

EVALUATION OF CRITICAL THINKING DISPOSITION AMONG IRANIAN MEDICAL FACULTY MEMBERS

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ABSTRACT

Aim: Faculty members are considered as a foundation for an higher educational system and their skills and competencies development is imperative and undeniable in a modern world. The present study aimed to assess the critical thinking disposition among faculty members of Semnan University of Medical Sciences in 2016. **Material and methods:** A cross sectional study was designed to measure critical thinking dispositions of 99 faculty members of Semnan University of Medical Sciences (Semnan, Iran). Data were gathered by a Likert standard California critical thinking disposition inventory (CCTDI) with 75 items. Finally, data were analyzed by descriptive (mean and standard deviation) and inferential (Friedman, t-test and one-way ANOVA) statistics. **Findings:** The mean and standard deviation of whole score of critical thinking disposition was 249.09 ± 47.23 . The mean scores of critical thinking disposition and its subscales had not a significant relationship with faculty member's demographic characteristic except in one area. **Discussion:** Based on our results, the mean score of critical thinking disposition and its subscales are in a ambivalence level in faculty members of Semnan University of Medical Sciences. It is felt the necessity of using appropriate strategies for teaching and nurturing this kind of thinking and improving the quality of education.

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Introduction

The pace of continuous and increasing change in the 21st century requires for human to make more mental effort to achieve his goals. Science is one of those efforts that require the most attention as an area of creativity, intelligence, seriousness and other human intellectual capabilities. In spite of the great technological changes achieved through science in terms of improving health, economics and lifestyle, new issues and complexities have emerged in human life that have created many mental challenges for citizens in deciding on different ethical issues for themselves, others, and humanity [1]. One of the basic characteristics of man is the awareness of his own behavior and the power of thought. In other words, a person can be aware of his or her behavior and uses of his power of thinking in dealing with different issues and affairs [2]. The power of thought is the unique feature of the human being that distinguishes man from other beings [3]. There are several different types of thinking or ways to think which critical thinking is one of the most important ones [4].

Critical thinking is the ability through which the learner reaches the designated educational objectives only after receiving the key concepts raised by the master and during an active mental process. This ability can increase the retention of content received by students and clearly provides the main implications for learning that have been the goal of education. When a person deals with the subject matter in a rational and logical way, in fact he has taken the first step toward critical thinking [5, 6]. Critical thinking is a deliberate, systematic, purposeful, effective, rational, and outcome-based thinking that scientifically

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analyzes all available information and opinions [7]. Critical thinking is a kind of reflective and rational thinking that influences decision-making about our beliefs and performance [8]. Some believe that critical thinking is the thoughtful ability to engage with their own thinking. They believe that this is possible when learners choose the exact criteria and standards for analyzing and evaluating their own thinking and regularly benefit from these criteria and standards to improve their thinking quality. Critical thinking is the result of valuable educational outcomes and the flow of research methods and approaches has contributed to its promotion and improvement [9, 10]. In medical science education, critical thinking is described as an ultimate goal and involves organizing information in such a way that learners arrive at knowing and acquiring knowledge in sensitive situations with mental effort. The ability to solve a problem on a patient's bedside is vital for his or her care, so reinforcing the critical thinking enables the person to make right decisions and to provide the best service in the care process [11]. In addition, the necessity of addressing critical thinking in medical science education has been significantly emphasized because of the necessity of its adaptation to the twenty-first century's growing and flourishing developments [12, 13].

Critical thinking has two dimensions: critical thinking skills and critical thinking disposition. While the first dimension emphasizes on cognitive strategies, the second dimension focuses on the attitudinal elements and the internal motives for problem solving. Critical thinking skills are kind of cognitive skills by nature. An ideal critical thinker must possess such skills. In fact, calling someone 'an ideal critical thinker' is not possible without first checking his or her approach to life, questions, and problems. Without a positive attitude toward critical thinking, critical thinking never occurs or if it does, it is below the standard levels [14]. In other words, critical thinking as a thoughtful judgment skill about the correctness or inaccuracy of thoughts and beliefs, has a fundamental importance in the rational development of individuals and their efficiency. This skill is used when one has the disposition to use this type of thinking. Disposition to critical thinking has been described as an inner motivation and habitual inclination which motivates the individual to use his critical thinking skills and one has no desire to apply his critical thinking skills without it [15]. Today, scholars believe that critical thinking is considered the main output of higher education and teaching critical thinking is seen as an essential part of education. Nevertheless, research on critical thinking is focused more on students than teachers and professors [16].

