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The Effect of Self-directed Learning on the Academic Self-efficacy of Dental Students

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Abstract

Background: Achieving academic self-efficacy requires up-to-date knowledge, skills, and self-directed learning. In recent decades, self-directed learning has been recognized as a vital method for keeping dental students current at any stage of their education.

Objectives: This study investigates the effect of self-directed learning on the academic self-efficacy of dental students.

Methods: This descriptive correlational study included all students enrolled at the School of Dentistry, Isfahan University of Medical Sciences. Academic self-efficacy was measured using Owen & Froman's Self-efficacy Scale, while self-directed learning was assessed using Fisher's exact test. The effect of self-directed learning on students' self-efficacy was then determined. Data analysis was performed using the independent *t*-test, Pearson correlation coefficient, and multivariate linear regression.

Results: The Pearson correlation coefficient results indicated a significant correlation between self-directed learning and the academic self-efficacy of dental students. Self-directed learning was found to be a significant predictor of self-efficacy levels in the study sample.

Conclusions: The findings of this study suggest that dental education authorities and professors can enhance self-directed learning by identifying factors that influence academic self-efficacy. Through careful planning and curriculum integration, they can effectively train self-directed students.

Keywords: Self-directed Learning, Academic Self-efficacy, Self-management, Self-control

1. Background

Due to the constant and rapid changes in dental knowledge, possessing a set of knowledge and skills alone does not guarantee success in this profession. Furthermore, much of what dental students learn in college becomes outdated in the real-world environment. Therefore, students should be cultivated into lifelong learners to enhance their success in this profession. As students must be prepared for lifelong learning, self-directed learning theory is increasingly being utilized as a requirement in medical education (1). Self-directed learning has garnered significant attention, with researchers such as Boyer et al. introducing it as a tool for lifelong learning (2). This type of learning fosters knowledge in specific areas and the ability to transfer conceptual knowledge to new situations. It empowers students to identify and fulfill their educational needs independently of a formal education system (3). Readiness for self-directed learning is a primary predictor of general self-management (4).

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In recent years, self-directed learning has been proposed as an integrated framework to influence learning beyond educational systems in various environments, such as the labor market and sales force. Benefits of self-directed learning include increased choice, self-confidence, independence, and motivation (5). Additionally, equipping students with self-directed learning abilities transforms them into lifelong learners, enabling them to recognize and address their learning needs. From an economic perspective, if students become self-directed learners, medical education centers will derive greater benefits from their financial investments (6).

In the medical and dental professions, the ability to direct and organize personal learning experiences is critical to success. Given the proposed benefits of self-directed learning outcomes, educational environments and medical universities emphasize its importance and have deemed self-directed learning skills essential for the 21st century (7).

2. Objectives

While similar studies have been conducted in different fields or target groups, a gap remains in self-directed learning among students in medical education. Therefore, this study aims to investigate the relationship between self-directed learning and the academic self-efficacy of dental students.

3. Methods

The statistical population of this descriptive correlational study comprised all students enrolled in the second semester of the 2018 - 2019 academic year at the School of Dentistry, Isfahan University of Medical Sciences. The sample size was determined based on the population size using the Morgan table or Cochran's formula. Participants were selected through purposive and convenience random sampling methods. Inclusion criteria included consent to participate in the research and completion of at least two years of the dental program during the research period.

Academic self-efficacy was measured using Owen & Froman's Academic Self-efficacy Questionnaire, while participants' levels of self-directed learning were assessed using the survey developed by Fisher, King, and Tague (2001). The effect of self-directed learning on students' self-efficacy was then determined. The validity of Owen & Froman's Academic Self-efficacy Scale was confirmed by experts in Saadat et al.'s research, with a reliability score above 0.70 as determined by Cronbach's alpha (8).

The self-directed learning questionnaire is a 41-item test developed by Fisher, King, and Tague (2001) and was first standardized in Iran by Nadi and Sajadian (9). This scale includes three components: Self-management, desire for learning, and self-control. It is rated on a five-point Likert scale ranging from strongly agree (5) to strongly disagree (1). The self-management component consists of 15 questions, with scores ranging from 15 to 75. The desire for learning component scores range from 11 to 55, and the self-control component scores range from 15 to 75. The total score for students' self-management is obtained by summing these three components. Fisher et al. (as cited by Nadi and Sajadian) reported a Cronbach's alpha reliability coefficient of 0.92 for the entire scale, with coefficients of 0.85, 0.84, and 0.83 for the subscales of self-management, desire for learning, and self-control, respectively (9). The validity of this scale has been deemed acceptable by Roberson Jr through construct validity and confirmatory factor analysis (10).

