Assessing the current status of self-directed learning skills of Iranian Medical Sciences students

Abstract

Introduction: Self-directed learning (SDL) is a key competency in medical education, enabling students to adapt to rapid advances in medical knowledge and promoting lifelong learning. This study aimed to assess SDL skills among students at Saveh University of Medical Sciences.

Methods: This cross-sectional descriptive study was conducted among 252 students at Saveh University of Medical Sciences during the 2023–2024 academic year. Participants were selected through proportionate stratified random sampling. Data were collected using the 41-item Self-Directed Learning Readiness Scale, assessing self-management, learning motivation, and self-control. Data were analyzed using descriptive statistics, the Mann–Whitney U test, and the Kruskal–Wallis test, followed by Dunn's pairwise comparisons with Bonferroni correction.

Results: The mean age of participants was 22.5 years (SD = 3.2), and 69.8% were female. The mean total SDL score was 162.5 out of 205 (79.3%), indicating moderate readiness. Learning motivation had the highest relative score (82.4%), followed by self-control (81.3%) and self-management (75.4%). No significant difference in total SDL scores was observed between genders ($p = 0.064$). Significant differences across academic disciplines were found in self-management ($p = 0.016$) and total SDL scores ($p = 0.011$), but not in learning motivation or self-control. Anesthesiology students had the highest mean rank for total SDL (166.5), while occupational health students had the lowest (96.6).

Conclusion: Students demonstrated moderate SDL readiness, with learning motivation as the strongest dimension and self-management showing the greatest potential for improvement. Educational interventions, including structured SDL workshops and faculty development programs, are recommended to strengthen students' independent learning competencies. Longitudinal studies are also needed to evaluate the impact of such interventions.

Keywords: Self-directed learning; Learning readiness; Medical students; Medical education; Iran.

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Introduction

A core mission of higher education institutions is to foster lifelong learners who possess the capacity for self-directed inquiry and continuous growth. Accordingly, developing competent and highly skilled human capital stands as one of the fundamental responsibilities of universities in preparing graduates for the complexities of modern professional practice (1, 2). Students represent the cornerstone of higher education systems (3, 4). Academic achievement is widely regarded as one of the primary indicators of institutional performance, leading universities to invest considerable resources in promoting student success (5). A key individual factor contributing to academic outcomes is learning style (6), defined as an individual's characteristic and preferred approach to acquiring, processing, and retaining new information and skills (7).

One of the contemporary learning approaches that can significantly contribute to students' academic success is self-directed learning (SDL) (8, 9).

The most widely accepted definition, proposed by Knowles, describes SDL as a process in which individuals take the initiative, with or without the assistance of others, to diagnose their learning needs, formulate learning goals, identify and implement appropriate learning strategies, and evaluate learning outcomes (10).

This definition underscores two core dimensions of SDL: the process of learning itself and the assumption of personal responsibility for one's own learning (11). According to adult education scholars, SDL encompasses three major components: motivation, metacognition, and self-regulation (12).

Empirical evidence supports the effectiveness of SDL. Nadi et al. (2021) developed and validated an SDL training package and examined its impact on academic engagement and academic vitality among university students at Shahid Bahonar Farhangian University of Isfahan. Their findings revealed statistically significant differences between the intervention and control groups in post-test and follow-up phases. The training package improved academic engagement by 54.5% in the post-test and 44.4% in the follow-up, while its effect on academic vitality was 48.3% and 33%, respectively (13). Similarly, Esfahani et al. (2021) investigated healthcare management students' attitudes toward SDL and found that motivational capacity was perceived as a particularly influential factor in the effectiveness of self-directed learning (14).

SDL is a purposeful process characterized by learners' active engagement in identifying and seeking information, while consciously taking responsibility for setting learning objectives and selecting learning activities (15). Students with high SDL competence tend to be proactive learners who demonstrate strong intrinsic motivation, effective problem-solving skills, and the ability to autonomously manage their learning processes (16). In SDL environments, control shifts from instructors to learners, enabling students to exercise greater autonomy in pursuing their learning goals and making informed decisions about what and how to learn (17, 18). Instructors act as facilitators by modeling effective learning strategies and supporting students in developing their own capabilities (19).

Further supporting this, Karatas and Arpaci (2021) examined the predictive role of SDL, metacognitive awareness, and 21st-century skills on readiness for online learning among prospective teachers in Turkey. Using structural equation modeling (SEM), they found that SDL skills, metacognitive awareness, and 21st-century competencies were significant positive predictors of online learning readiness (20). The benefits of SDL are well-documented and include enhanced decision-making, self-confidence, independence, motivation, efficient use of resources, and the development of lifelong learning skills (21). Consequently, integrating SDL into higher education curricula is essential, as it can positively influence students' academic engagement, vitality, and overall success (22). This approach is particularly relevant in medical education, where rapid advancements in knowledge and the need for continuous learning make SDL a critical competency (23, 24).

