

Investigating the Relationship Between Emotional Intelligence and Self-Directed Learning of Clinical Medical Students: A Cross-Sectional Study

Afsaneh Karimi¹ , Javid Dehghan Haghighi² , Mohammad Okati³ , Leila safabakhsh⁴ 

¹Pregnancy Health Research Center, Zahedan University of Medical Sciences, Zahedan, Iran

²Department of Community Medicine, School of Medicine, Zahedan University of Medical Sciences, Zahedan, Iran

³School of Medicine, Zahedan University of Medical Sciences, Zahedan, Iran

⁴Community Nursing Research Center, Zahedan University of Medical Sciences, Zahedan, Iran

*Corresponding Author: Leila safabakhsh, leilasafabakhsh@gmail.com

Abstract

Introduction: Self-directed learning is a core competency in medical education, enabling learners to regulate their own learning and adapt to rapidly changing clinical environments. Emotional intelligence, defined as the capacity to recognize, understand, and manage emotions, has been proposed as a potential predictor of autonomous learning behaviors. This study examined the relationship between emotional intelligence and self-directed learning among clinical medical students.

Methods: A descriptive-analytical cross-sectional study was conducted among 209 clinical medical students during the 2021–2022 academic year. Data were collected using a three-part instrument consisting of demographic information, the Goleman Emotional Intelligence Questionnaire, and the Fisher Self-Directed Learning Questionnaire. Descriptive statistics, independent t-tests, and one-way ANOVA were used for data analysis.

Results: No significant differences were observed in overall emotional intelligence or self-directed learning according to gender, educational level, or nativity ($P > 0.05$). However, male students scored significantly higher in the self-motivation dimension of emotional intelligence ($P = 0.04$), while married students demonstrated significantly higher self-regulation ($P < 0.001$) and total emotional intelligence scores ($P = 0.04$) than single students. No significant correlation was found between emotional intelligence and self-directed learning ($r = 0.004$, $P = 0.96$).

Conclusion: The findings suggest that no significant relationship exists between emotional intelligence and self-directed learning among clinical medical students. Although selected emotional intelligence dimensions varied according to gender and marital status, emotional intelligence was not significantly associated with self-directed learning. Future longitudinal and multi-center studies are recommended to further explore the relationship between these constructs in medical education.

Keywords: Emotional intelligence, Self-directed learning, Medical students, Clinical education

Citation: Karimi A, Dehghan Haghighi J, Okati M, safabakhsh L. Investigating the relationship between emotional intelligence and self-directed learning of clinical medical students: a cross-sectional study. Health Dev J 2026;15:1147. doi:10.34172/jhad.1147

Received: June 19, 2024, **Revised:** August 11, 2026, **Accepted:** September 5, 2026, **ePublished:** September 13, 2026

Introduction

Self-directed learning (SDL) is considered an essential competency for medical students, particularly those engaged in clinical education. In clinical settings where learners face complex, ambiguous, and rapidly changing situations, the ability to independently identify learning needs, seek relevant information, and regulate learning strategies becomes fundamental. SDL enables medical students to develop a deeper understanding, clinical reasoning skills, and the capacity for lifelong learning, all of which are critical for professional growth in modern medical practice (1). Emotional intelligence (EI) represents another influential factor in learning within clinical environments. EI encompasses abilities such as understanding and regulating one's emotions, demonstrating empathy,

managing interpersonal relationships, and coping with stress. These competencies are especially relevant in clinical education, where students frequently encounter emotionally demanding situations, patient interactions, and team-based decision-making. Higher EI may facilitate better communication, improved adaptation to clinical stressors, and more effective engagement in learning activities (2-4).

EI, along with cognitive and spiritual intelligence, is currently of interest to psychologists and comprises competencies, skills, and facilitators that influence intelligent behavior. Individuals with high EI understand themselves and others effectively, establish appropriate relationships, and adapt and cope effectively with their immediate environment. However, one problem in our educational system is the overemphasis on academic ability,



which neglects the importance of EI in shaping the lives of society members. Nevertheless, influential individuals in society are those with high EI (5, 6).

Currently, it is believed that cognitive intelligence accounts for only about one-fourth of success, with the remainder attributable to other factors, including emotional intelligence and skills. It is said that students with high EI experience fewer academic failures and anxieties. In general, many studies show a positive and significant correlation between EI and academic progress (7).