Data were analyzed using descriptive statistics, including mean and standard deviation, and inferential statistics, including the independent *t*-test, Pearson correlation test, and multivariate linear regression. Information regarding the theoretical framework and its conceptual issues was obtained from scientific resources and library documents.

4. Results

In this study, questionnaires were distributed to 200 dental students at the School of Dentistry. Three questionnaires were excluded from the final analysis due to incompleteness, resulting in 197 questionnaires being analyzed. The mean age of participants was 23.6 years. Regarding gender distribution, 107 participants were female (72%), 42 were male (28%), and 46 did not declare their gender. Participants were categorized into two groups: First years (semesters 1 to 6) and final years (semesters 7 to 12). Thirteen participants reported their education level as below semester 6, 58 reported above semester 6, and 126 did not report their level of education.

The mean and standard deviation of the total self-directed learning score and its three subscales, based on gender and educational status, are presented in Table 1. Additionally, the mean and standard deviation of the self-efficacy score for all students, based on gender and educational status, are reported in Table 2.

The Pearson correlation test was used to evaluate the correlation between self-directed learning and its subscales with academic self-efficacy among dental students, revealing a significant correlation between

Table 1. Mean and Standard Deviation of Self-directed Learning and Its Subscales

Scales	Mean ± SD
Self-directed learning	
Total score	152.10 ± 21.70
Female	156.78 ± 14.98
Male	150.78 ± 26.26
First period	154.53 ± 14.55
Second period	156.60 ± 16.22
Self-control	
Total score	62.46 ± 10.56
Female	65.10 ± 6.78
Male	61.42 ± 12.81
First period	63.53 ± 7.96
Second period	65.00 ± 7.08
Self-management	
Total score	42.73 ± 7.47
Female	43.25 ± 6.46
Male	42.90 ± 9.22
First period	43.53 ± 4.44
Second period	43.67 ± 7.77
Desire for learning	
Total score	46.54 ± 8.10
Female	48.11 ± 5.09
Male	46.23 ± 7.58
First period	47.23 ± 4.78
Second period	47.72 ± 5.33

Table 2. Mean and Standard Deviation of Self-efficacy Scores

Scales	Mean ± SD
Self-efficacy	
Total sample	103.10 ± 17.27
Female	101.96 ± 16.17
Male	107.25 ± 18.07

self-directed learning and academic self-efficacy (Table 3). Furthermore, a significant and positive relationship was observed between academic self-efficacy and the three components of self-management, self-control, and desire for learning (Table 4).

The student's *t*-test was employed to assess the level of academic self-efficacy between male and female dental students, indicating no significant difference in self-efficacy levels between genders (Table 5). The student's *t*-test was also used to evaluate the levels of self-directed learning and academic self-efficacy between first-year and final-year dentistry students, showing no significant difference in self-directed learning and self-efficacy levels between these groups (Table 6).

Regression analysis was conducted to evaluate students' self-efficacy based on the level of self-directed learning, with self-directed learning as the independent variable (predictor) and self-efficacy as the dependent variable (criterion). This analysis demonstrated that self-directed learning could significantly predict the level of self-efficacy in the study sample (Table 7).

5. Discussion

The present study was conducted to investigate the effect of self-directed learning on the academic self-efficacy of dental students at Isfahan University of

Table 3. Pearson Correlation Coefficient of Self-directed Learning and Self-efficacy

Variable	Pearson Correlation Coefficient	P-Value
Self-efficacy-self-directed learning	0.329	≤ 0.001

Table 4. Pearson Correlation Coefficient Between Self-efficacy and Three Components of Self-directed Learning

Variables	Pearson Correlation Coefficient	P-Value
Self-control-self-efficacy	0.162	≤ 0.001
Self-management-self-efficacy	0.462	≤ 0.001
Desire for learning-self-efficacy	0.280	≤ 0.001

Table 5. Results of Comparison of Females and Males in Self-directed Learning and Self-efficacy Scales

Variables	*t*	df	P-Value
Self-directed learning	1.77	195	0.07
Self-efficacy	1.71	195	0.08

Medical Sciences. A total of 200 dental students at the School of Dentistry were evaluated for their levels of self-efficacy and self-directed learning. The mean score for students' self-directed learning was 156, which, according to Fisher's test (2001), indicated that dental students significantly benefited from self-directed learning. Additionally, the students' mean self-efficacy score was 103, suggesting average self-efficacy based on Owen & Froman's Scale.

The results of this study demonstrated a significant and positive association between self-directed learning and students' self-efficacy (Tables 3 and 4), indicating that greater use of self-directed learning strategies led to a higher sense of self-efficacy among students. This finding aligns with the studies of Faridi (11), Farrokh and Shahtalebi (12), and Ranjbar et al. (13), which also reported a positive and significant relationship between self-directed learning and self-efficacy. Hoban and Hoban (14) similarly found a significant and positive relationship between these two components. The primary difference between these studies and the present study lies in the statistical population and the examination of other variables as mediators.

