unclear. Future longitudinal studies are necessary to explore these relationships further.

Conclusion

The results of the study showed that all three approaches (deep, strategic, and surface) exist among students, but the average deep learning approach is greater than the strategic approach and the surface approach. Additionally, this study found that students' disposition towards critical thinking was at a moderate level, and a correlation was observed between learning approaches and this disposition. In summary, the results obtained from this research suggest that those responsible for higher education should optimize teaching and evaluation methods. Therefore, it is suggested that by transforming the existing teaching and evaluation approaches, the grounds for strengthening the deep learning approach be provided. It is also suggested that professors make more use of active and modern teaching strategies to increase students' motivation and willingness to apply critical thinking skills.

Acknowledgements: The authors gratefully acknowledge the assistance of all the medical students at Sirjan University who participated in this research.

Conflict of interests: There is no conflict of interest.

Ethical approval: Ethical approval for this study was obtained from the Ethics Committee of Sirjan School \of Medical Sciences, Sirjan, Iran (Ethical Code: IR.SIRUMS.REC.1403.004). All participants were informed about the study's goals, the privacy of their data, and their right to choose whether or not to participate.

Funding/Support: Sirjan University of Medical Sciences has financially supported this study.

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Table 1. Comparison of mean scores for learning approaches and critical thinking disposition by gender using independent samples T-tests

Variable	Minimum Score	Maximum Score	Overall	Male	Female	P-Value*
			Mean (SD)			
Commitment	19	98	47.80 (7.51)	47.43 (10.53)	47.91 (6.34)	0.722
Perfectionism	17	44	28.57 (4.45)	28.85 (3.68)	28.48 (4.67)	0.547
Creativity	19	92	40.89 (6.60)	38.61 (6.38)	41.58 (6.53)	< 0.001
Critical Thinking Disposition	79	175	117.35 (13.15)	115.48 (14.26)	117.91 (12.78)	0.189
Surface Approach	11	39	26.74 (5.38)	26.86 (5.62)	26.71 (5.31)	0.83
Strategic Approach	23	55	38.92 (5.05)	36.94 (5.05)	39.52 (4.91)	< 0.001
Deep Approach	13	65	46.30 (6.49)	46.07 (7.19)	46.36 (6.29)	0.743

*Two independent samples t-test
Minimum and Maximum Scores represent the lowest and highest possible (theoretical) scores for the variables on the measurement instrument used.

Table 2. Correlation between learning approaches and critical thinking disposition in participating students

Variable	Commitment	Perfectionism	Creativity	Critical Thinking Disposition
Deep Approach	0.527*	0.220*	0.459*	0.608*
Strategic Approach	0.483*	0.079	0.482*	0.544*
Surface Approach	-0.109*	-0.326	-0.182	-0.051*

*P-value of Pearson correlation P<0.001