Taken together, students' academic and professional success is closely linked to their proficiency in contemporary learning approaches, especially self-directed learning. The more competent students become in SDL, the greater their capacity to achieve educational goals and experience meaningful personal and academic growth. While several studies have examined SDL among Iranian university students and reported both consistent and varying results (25-28), no previous research, to the best of our knowledge, has assessed SDL skills among students at Saveh University of Medical Sciences. Therefore, the present study was conducted in 2023 to evaluate the current status of SDL skills in this population.

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Methods

Study design and setting

The present study was a cross-sectional descriptive study conducted during the 2023–2024 academic year at Saveh University of Medical Sciences.

Sample size and sampling

The study population included all students enrolled at the university (N = 750). The sample size was calculated using Cochran's formula :$n = z^2pq/d^2/[1 + (z^2pq/d^2 - 1)/N] \approx 254$, at a 95% confidence level (z = 1.96, p = q = 0.5 and d = 0.05). A proportionate stratified random sampling method was employed, with academic discipline as the stratum. First, the proportion of students in each academic discipline was determined based on official enrollment statistics. The required sample size for each stratum was then calculated proportionally. Within each stratum, participants were selected using simple random sampling by assigning numerical codes to eligible students and employing Microsoft Excel's random number generator.

Eligibility and participation

Students were eligible if they were enrolled in the 2023–2024 academic year and had completed at least one semester. Students were excluded if guest or transferred students, or incomplete questionnaires]. A total of 254 students were selected and invited; 2 questionnaires were excluded because of incomplete responses. The final analyzed sample therefore comprised 252 students (response rate [99.2%]).

Instrument and scoring

Data were collected using a standardized self-report questionnaire. SDL skills were assessed with the Self-Directed Learning Readiness Scale (SDLRS) originally developed by Fisher et al. (2013) and translated and validated in Persian by Nadi and Sajadian (29).

The instrument comprises 41 items rated on a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). It measures three subscales of SDL: self-management (16 items), learning motivation (11 items), and self-control (14 items). Sample items include "I use a plan to solve my problems" (self-management), "I enjoy studying" (desire for learning), and "I am able to focus on a problem" (self-control). The distribution of items across the subscales is presented in Table 1.

Table 1. Mapping of SDL Questionnaire Items to Their Respective Components

Component	Items	Total Items
Self-Management	1–16	16
Learning Motivation	17–27	11
Self-Control	28–41	14
Total	1–41	41

Item scores were summed to obtain subscale scores (self-management 16–80, learning motivation 11–55, self-control 14–70) and a total score (41–205); higher scores indicate greater SDL readiness. Total scores of [41–96] were classified as low, 97–164 as moderate and [165–205] as high readiness

Reliability

Fisher et al. (2001) reported a Cronbach's alpha of 0.92 for the total scale, with coefficients of 0.85, 0.84, and 0.83 for the self-management, learning motivation, and self-control subscales, respectively (30). In a subsequent study by Behrouzi et al. (2011), Cronbach's alpha was used to calculate the reliability coefficients of the SDL Scale, the results of which are presented in Table 2 (31).

Table 2. Cronbach's Alpha Reliability Coefficients of the SDL Scale as Reported by Behrouzi et al.

Statistical Index	Self-Management	Learning Motivation	Self-Control	Total Scale
Cronbach's Alpha	0.76	0.84	0.31	0.85

Statistical analysis

Data were analyzed using SPSS software version 19. Descriptive statistics, including measures of central tendency and dispersion, were used to summarize the demographic characteristics and SDL scores (mean, standard deviation, median and interquartile range). Normality was assessed with the Kolmogorov–Smirnov test. Due to the non-normal distribution of the data, non-parametric tests (Mann-Whitney U and Kruskal-Wallis) were applied to compare SDL scores by gender and academic discipline. Effect sizes were calculated as $r = |Z|/\sqrt{N}$ for the Mann–Whitney U test and $\varepsilon^2 = H/(N - 1)$ for the Kruskal–Wallis test. Significant Kruskal–Wallis results were followed by Dunn's pairwise

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comparisons with Bonferroni correction. Exact p-values are reported. All statistical tests were two-tailed and performed at a 95% confidence level ($p < 0.05$).