Moreover, a crucial characteristic of learners in learning environments is their readiness for self-directed learning. Therefore, examining the factors influencing learners' readiness for self-directed learning is essential for improving learning programs. Self-directed learning is a purposeful process typically characterized by behavioral activities involved in identifying and searching for specific information (8-10). The learner consciously takes responsibility for decisions related to goals and activities. Self-directed learning skills are essential for learners' success in the medical profession. To achieve more motivated, deeper learning and greater permanence, students must develop self-directed learning skills. These skills will also help students acquire unique knowledge, skills, and attitudes in their personal and professional growth. Therefore, empowering students to develop the skills necessary for self-directed learning should be a primary goal of educational curricula. The transformation of teaching into learning is needed, and this transition requires individuals to learn how to learn (11-13).

Many authors have claimed that EI enhances an individual's ability to adapt socially, work more effectively in teams, perform better, and cope more effectively with stress and other environmental pressures (5).

In summary, examining the dimensions that contribute to improving students' education and recognizing their abilities and skills are more critical than ever. In today's world with rapidly advancing knowledge and technology, paying attention to self-directed learning, emotional intelligence, and academic adaptability is essential, particularly in higher education.

In previous research at this university, only emotional intelligence or self-directed learning has been investigated separately. It has not been investigated whether emotional intelligence is related to self-leadership learning. Given that emotional intelligence varies across individuals, particularly across cultures, this study examines the relationship between emotional intelligence and self-directed learning among clinical medical students.

Methods

This descriptive-analytic cross-sectional study was conducted in 2022 at Zahedan University of Medical Sciences. The study population included all 209 clinical medical students. Because the total number of eligible students was limited, a census method was used. Before

participation, students were provided with information about the study objectives and procedures. Students who declined participation or submitted incomplete questionnaires were excluded from the analysis.

We used a 3-part questionnaire to collect data for this study, comprising items on demographic characteristics, the Goldman Standard Emotional Intelligence Questionnaire, and the Fisher Standard Self-Directed Learner Questionnaire.

Goleman Emotional Intelligence Questionnaire

The Goleman Emotional Intelligence Questionnaire consists of 33 items rated on a 5-point Likert scale (1 = strongly disagree to 5 = strongly agree). The questionnaire includes five dimensions, and for each dimension, the number of items, possible answers, and score range are as follows:

1. Self-awareness (7 items): possible answers range from 1 to 5; score range 7–35.
2. Self-regulation (6 items): possible answers range from 1 to 5; score range 6–30.
3. Self-motivation (6 items): possible answers range from 1 to 5; score range 6–30.
4. Empathy (7 items): possible answers range from 1 to 5; score range 7–35.
5. Social skills (7 items): possible answers range from 1 to 5; score range 7–35.

The total questionnaire score, therefore, ranges from 33 to 165. In the present study, Cronbach's alpha for the total scale was 0.85.

Self-Directed Learning Questionnaire (Fisher et al.)

The Self-Directed Learning Questionnaire contains 41 items, scored on a 5-point Likert scale (1 = completely disagree, 5 = completely agree). It includes three dimensions:

- Self-control (15 items): possible answers 1–5; score range 15–75.
- Self-management (14 items): possible answers 1–5; score range 14–70.
- Motivation for learning (12 items): possible answers 1–5; score range 12–60.

The total scale score ranges from 41 to 205. Cronbach's alpha in this study was 0.82

The self-directed learning scale is a 41-item self-assessment tool developed by Fisher et al. (2001) (15) and standardized in Iran by Nadi and Sajadian. In this study, the questionnaire's validity was investigated, and its reliability, assessed using Cronbach's alpha, was 0.82. (16). The minimum and maximum scores that can be obtained from this questionnaire are 41 and 205.

The collected data were entered and analyzed using the Statistical Package for the Social Sciences (SPSS) for descriptive statistics (mean, standard deviation, frequency, and percentage) and for analytical statistics (One-sample T-test, independent-samples t-test, F-test, and one-way ANOVA).

Results

Among 209 clinical students, 118 (56.5%) were female, 132 (63.2% were single, and 135 (64.6%) were interns. [Table 1](#) summarizes the participants' demographic characteristics ([Table 1](#)).

Analysis of emotional intelligence by gender revealed no significant difference in total scores between males and females ($P=0.28$). The only exception was the self-motivation subscale, where males scored significantly higher ($P=0.04$).

For the remaining subscales, including empathy and self-regulation, observed differences were not statistically significant.