Hatami et al. (2012) quoting from Coon (1997), describe the importance of having critical thinking skills for professors: "It seems that an educator is a variable that is directly related to the phenomenon of critical thinking in education. If the university professor has a minimum level of critical thinking skill capacity or even lacks a philosophy-centered critical thinking idea, there is a little chance for students to learn critical thinking" [17]. Critical thinking skills can be improved through curriculum [18]. In order to develop critical thinking, it is necessary to have a fundamental revision in curriculum and such a change involves contemplating the role of the teacher, teaching methods and learning outcomes [19]. University professors play a central role in guiding and leading the education and creating the necessary skills in medical students [20]. Critical thinking is also an inevitable component of professional competence and clinical decision making [21]. The empowerment of faculty members in the areas of teaching, leadership and knowledge-based research will also contribute to the achievement of the mission and the broad goals of universities [22].

Few studies have been conducted to determine the critical thinking of university professors in Iran. In a study, Rafiee et al. (2017) assessed the critical thinking disposition of faculty members of Rafsanjan University of Medical Sciences using the abridged 33-item version of Ricketts' critical thinking questionnaire, which includes 3 subcategories of creativity, development and commitment. The results indicated that the mean score of critical thinking and its subscales in faculty members of Rafsanjan University of Medical Sciences are at a relatively desirable level [23]. In a study aimed at determining the impact of reflection on the critical thinking of student-teachers, Badri Gargary (2012) came to the conclusion that the reflection on critical thinking led to the growth of critical thinking skills (deduction) and the tendency to cognitive thinking (curiosity and regular practice) among student-teachers [24]. Palmer (2007) concluded in a research that the part-time professors who have received formal education have a greater critical thinking disposition. There is also a positive relationship between those professors who have positive critical thinking dispositions and those who consider critical thinking as a goal and use it in the classroom discussion [25].

Regarding the few studies done in this respect, and by taking into consideration the fact that research in this area can be useful in providing opportunities and plans for the growth of critical thinking of professors who tend to use critical thinking in their teaching methods or are interested in fostering the critical thinking of their students, and helping them adopt the appropriate teaching techniques, the researcher decided to conduct a study in order to reach a depth understanding of the subject. Therefore, this study was conducted with the aim of determining the critical thinking disposition among professors of Semnan University of Medical Sciences in order to provide the basis for planning for the growth of faculty members and improve the quality of education.

Materials and Methods

The current cross-sectional study was conducted on 99 faculty members of Semnan University of Medical Sciences in the academic year 2016. The sample size consisted of all faculty members of Semnan University of Medical Sciences and simple non-random sampling method was used. The data collection tools was a two-section questionnaire containing demographic information and California Critical Thinking Disposition Inventory containing 75 closed-ended questions with a Likert-type scale. The first section of the questionnaire consisted of information such as age, gender and work experience of the faculty member, and the second part of the questionnaire was related to critical thinking disposition including 75 items in the form of

a 6 point Likert scale ranging from 'completely disagree' to 'completely agree.' There were seven subscales in CCTDI questionnaire: Truthseeking (12 items), Open-mindedness (12 items), Analyticity (11 items), Systematicity (11 items), Confidence in Reasoning (9 items), Maturity of Judgment (10 items), and Inquisitiveness (10 items). The maximum and minimum achievable scores from this test are 70 and 420, respectively. The classification and interpretation of the critical thinking disposition have been as follows: A score of 350 or above represents a strong disposition, a score between 280 and 300 shows positive inclination, a score between 211 and 279 represents ambivalence, and a score below 210 shows a negative tendency in the respondents. For each subscale, a score above 50 means a strong positive tendency, 40-50 means positive inclination, 31 -39 means ambivalence, and a score below 30 means negative tendency.