Ethical considerations

The study protocol was approved by the Research Ethics Committee of Saveh University of Medical Sciences (code IR.SAVEHUMS.REC.1403.031, Prior to data collection, the aims of the study were explained. Questionnaires were subsequently distributed among the selected participants after obtaining informed consent. Participation was voluntary and responses were anonymous.

Results

The study population comprised 252 students from Saveh University of Medical Sciences, selected through stratified random sampling. The majority of participants (60.2%) were aged 20–24 years; the mean age was 22.5 years (SD = 3.2; median = 22; range 18–30).

Regarding gender distribution, 69.8% (n = 176) of participants were female and 30.2% (n = 76) were male. Marital status was predominantly single (92.9%). Table 3 presents the number of participating students by field of study and academic level. Most participants (86.9%) were bachelor's students. Nursing was the largest group (n = 46, 18.3%), followed by public health (n = 42, 16.7%); the smallest groups were emergency medicine (n = 19, 7.5%) and environmental health (n = 15, 6.0%).

Table 3. Number of Participating Students by Field of Study and Academic Level (n = 252)

Field of Study	Associate's Degree	Bachelor's Degree	Master's Degree	General Practitioner	Total	% of sample
Public Health	0	42	0	0	42	16.7
Environmental Health	0	15	0	0	15	6.0
Occupational Health	0	25	0	0	25	9.9
Nursing	0	46	0	0	46	18.3
Operating Room	0	29	0	0	29	11.5
Anesthesiology	0	21	0	0	21	8.3
Health Information Technology	0	23	0	0	23	9.1
Medicine	0	0	1	31	32	12.7
Emergency Medicine	1	18	0	0	19	7.5
Total	1	219	1	31	252	100

The Mann–Whitney U test was used to compare total SDL scores between the two gender groups. No statistically significant difference was observed between genders (p = [0.064], r = [0.12]; Table 4). Female students had a slightly higher mean rank ([130.2] vs. [120.5]), but the difference was not statistically significant.

Table 4. Mann–Whitney U Test for Examining Gender Differences in SDL Skills Among Students of Saveh University of Medical Sciences

Group	n	Mean Score	U	Z	p-value	Effect size (r)
Male	76	120.5	7200	−1.85	[0.064]	[0.12]
Female	176	130.2	—	—	—	—

Descriptive statistics for the subscales and total SDL score are presented in Table 4. The mean total SDL score was 162.5 (79.3% of the maximum score of 205), within the moderate range (97–164) and close to its upper limit. As a proportion of the maximum possible score, learning motivation was highest (82.4%), followed by self-control (81.3%) and self-management (75.4%).

Table 5. Descriptive statistics of SDL subscales and total score (n = 252)

Scale	Items	Possible Range	Observed Min–Max	Mean (SD)	Mean, % of max	Readiness Level
Self-Management	16	16–80	36–80	60.3 (0.52)	75.4	Moderate to High

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Scale	Items	Possible Range	Observed Min–Max	Mean (SD)	Mean, % of max	Readiness Level
Learning Motivation	11	11–55	32–54	45.3 (0.40)	82.4	Moderate
Self-Control	14	14–70	42–70	56.9 (0.43)	81.3	Moderate
SDL Skills (total)	41	41–205	120–205	162.5 (1.15)	79.3	Moderate

Mean ranks of SDL differed across disciplines (Table 5). The highest were in anesthesiology (166.5), operating room (150.5), emergency medicine (142.2) and medicine (134.3), and the lowest in occupational health (96.6), health information technology (104.1) and nursing (109.9); the overall mean rank was 126.5.

Table 6. Comparison of Mean Ranks of Self-Management, Learning Motivation, Self-Control, and SDL Skills Across Different Fields of Study at Saveh University of Medical Sciences

Field of Study	n	Mean Rank Self-Management	Mean Rank Motivation	Mean Rank Self-Control	Mean Rank SDL
Public Health	42	133.05	128.24	119.52	128.3
Environmental Health	15	114.57	114.27	122.07	117.8
Occupational Health	25	98.42	95.42	112.34	96.6
Nursing	46	105.08	118.95	109.66	109.9
Operating Room	29	135.43	147.66	153.07	150.5
Anesthesiology	21	168.71	157.69	154.38	166.5
Health Information Technology	23	117.72	105.78	106.87	104.1
Medicine	32	131.63	132.91	145.34	134.3
Emergency Medicine	19	151.97	139.03	125.47	142.2

For inter-disciplinary comparisons, the Kruskal–Wallis test was applied to the scores. Significant differences between disciplines were found in self-management ($H = 18.756$, $df = 8$, $p = 0.016$, $\varepsilon^2 = 0.075$) and in total SDL ($H = 19.725$, $df = 8$, $p = 0.011$, $\varepsilon^2 = 0.079$), but not in learning motivation ($p = 0.070$) or self-control ($p = 0.067$) (Table 7). The effect sizes were small to moderate.