Table 1. Respondent Demographics

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	91	43.5
	Female	118	56.5
Marital status	Single	132	63.2
	Married	77	36.8
Educational level	Stager	74	35.4
	Intern	135	64.6
Native status	Native	112	53.6
	Non-native	97	46.4

Table 2. Emotional Intelligence and Self-Directed Learning Scores by Gender

Variable	Domain (Sub-Scale)	Male (Mean $\pm$ SD)	Female (Mean $\pm$ SD)	P-Value
Emotional Intelligence	Self-awareness	24.43 $\pm$ 2.76	24.17 $\pm$ 2.86	0.51
	Self-regulation	21.45 $\pm$ 3.12	22.25 $\pm$ 3.15	0.07
	Self-motivation	20.04 $\pm$ 2.96	19.21 $\pm$ 2.87	0.04
	Empathy	16.67 $\pm$ 2.65	15.97 $\pm$ 2.72	0.06
	Social skills	16.23 $\pm$ 2.28	16.23 $\pm$ 2.10	0.99
Total		98.82 $\pm$ 6.16	97.83 $\pm$ 6.93	0.28
Self-Directed Learning	Self-control	52.38 $\pm$ 7.89	50.63 $\pm$ 7.74	0.11
	Self-management	58.32 $\pm$ 8.93	57.73 $\pm$ 9.19	0.64
	Motivation for learning	42.70 $\pm$ 6.40	42.61 $\pm$ 5.86	0.91
	Total	153.42 $\pm$ 21.87	150.98 $\pm$ 21.19	0.42

Table 4. Emotional Intelligence and Self-Directed Learning Subscales by Marital Status and Nativity among Students

Variable	Subscale	Single (Mean $\pm$ SD)	Married (Mean $\pm$ SD)	P-value	Native (Mean $\pm$ SD)	Non-native (Mean $\pm$ SD)	P-value
Emotional Intelligence	Self-awareness	24.06 $\pm$ 2.95	24.66 $\pm$ 2.53	0.14	24.28 $\pm$ 2.89	24.28 $\pm$ 2.73	0.98
	Self-regulation	21.44 $\pm$ 3.13	22.70 $\pm$ 3.06	0.00	21.90 $\pm$ 3.05	21.91 $\pm$ 3.28	0.99
	Self-motivation	19.67 $\pm$ 2.91	19.41 $\pm$ 2.98	0.55	19.53 $\pm$ 3.04	19.62 $\pm$ 2.81	0.84
	Empathy	16.12 $\pm$ 2.52	16.53 $\pm$ 3.00	0.29	16.59 $\pm$ 2.40	15.91 $\pm$ 2.99	0.07
	Social skills	16.26 $\pm$ 2.05	16.18 $\pm$ 2.38	0.81	16.42 $\pm$ 2.33	16.01 $\pm$ 1.96	0.17
Total		97.55 $\pm$ 6.53	99.49 $\pm$ 6.60	0.04	98.73 $\pm$ 6.85	97.72 $\pm$ 6.31	0.27
Self-Directed Learning	Self-control	51.50 $\pm$ 7.85	51.22 $\pm$ 7.86	0.80	51.38 $\pm$ 8.03	51.41 $\pm$ 7.65	0.98
	Self-management	57.13 $\pm$ 9.12	59.48 $\pm$ 8.80	0.07	58.20 $\pm$ 9.15	57.76 $\pm$ 9.00	0.73
	Motivation for learning	42.58 $\pm$ 6.21	42.77 $\pm$ 5.91	0.83	42.72 $\pm$ 5.95	42.57 $\pm$ 6.26	0.85
Total		151.21 $\pm$ 21.91	153.47 $\pm$ 20.70	0.46	152.30 $\pm$ 21.65	151.74 $\pm$ 21.32	0.85

Regarding self-directed learning, males scored slightly higher than females on self-control, self-management, and motivation for learning ([Table 2](#)).

No statistically significant differences were observed between stagers and interns in any of the emotional intelligence or self-directed learning dimensions ([Table 3](#)).

[Table 4](#) shows that no statistically significant differences were observed in self-directed learning or its subscales according to marital status or nativity ($P>0.05$). Regarding emotional intelligence, married students had significantly higher scores in self-regulation ($P<0.001$) and total emotional intelligence ($P=0.04$) compared with single students. No significant differences were found in emotional intelligence scores based on nativity (all $P>0.05$).