The validity and reliability of this test has been demonstrated many times in previous studies [26-28]. To determine the reliability, the questionnaire was completed by 10 faculty members. The Cronbach's Alpha coefficient for the entire questionnaire was calculated 0.90% and for the subscales it was 0.68% to 0.80%. To complete the questionnaire, the number, names and workplace of the faculty members were obtained from the staff department of faculty members of the university. Given the busyness of the faculty member, it was suggested that the questionnaire to be sent to the statistical community through official automation and messenger system. Also, in some cases, researchers have asked to complete the questionnaire by attending and sending a reminder for faculty members at the university. In addition to explaining its design and objectives, and observing ethical standards such as optional participation in research and ensuring confidentiality of information, the researchers made an effort to send and distribute the questionnaire among subjects.

To analyze the data, while constructing frequency distribution table and calculating central and dispersion indicators, mean and standard deviation of each subscale of the questionnaire were calculated. Friedman test, independent t-test and one-way ANOVA test (to determine the relationship between demographic characteristics of the population with critical thinking disposition) at a significant level of 5% were used for data analysis. Analysis was done using SPSS 16.0 software.

Ethical considerations

The study was approved by the ethics committee of Semnan University of Medical Sciences (ethic code: IR.SEMUMS.REC.1394.154, 2015/10/12). Prior to the beginning of the study, the approval of the relevant authorities was acquired and then some explanations were provided to the participants about the purpose of the research, ensuring the confidentiality of information and their rights for participating, or leaving the study and participants were deemed to have consented to participate if they chose to complete the survey.

Results

Of the 140 faculty members, 99 subjects (71%) participated in the study and completed and returned the questionnaire. 60.6% of participants (N = 60) were female. 33.3% of participants (N =33) had a work experience of 15-25 years. The mean and standard deviation of participants' age was 44 ± 22.8 years (Table 1).

Table 1. Frequency distribution of demographic characteristics of faculty members

Characteristic	Group	N	%
Sex	Female	60	60.6
	Male	39	39.4
Work experience	< 5	19	19.2
	5-15	32	32.3
	15-25	33	33.3
	> 25	15	15.2
Age	25-35	20	20.2
	35-45	31	31.3
	45-55	43	43.4
	> 55	5	5.1

The mean and standard deviation of the total score of critical thinking disposition among faculty members were 24.29 ± 23.47 . Independent T-test and ANOVA results did not show any significant relationship between the total score of critical thinking disposition and the demographic characteristics of the participants (Table 2).

Table 2. Relationship between the total score of critical thinking disposition and demographic characteristics of faculty members

Characteristic	Group	Mean± SD	F	T	df	P-Value
Sex	Female	25.07± 2.83	-	0.58	97	0.56
	Male	24.79± 1.98				
Work experience	< 5	25.40± 1.72	1.25	-	3	0.29
	5-15	24.27± 2.46				
	15-25	25.06± 2.35				

	> 25	25.29± 2.67				
Age	25-35	31.7± 2.67	0.96	-	3	0.41
	35-45	40.96± 2.76				
	45-55	50.37± 2.78				
	> 55	57.2± 1.64				

Independent T-test and ANOVA results showed that there is no significant relationship between the subscales of critical thinking disposition and the demographic characteristics of the participants except in one case (open-mindedness with work experience) (Table 3).

Table 3. Relationship between critical thinking disposition subscales scores with demographic specifications of faculty members

Characteristic	Group	Truthseeking	Open-mindedness	Analyticity	Systematicity	Confidence in Reasoning	Maturity of Judgment	Inquisitiveness
		Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD	Mean±SD
Sex	Female	37.69± 4.86	41.07± 6.35	36.64± 5.26	36.82± 6.18	25.12± 5.45	36.20± 5.18	37.23± 5.64
	Male	36.76± 4.54	40.26± 4.29	35.30± 3.91	36.85± 5.07	25.48± 3.72	35.83± 4.14	37.48± 4.92
Work experience	< 5	37.73± 5.03	42.60± 4.28	36.26± 4.02	38.47± 4.28	24.84± 3.96	36.26± 4.29	38.36± 4.70
	5-15	36.46± 3.96	39.00± 4.47	35.56± 4.06	34.96± 5.97	24.28± 4.78	35.75± 5.09	36.71± 5.05
	15-25	37.24± 4.75	40.18± 4.46	35.39± 4.87	31.39± 5.26	26.45± 4.30	36.03± 4.82	37.93± 6.07
	> 25	37.53± 5.64	42.93± 7.74	36.80± 5.40	37.53± 5.79	25.80± 4.50	36.00± 3.31	36.33± 3.92
Age	25-35	37.45± 4.72	42.10± 4.47	36.50± 3.99	37.80± 4.20	24.50± 3.91	36.50± 4.55	37.75± 3.61
	35-45	36.58± 3.95	39.12± 4.53	35.19± 4.41	35.51± 6.06	24.93± 4.03	35.03± 4.62	36.80± 5.06
	45-55	37.72± 5.19	41.00± 5.96	36.04± 5.01	37.06± 5.71	25.97± 5.14	36.27± 4.69	37.51± 6.12
	> 55	34.20± 3.11	40.00± 2.54	35.20± 2.58	39.20± 3.96	25.80± 2.48	37.20± 2.77	38.40± 2.96
P-Value	Sex	0.34	0.48	0.17	0.98	0.72	0.70	0.82
	Work experience	0.78	0.04	0.73	0.11	0.23	0.98	0.53
	Age	0.36	0.21	0.74	0.33	0.60	0.55	0.87