Table 7. Kruskal–Wallis Test Statistics (N = 252)

Subscale	χ^2 Statistic (H)	Degrees of Freedom	p-value	ε^2	Interpretation
Self-Management	18.756	8	0.016	0.075	Significant
Learning Motivation	14.501	8	0.070	0.058	Non-significant
Self-Control	14.617	8	0.067	0.058	Non-significant
SDL	19.725	8	0.011	0.079	Significant

Dunn's pairwise comparisons with Bonferroni correction (Table 8) showed that total SDL was significantly higher in anesthesiology than in occupational health students (adjusted p = [0.043]), and that self-management was significantly higher in anesthesiology than in nursing students (adjusted p = [0.033]) and in occupational health students (adjusted p = [0.040]). No other pairwise difference remained significant after adjustment.

Table 8. Pairwise comparisons (Dunn's test, Bonferroni-adjusted) after significant Kruskal–Wallis results; only pairs with adjusted p < 0.05 are shown.

Scale	Pair	Mean-rank difference	z	Adjusted p
Total SDL	Anesthesiology vs. occupational health	[69.9]	[3.24]	[0.043]
Self-management	Anesthesiology vs. nursing	[63.6]	[3.31]	[0.033]
Self-management	Anesthesiology vs. occupational health	[70.3]	[3.26]	[0.040]

Discussion

The findings of this study, derived from data collected from 252 students at Saveh University of Medical Sciences, showed a moderate level of SDL readiness: the mean total score was 162.5 out of 205 (3.96 per item on the 5-point scale), at the upper end of the moderate band (97–164). As a proportion of the maximum possible score, learning motivation was highest (82.4%; item mean 4.12), followed by self-control (81.3%; 4.06) and self-management (75.4%; 3.77). These are descriptive comparisons; differences between subscales were not tested.

This moderate level is consistent with numerous domestic studies; A moderate level of SDL readiness has also been reported among nursing students at Zanjan University of Medical Sciences (28). Tahmassebzadeh et al. (2017) reported reported moderate-to-high scores at Tabriz University of Medical Sciences, but they studied attitudes toward SDL rather than readiness, so the results are not directly comparable. He reported mean scores in key components such as learner decision-making (4.78 ± 0.78) and motivational factors (4.97 ± 0.51) at a moderate-to-high level, confirming a positive perception of SDL while emphasizing barriers such as insufficient knowledge in this domain (4.78 ± 0.78) (26). A recent study on SDL readiness among basic medical sciences students reported an overall mean of 3.8 out of 5 (32). our per-item mean (3.96) was somewhat higher. Differences in instruments, populations and years limit the comparability of these studies.

Statistically significant inter-disciplinary differences in self-management and in overall SDL skills were found ($H = 18.756$, $p = 0.016$, $\varepsilon^2 = 0.075$ and $H = 19.725$, $p = 0.011$, $\varepsilon^2 = 0.079$, respectively), with small-to-moderate effect sizes. Anesthesiology students had the highest mean ranks, followed by operating room, emergency medicine and medicine students, whereas occupational health, health information technology and nursing students had the lowest (Table 5). Pairwise comparisons with Bonferroni correction showed that anesthesiology students ranked significantly higher than occupational health students for total SDL and higher than both nursing and occupational health students (for self-management; no other pair remained significant). The omnibus differences therefore appear to be driven mainly by the anesthesiology group.

Because this was a cross-sectional study and curriculum content, clinical exposure and academic level were not measured, we cannot determine why the disciplines differ, and our data do not show that clinical training raises SDL. One possible explanation is that practice-oriented training offers more opportunity to practice planning and independent decision-making; this should be tested in studies that measure these exposures. The pattern was also not a simple clinical-versus-theoretical split: nursing students, whose programs include clinical training, ranked below the overall mean rank (109.9 vs. 126.5), whereas public health students ranked above it (128.3). Faculty teaching quality has been associated with SDL in an Iranian study (33).

The absence of statistically significant gender differences in SDL skills (p = [0.064], r = [0.12]); female students had a slightly higher mean rank, but this should not be interpreted as a real difference. This is in line with Isfahani et al. , who reported no gender difference in attitudes toward SDL among health services management students (14). Because the study was not designed to detect small differences, a non-significant result does not show that gender is unrelated to SDL, and we draw no conclusions about educational equity or gender-specific programs.

Learning motivation and self-control did not differ significantly between disciplines, whereas self-management did. In relative terms, self-management had the lowest score, making it the dimension