No significant correlation was found between total emotional intelligence and total self-directed learning scores ($r=0.004$, $P=0.96$). This finding indicates no meaningful linear relationship between the two variables among the students ([Table 5](#)).

Discussion

The present study examined the relationship between emotional intelligence (EI) and self-directed learning (SDL) among clinical medical students and found no statistically significant association between the two

Table 3. Emotional Intelligence and Self-Directed Learning Scores by Educational Level

Variable	Domain (Sub-Scale)	Stager (Mean $\pm$ SD)	Intern (Mean $\pm$ SD)	P-Value
Emotional Intelligence	Self-awareness	24.23 $\pm$ 2.85	24.31 $\pm$ 2.80	0.84
	Self-regulation	21.92 $\pm$ 2.79	21.90 $\pm$ 3.35	0.96
	Self-motivation	19.49 $\pm$ 3.16	19.62 $\pm$ 2.81	0.75
	Empathy	16.17 $\pm$ 2.82	16.32 $\pm$ 2.65	0.70
	Social skills	16.22 $\pm$ 2.08	16.24 $\pm$ 2.23	0.95
Total		98.02 $\pm$ 6.05	98.39 $\pm$ 6.91	0.70
Self-Directed Learning	Self-control	51.35 $\pm$ 5.10	51.42 $\pm$ 9.01	0.94
	Self-management	58.23 $\pm$ 6.00	57.87 $\pm$ 10.37	0.75
	Motivation for learning	42.63 $\pm$ 4.48	42.66 $\pm$ 6.82	0.98
Total		152.22 $\pm$ 13.09	151.95 $\pm$ 24.91	0.93

Table 5. Correlation between Emotional Intelligence and Self-Directed Learning

Variables	r	P-value
Emotional Intelligence – Self-Directed Learning	0.004	0.96

constructs. Furthermore, most demographic variables, including educational level and nativity, were not significantly associated with EI or SDL. However, significant differences were observed in the self-motivation dimension of emotional intelligence across gender and in self-regulation and total emotional intelligence according to marital status. The absence of a significant correlation between emotional intelligence and self-directed learning contrasts with several previous studies that reported positive associations between these constructs. Zhoc et al. found that emotional intelligence contributed significantly to self-directed learning and academic outcomes among university students (7). Similarly, Koç reported a positive relationship between emotional intelligence, self-directed learning readiness, and academic achievement (13), while Bansal demonstrated that students with higher emotional intelligence tended to exhibit stronger self-directed learning characteristics (5). In contrast, the present study did not identify a meaningful relationship between overall EI and SDL ($r=0.004$, $P=0.96$). One possible explanation is that clinical learning environments differ substantially from the educational settings examined in many previous studies. Clinical training is characterized by structured schedules, intensive supervision, heavy workloads, and limited learner autonomy, factors that may reduce the influence of emotional competencies on independent learning behaviors (14-16). The lack of association may also suggest that emotional intelligence and self-directed learning represent related but distinct constructs. Emotional intelligence primarily reflects emotional awareness, regulation, and interpersonal functioning (4), whereas self-directed learning involves planning, monitoring, and evaluating one's own learning processes (8, 11, 12). Consequently, the development of one competency may not necessarily be accompanied by equivalent growth in the other, particularly within highly structured educational environments. With regard to gender, no significant differences were observed in overall emotional intelligence or self-directed learning scores. However, male students demonstrated significantly higher scores in the self-motivation dimension of emotional intelligence. Self-motivation reflects an individual's capacity to sustain effort, pursue goals, and remain engaged despite challenges. Although this finding was statistically significant, it was limited to a single subscale and therefore should not be generalized to overall emotional intelligence. Previous studies have reported inconsistent findings regarding gender differences in emotional intelligence, with some reporting higher scores among female students and others reporting no significant differences (16, 17). Such discrepancies may reflect variations in cultural contexts, educational settings, and measurement approaches.

Educational level was not significantly associated with either emotional intelligence or self-directed learning. The similarity of scores between stagers and interns may indicate that progression through clinical training alone does not necessarily result in measurable changes in these competencies. Emotional intelligence and self-directed learning are multifaceted attributes that may require deliberate educational interventions, reflective experiences, and supportive learning environments to develop over time rather than relying solely on clinical exposure (8, 18, 19). However, given the cross-sectional design of the present study, developmental interpretations should be made cautiously.

