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Comparison of the level of critical thinking skills of faculties and medical students of Ahvaz Jundishapur University of Medical Sciences, 2021

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Abstract:

BACKGROUND: One of the main tasks of educational institutions, in addition to developing students' professional competencies, is to develop decision-making and problem-solving skills, which are themselves influenced by critical thinking that should be developed by instructors at the university. The aim of this study was to compare the level of critical thinking skills in students and faculties of Ahvaz Jundishapur University of Medical Sciences.

MATERIALS AND METHODS: In this cross-sectional descriptive study, the sample consisted of 81 medical students and 52 faculty members of the medical school who were teaching and studying in 2021. The research method was descriptive analytical and the data collection tool was the California Critical Thinking Questionnaire Form B. SPSS-18 software and *t*-test were used to analyze the data.

RESULTS: The mean score of students' critical thinking skills was 12.49 ± 4.43 and that of faculties was 12.44 ± 3.76 and no significant difference was observed between the scores of the two groups ($P = 0.94$).

CONCLUSION: The findings of the study show that the level of critical thinking skills in both faculties and students is below the standard and poor. The results of the study indicate the weakness of critical thinking in students and faculties in all dimensions, which indicates the need to teach critical thinking skills at the university level. Therefore, educational planners and faculty officials should pay more attention to developing critical thinking skills in their educational programs.

Keywords:

Critical thinking, faculty, medical education, students

Introduction

Efforts to develop critical thinking skills are one of the most important goals and missions of universities and higher education centers. Because the current situation in a world full of change in the 21st century requires that university graduates be thoughtful and educated people who can use the critical and creative abilities to meet the needs and requirements of living in such a world. This goal is doubly necessary for all academic disciplines, especially in the field of

medical sciences, whose main subject is the study, evaluation, and decision-making at the patient's bedside.^[1-3] This is exactly why the World foundation Medical Education, while considering critical thinking as one of the standards of medical education, emphasizes on its growth and strengthening in the curriculum of students in medical schools and considers it as one of the key points in the accreditation of medical schools has introduced.^[4]

The findings of existing researches indicate that the ability and performance of students

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of different universities in the country in the field of critical thinking is at a low level. Researchers in their studies, while confirming the low level of critical thinking skills in students, have stated that in this regard, there is no significant difference between students of different universities, in other words; critical thinking skills are low among all students in the country.^[5-9] Researchers believe that the main factors in this situation are the use of traditional and passive teaching methods and current evaluation methods by university faculties and have emphasized the review of the role and position of faculties in the field of teaching critical thinking.^[10,11]

According to researchers, current teaching methods in universities are not responsible for the development of critical thinking in students. Certainly, the role and position of faculties as environmental providers is very important for cultivating this thinking. In order to be able to teach critical thinking to students, we must see what is the understanding and ability of faculty members of critical thinking? If the perception and ability of faculties of this thinking is high and acceptable, if appropriate methods are used, we can expect to nurture students with critical thinking. Naturally, faculties are more successful in educating students and developing critical thinking who have a high level of critical thinking. It is necessary for teachers to have critical thinking skills, because with low levels of critical thinking, they cannot develop critical thinking in students.

However, the results of few studies that have been done in this field indicate that the level of critical thinking scores in medical teachers is low. Yousefi Saeedabadi in 2009 in Mazandaran University of Medical Sciences and Fatehi Kharazmi in 2019 in Isfahan State and Free Universities by examining the level of critical thinking skills of faculties have reported the average scores of faculties as weak and lower than the international standard.^[12,13]

One of the important tasks of university faculties, in addition to transferring knowledge and skills to learners, is to train students as thoughtful, analytical, and critical thinking skills. As fostering and strengthening students' critical thinking in universities is one of the main goals of higher education. Therefore, its mechanisms must be seriously considered. It should be acknowledged that in developing critical thinking, in addition to educational programs and teaching methods, the performance of teachers and their ability in critical thinking skills is also important. Because, the faculties who are supposed to act as teachers in teaching critical thinking to students themselves must have high levels of critical thinking to be able to teach it to students in appropriate ways. For this reason, measuring the level of critical thinking skills

of university professors as student teachers can help clarify the current situation.

Despite the importance and special attention to critical thinking in higher education centers and its vital role in educating medical students about human health and also considering that university faculties have a pivotal role in developing and strengthening students' critical thinking skills. There is not much researched in our country about this subject. This study was designed and conducted. Therefore, this study was conducted to determine and compare the level of critical thinking of faculties and students of basic sciences in the medical school of Ahvaz Jundishapur University of Medical Sciences.

Materials and Methods

Study design and setting:

This descriptive cross-sectional study was conducted in 2021. The study population was medical students of basic sciences and faculties of basic sciences of Ahvaz Jundishapur University of Medical Sciences.

Study participants and sampling:

According to previous studies^[6,12] and based on Cochran's formula in determining the sample size, 61 faculties and 104 students were selected.