Among the subscales of critical thinking disposition, the open-mindedness subscale had the highest mean (40.58) and the Confidence in Reasoning subscale had the lowest mean (25.34) (Figure 1).

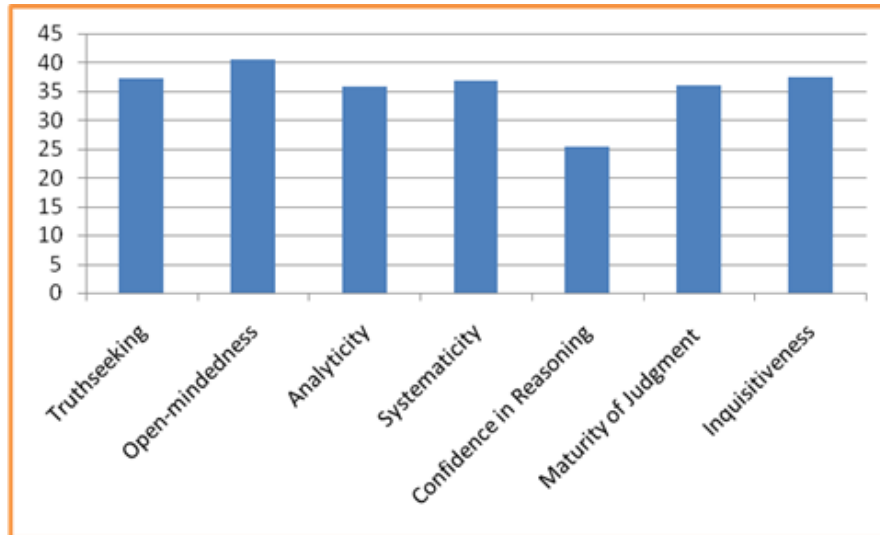


Figure 1. The average scores of faculty members in the critical thinking tendency subcategories

Discussion

The findings of this study aimed to determine the critical thinking disposition in faculty members of Semnan University of Medical Sciences indicate that the mean scores of the faculty members' critical thinking disposition was 249.29 out of 420 (total score), representing their ambivalence tendency toward critical thinking. This finding is inconsistent with the findings of Karami et al. (2014) that investigated the critical thinking dispositions of faculty members of Rafsanjan University of Medical Sciences [2, 23]. In the above study, the critical thinking disposition in the studied population has been reported at a desirable level. The reason for this discrepancy can be attributed to the type of instrument used to measure critical thinking dispositions. Rafiee and Karami's used Ricketts's critical thinking questionnaire in their study; it contains 33 items and 3 subscales and the answers to the questions were given in a shorter period of time and with easiness; whereas the present study utilized California Critical Thinking questionnaire which has been more comprehensive than the Ricketts questionnaire and contains 75 items in 7 sub-scales, and some of the questions were answered with a little difficulty, and needed a little more time to think and reflect.