Married students demonstrated higher self-regulation and total emotional intelligence scores than single students. However, given the cross-sectional design of the study, no causal interpretation can be made regarding this association nevertheless, because the study design was cross-sectional, no causal conclusions can be drawn. It is equally plausible that individuals with stronger emotional competencies are more likely to establish and maintain stable interpersonal relationships.

No significant differences in self-directed learning were observed according to marital status or nativity. Likewise, nativity was not associated with any dimension of emotional intelligence. These findings suggest that demographic characteristics alone may have limited influence on emotional intelligence and self-directed learning among clinical medical students. Previous studies have similarly reported inconsistent relationships between demographic variables and these educational constructs, emphasizing the importance of contextual and environmental influences (14, 20).

Although emotional intelligence and self-directed learning were not significantly correlated in this study, both remain important competencies in medical education. Emotional intelligence has been associated with communication skills, professional behavior, stress management, and academic success (1-4, 16, 17), whereas self-directed learning is widely recognized as a fundamental prerequisite for lifelong learning and professional development in healthcare professions (8, 11, 12, 18, 19). Therefore, educational programs may benefit from addressing these competencies through targeted and evidence-informed strategies rather than assuming that improvement in one will automatically enhance the other. Recent evidence suggests that instructional approaches such as blended learning and structured learner-centered activities may enhance self-directed learning abilities among medical students (21). This study has several limitations. First, the sample was drawn from a single institution, which may limit the generalizability of the findings. Second, both emotional intelligence and self-directed learning were assessed using self-report questionnaires, making the results susceptible to response and social desirability bias. Third, the cross-

sectional design precludes examination of developmental changes and prevents causal inference. Future multi-center, longitudinal, and interventional studies are recommended to better understand how emotional intelligence and self-directed learning evolve during medical training and to identify educational approaches that may support their development.

Overall, the findings suggest that emotional intelligence and self-directed learning function largely independently within this population of clinical medical students. While selected emotional intelligence dimensions varied according to gender and marital status, most demographic variables showed limited associations with either construct. These findings highlight the importance of considering emotional intelligence and self-directed learning as complementary but distinct educational outcomes within medical education.

Conclusion

The findings of this study showed no significant correlation between emotional intelligence and self-directed learning among clinical medical students. In addition, most demographic variables were not significantly associated with either construct, although differences were observed in selected emotional intelligence subscales according to gender and marital status.

These findings suggest that emotional intelligence and self-directed learning may represent distinct aspects of student development within clinical medical education. While both constructs are considered important for professional growth and lifelong learning, the present study did not identify a significant relationship between them in this population.

Given the cross-sectional design, causal inferences cannot be made. Future longitudinal, interventional, and multi-institutional studies are recommended to further explore the development of emotional intelligence and self-directed learning and to examine factors that may influence their relationship in medical education settings.

Acknowledgments

The authors would like to thank the Vice Chancellor for Research and Technology of ZAUMS for supporting this project.

Authors' Contribution

Conceptualization: Leila Safabakhsh, Javid Dehghan Haghighi
Data Curation: Mohammad Okati, Afsaneh Karimi
Formal Analysis: Javid Dehghan Haghighi
Investigation: Mohammad Okati
Methodology: Leila Safabakhsh, Javid Dehghan Haghighi
Project Administration: Leila Safabakhsh
Resources: Leila Safabakhsh, Afsaneh Karimi
Supervision: Leila Safabakhsh
Validation: Javid Dehghan Haghighi
Visualization: Leila Safabakhsh
Writing–Original Draft: Leila Safabakhsh, Javid Dehghan Haghighi, Afsaneh Karimi, Mohammad Okati
Writing–Review & Editing: Leila Safabakhsh, Javid Dehghan Haghighi, Afsaneh Karimi, Mohammad Okati

Competing Interests

The authors declare that they have no competing interests.

Ethical Approvals

This study is the result of M.D thesis that was approved by the Ethics Committee of the Deputy of Research and Technology of Zahedan University of Medical Sciences (No: IR.ZAUMS.REC.1400.353).