For a more detailed analysis, the relationship between self-efficacy and self-directed learning subscales was examined separately, as outlined in the second to fourth hypotheses. The Pearson correlation coefficient results showed a significant and positive correlation between self-directed learning and the academic self-efficacy of dental students. In other words, higher self-directed learning among students led to a greater sense of self-efficacy.

There was a significant and positive relationship between the desire for learning and academic self-efficacy of dental students, indicating that a greater desire for learning resulted in a higher sense of self-efficacy. Additionally, a significant and positive relationship was observed between self-control in learning processes and academic self-efficacy of dental students, although this relationship was weaker than the other two.

Based on the results of the student's *t*-test, there was no significant difference between females and males in the use of self-directed learning strategies, with neither group having an advantage over the other. This finding aligns with the study by Khatib Zanjani et al., which found no significant difference in self-directed learning readiness across gender and field of study in relation to e-learning acceptance and academic achievement (15).

While few studies have focused on self-directed learning and its related factors, including self-efficacy, research in this area has been increasing in recent years. A study by Zaersabet et al. at Guilan University of Medical Sciences in Iran reported that students' self-directed learning was at a moderate level (3). In a 2016 study by Ingersoll et al., self-directed learning demonstrated different effects compared to other learning methods where the therapist acted as a teacher (16). Edmondson et al. conducted a review that indicated a significant positive association between self-directed

Table 6. Results of Comparison of Students in the First and Last Years in Self-directed Learning and Self-efficacy Scales

Variables	*t*	df	P-Value
Self-directed learning	0.421	195	0.67
Self-efficacy	0.940	195	0.34

Table 7. Results of Regression Analysis of Self-efficacy Prediction Based on Self-directed Learning

Variables	B	Beta	*t*	P-Value
Constant	58.21	-	6.21	0.001
Self-directed learning	0.29	0.329	4.83	0.01

learning and academic performance, future aspirations, creativity, curiosity, and life satisfaction (17).

In their research on self-directed learning and ICT literacy, Abili et al. observed a positive and significant correlation between self-directed learning components and ICT literacy (18). Khazaei and Ashurnezhad found that 98% of changes in self-directed learning were explained by ICDL software and the Internet, highlighting them as effective educational components in fostering self-directed learning (19). Shahraki et al. also identified a significant positive relationship between self-directed learning and cultural intelligence and critical thinking (20).

The similarity of these studies with the present study lies in the focus on self-directed learning as a central component and its relationship with other factors, which were somewhat consistent with the components examined in this research. Additionally, a study on medical students at Isfahan University of Medical Sciences demonstrated a positive and significant relationship between self-directed learning and academic motivation (21). Nadi et al. also explored medical and dental students' perceptions of self-directed learning and its relationship with personal characteristics, finding a significant relationship between self-directed learning readiness and total grade point average and basic sciences score (1).

These studies collectively indicate a high level of self-directed learning readiness among medical students, and the present study corroborates this finding, consistent with other research. This may suggest that students with strong academic standing consider Isfahan University of Medical Sciences as a preferred option.

5.1. Conclusions

The findings suggest that dental students engaged in self-directed learning are motivated to achieve optimal results through self-management, self-control, and a desire for learning. These students are also driven to enhance their self-efficacy by identifying their needs through participatory decision-making, class activities, and taking responsibility for their learning.

5.2. Suggestions

Given the ever-evolving nature of dental science, it is crucial for graduate dentists, as members of the community health and treatment team, to maintain the ability to stay updated post-graduation. Therefore, self-efficacy factors and other influences on students' self-directed learning should be considered to enhance their self-directed learning during university studies and ensure a continued desire to acquire up-to-date knowledge after graduation. Utilizing the results of this study, medical education authorities and professors can identify factors related to self-directed learning, including academic self-efficacy, to train self-directed learners through careful planning and integration of these factors into the curriculum. It is important to note that this study was conducted with dental students, so caution should be exercised when generalizing the results to other disciplines. Additionally, it is recommended that similar research be conducted among graduates.

5.3. Limitations

One limitation of this study was the lengthy response time, which led to some students' reluctance to complete the questionnaire.

Footnotes

Authors' Contribution: FahIme Pakravan: Supervsing the implementation of the article; Mehdi Nasr Isfahani: English translation; Nematollah Salehi Najafabadi: Help with data collection; Fahimeh Moslehi: Data collection; Fatemeh Abbasi: Article editing, submission, follow up.

Conflict of Interests Statement: There is no conflict of interests.

Data Availability: The dataset presented in the study is available on request from the corresponding author during submission or after publication.

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Informed Consent: Participants signed the informed consent form.

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