It should be noted that this is the first study in Iran that investigated the critical thinking dispositions of faculty members using California's Critical Thinking Disposition Inventory. The different results have been found with other studies using Critical Thinking California Questionnaire. In a study by Barkhordari et al. (2011), the mean and standard deviation of total score on critical thinking disposition of undergraduate nursing students at Yazd Islamic Azad University were reported $2764/87 \pm 18.67$, demonstrating the ambivalence tendency among the students [26]. Also, a comparison of the average score of the critical thinking disposition between Australian and Hong Kong students showed that the average score for Hong Kong students was found 268/36 (ambivalence and a relatively negative tendency); the average score for Australian students was found 287.73 (positive tendency) [29]. In a research conducted on nurses at the Egyptian Mansoureh University Hospital, Shiahata et al. (2011) found that the mean and standard deviation of the total score of critical thinking inclination were 305.8 ± 29.5 , which indicates the positive inclination of nurses towards critical thinking [30]. In addition, in Naber et al. study (2013), the mean and standard deviation of the total score toward the critical thinking inclination of undergraduate nursing students at the University of the United States were reported 308.72 ± 29.78 , representing a strong and stable inclination among these students [31]. Moreover, in a study conducted in Canada, the mean and standard deviation of critical thinking inclination among 4th-year undergraduate nursing students were reported 3.123 ± 36.4 , representing the positive inclination of these students toward critical thinking [32]. However, the relative low score in the tendency toward critical thinking among Iranian professors and students can also be due to cultural differences, since the results of research conducted in China are also confirmed by this finding [29]. It seems that there is a need to use modern teaching methods when teaching lessons for students, including critical thinking in European countries, but despite the necessity of this attitude in Iran, no practical steps are being taken. Creating an educational environment along with discussion, thinking, teaching creative thinking skills and problem-based learning can help develop skills and tendency to critical thinking [34], but this issue has remained largely neglected in our country.

According to researchers, the faculty members in the study were not familiar with the modern teaching methods, including critical thinking during their college life, and had no tendency toward it. Furthermore, there are several factors that influence the critical thinking inclination of the professors which need to be investigated.

Findings showed that there was no significant relationship between the total scores of critical thinking disposition and its subscales with age, gender, and work experience of faculty except in one subscale (work experience with open-mindedness). This finding is consistent with the findings of the studies by Rafiee et al. (2016), YousefiSaeedabadi (2009) and

Rezaiean et al. (2013) [20, 23, 35], but contradicts the results of the study by Safari et al. (2012) who reported a significant difference between the critical thinking dispositions of female and male teachers in Kermanshah University [36], as well as the results of a study by Azody et al. (2010) on students of Bushehr University of Medical Sciences, in which a positive relationship was observed between age and critical thinking scores [37]. The results of the study by Azody et al. (2010) and Kiani et al. (2012) demonstrated that the acquisition of skills and experience could have a positive effect on the increase in the mean score of critical thinking skills [37, 38], which is inconsistent with the results of this study except for the open-mindedness subcategory. The difference in the studied population can justify this discrepancy to some extent.

The results indicated that there was a significant correlation between the scores of critical thinking disposition in the open-mindedness subscale and the work experience of the faculty members. Professors with a job experience of over 25 years old had the highest score in this subscale (42.93). Unfortunately, no studies have been found to support the findings of the research; but, according to the researchers, with increasing work experience, people learn to handle their life's problems effectively and as a result, the spirit of criticism and tolerance will be increased.

Findings also showed that among faculty members, the highest score of critical thinking tended to fall under the open-mindedness dimension and the lowest score fall under the confidence in reasoning dimension. Moreover, the scores of any of the subscales did not reach the standard score of 50, which was found consistent with the findings of the study by Shin et al. (2006) among South Korean students [39].

One of the most important limitations of this study was the lack of involvement of university professors; despite all the efforts made by the researcher, 29% of faculty members especially clinical faculty members didn't returned sent or delivered questionnaires. Although the participation rate (71%) of faculty members is noteworthy and acceptable, the lack of participation of all faculty members can slightly influence the results of this study. In conclusion, the results showed that the rate of critical thinking disposition among faculty members of Semnan University of Medical Sciences was low and ambivalent. The low rate of critical thinking disposition of professors indicates that Iranian educational system is mostly focused on enhancing and strengthening the mind and knowledge domains rather than developing thinking skills, criticism, and scrutiny, analysis, inference, deductive reasoning and inductive reasoning as part of the dimensions of critical thinking skills [34]; therefore, planning on components such as new teaching approaches, holding critical and creative thinking workshops, providing facilities and appropriate educational environment for applying new educational methods can enhance the attitudes of faculty members and students to critical thinking and ultimately reinforces the quality of education in the country.

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Competing interests

The authors declare that they have no competing interests.

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