Funding

None

References

1. Javaid ZK, Mubashar M, Mahmood K, Noor A, Javed N, Akhtar K, et al. Effect of emotional intelligence and self-concept on academic performance: a systematic review of cross-cultural research. *Bulletin of Business and Economics (BBE)* 2024;13(2):189-99. doi:10.61506/01.00315
2. Fathi-Azar E, Hosseinzadeh M, Rahmani F. Relationship between emotional intelligence and academic achievement in Iranian university students: a meta-analysis. *Development Strategies in Medical Education* 2014;1(2):1-8. [Persian].
3. Radfar S, Aghaie M, Motashaker-Arani M, Noohi S, Saburi A. Evaluation of emotional intelligence and its relation to the academic achievement in medical students. *Thrita J Med Sci* 22013;2(2):113-9. doi:10.5812/thrita.8605
4. Salovey P, Mayer JD. Emotional intelligence. *Imagin Cogn Pers* 1990;9(3):185-211. doi:10.2190/DUGG-P24E-52WK-6CDG
5. Bansal K. A relative study of emotional intelligence on self-directed learning. *Mater Today Proc* 2021;37(Pt 2):2934-7. doi:10.1016/j.matpr.2020.08.701
6. Coté AC. Emotional Intelligence, Self-Directed Learning, and Online Success in Adult Learners: A Mediation Model. *Walden University*; 2020.
7. Zhoc KC, Chung TS, King RB. Emotional intelligence (EI) and self-directed learning: examining their relation and contribution to better student learning outcomes in higher education. *Br Educ Res J* 2018;44(6):982-1004. doi:10.1002/berj.3472
8. Garrison DR. Self-directed learning: toward a comprehensive model. *Adult Educ Q (Am Assoc Adult Contin Educ)* 1997;48(1):18-33. doi:10.1177/074171369704800103
9. Jafari M. Investigate the association between the components of emotional intelligence and academic achievement in students. *Razi J Med Sci* 2014;21(125):85-93. [Persian].
10. Okwuduba EN, Nwosu KC, Okigbo EC, Samuel NN, Achugbu C. Impact of intrapersonal and interpersonal emotional intelligence and self-directed learning on academic performance among pre-university science students. *Heliyon* 2021;7(3): e06611. doi:10.1016/j.heliyon.2021.e06611
11. Gibbons M. *The Self-Directed Learning Handbook: Challenging Adolescent Students to Excel*. John Wiley & Sons; 2002.
12. Knowles MS. *Self-Directed Learning: A Guide for Learners and Teachers*. New York: Association Press; 1975.
13. Koç SE. The relationship between emotional intelligence, self-directed learning readiness and achievement. *Int Online J Educ Teach* 2019;6(3):672-88.
14. Khatib Zanjani N, Ajam AA, Badnava S. Determining the relationship between self-directed learning readiness and acceptance of e-learning and academic achievement of students. *Iran Journal of Nursing* 2017;30(106):11-22. doi:10.29252/ijn.30.106.11
15. Razavi SM, Omid A, Rezaee H, Khalesi S. The correlation among emotional intelligence, motivated strategies for learning and the academic performance of dental students in Isfahan University of Medical Sciences during 2017-2018. *J Med Educ Dev* 2020;13(37):77-83. [Persian].
16. Zaheri A, Eshaghi SZ, Kheiri S, Ghaderi H. Investigating the

- relationship between emotional intelligence and academic achievement and academic motivation in students of Shahrekord paramedical school in 1397-1398. *Horiz Med Educ Dev* 2021;12(2):21-32. [Persian].
17. Alnjadat R, Al-Rawashdeh A. Confounding factors affecting the emotional intelligence amongst Jordanian nursing and midwifery undergraduate students during the COVID-19 pandemic's outbreak: a cross-sectional study using USMEQ-i. *Front Psychol* 2021;12:770261. doi:[10.3389/fpsyg.2021.770261](https://doi.org/10.3389/fpsyg.2021.770261)
 18. Fisher M, King J, Tague G. Development of a self-directed learning readiness scale for nursing education. *Nurse Educ Today* 2001;21(7):516-25. doi:[10.1054/nedt.2001.0589](https://doi.org/10.1054/nedt.2001.0589)
 19. Fooladvand M, Nadi MA. Validation of revisited self-directed learning readiness scale for nursing education among Iranian nursing and midwifery students. *J Educ Health Promot* 2019;8:266. doi:[10.4103/jehp.jehp_82_19](https://doi.org/10.4103/jehp.jehp_82_19)
 20. Huang MH. Factors Influencing Self-Directed Learning Readiness Amongst Taiwanese Nursing Students [dissertation]. Queensland University of Technology; 2008.
 21. Lu SY, Ren XP, Xu H, Han D. Improving self-directed learning ability of medical students using the blended teaching method: a quasi-experimental study. *BMC Med Educ* 2023;23(1):616. doi:[10.1186/s12909-023-04565-x](https://doi.org/10.1186/s12909-023-04565-x)