Data collection tool and technique

California Critical Thinking Skills Questionnaire (CCTS) Form B was used for data collection, which was designed by Facione and Facione in 1990 and used in many studies. The use of Kuder-Richardson coefficient has been reported from 0.68 to 0.70.^[14] In Iran, this test was first translated by Khalili and Soleymani and its reliability was reported 0.62.^[15] Validity and reliability of the Persian translation of this questionnaire in other researches have been reviewed and approved in Iran.^[9,16] This questionnaire is currently one of the most common tools for measuring critical thinking skills.

The California Critical Thinking Skills Test Form B consists of 34 multiple-choice questions consisting of 19 multiple-choice questions and 15 five-choice questions with one correct choice. This tool examines five factors that include: Analysis, evaluation, inferences, and inductive and deductive reasoning.

The range of questions includes items that measure semantic analysis from a sentence to a more complex combination of critical thinking skills. The scoring method is such that for each correct question, a score is assigned to the question and the sum of the correct questions of the test is its total score. The final score of the test is 34 and the score obtained in each part of the test varies from zero to 16. Hence, that in the analysis

section, a maximum of 9 points, in the evaluation section, a maximum of 14 points, in the inference section, a maximum of 11 points, in the inductive reasoning section, a maximum of 14 points, and finally in the deductive reasoning section, a maximum of 16 points.

Thus, for each person, six scores include five scores of critical thinking in each section and one total score of critical thinking. The researcher uploaded the questionnaire to a website and sent its link for 81 medical students and 52 faculties after obtaining ethical approval and permission from the school of medicine. After explaining the purpose of the study, the participants were asked to answer the questions.

For data analysis, descriptive indices, one-sample *t*-test and independent *t*-test were used for all tests by SPSS Software version 18 (IBM, SPSS Inc., Chicago, Illinois, USA). The maximum error was considered 0.05 .

Ethical consideration

Before participating in the study, the aim of the study was explained to all participants, and informed written consent was obtained by the researcher. The research units were also assured that the information received would remain confidential. The code of ethics was obtained from the Vice Chancellor for Research of Ahvaz Jundishapur University of Medical Sciences (IR.AJUMS.REC.1398.568).

Results

Eighty-one questionnaires were completed by students (77.9%) and 52 questionnaires by faculties (85.2%). 44 (54.3%) were students and 28 (53.8%) were male faculties. The mean age of students was 20.95 ± 2.51 years and faculties were 46.33 ± 9.91 . Among the studied faculties, 2 (3.8%) were instructors, 31 (59.6%) were assistant professors, 12 (23.1%) were associate professors, and 7 (13.5%) were professors.

The average total scores of critical thinking of professors and students were 12.44 ± 3.76 and 12.49 ± 4.43 , respectively. Tables 1 and 2 compare the mean scores of critical thinking and its subscales in students and faculty as shown. There is no statistically significant difference between the mean scores of male and female professors [Table 1]. However, in students, there is a statistically significant difference between the total score of students' critical thinking and some of its subscales. Moreover, the critical thinking scores of male students were significantly higher than female students [Table 2].

Table 3 shows the average critical thinking of professors and students.

The average of critical thinking of each group using one-sample *t*-test was compared with the average level of critical thinking. In this test, the mean scores of critical thinking of the sample were compared with the standard mean reported 15.94.^[9] The results showed that the average of critical thinking of professors and students and in general is significantly lower than the average level reported in 15.89.

Due to the fact that scores lower than 15.98 indicate the weakness of critical thinking, in this study, the level of critical thinking skills of both groups of students and teachers in this study is lower than the standard ($P \leq 0.0001$).

The mean and standard deviation of critical thinking and its subscales in students and faculties are given in Table 4. The comparison of the mean scores of critical thinking

Table 1: Comparison of the mean scores of critical thinking and its subscales in faculties by sex

Variable	Male	Female	t	P
Evaluation	4.86±1.90	4.92±2.28	0.103	0.919
Inference	3.79±1.61	3.58±1.67	0.444	0.660
Analysis	3.71±1.30	4.04±1.75	0.770	0.445
Deductive reasoning	5.29±1.63	5.33±2.68	0.076	0.940
Inductive reasoning	5.36±2.01	5.58±2.24	0.384	0.703
Total score of critical thinking	12.36±3.20	12.54±4.39	0.171	0.862

Table 2: Comparison of the mean scores of critical thinking and its subscales in students by sex

Variable	Male	Female	t	P
Evaluation	5.68±2.36	4.38±2.23	2.54	0.013
Inference	4.14±1.99	3.65±1.97	1.10	0.274
Analysis	3.80±1.59	3.14±1.81	1.74	0.084
Deductive reasoning	5.02±2.08	3.97±2.12	2.23	0.028
Inductive reasoning	7.07±2.85	6.08±2.74	1.57	0.119
Total score of critical thinking	13.61±4.26	11.16±4.31	2.56	0.012

Table 3: Comparison of the mean scores of critical thinking and its subscales in faculties and students

Variable	Average level	Mean±SD	t	P
Students	15.89	12.49±4.43	7.08	0.000
Faculties	15.89	12.44±3.76	6.78	0.000
Total	15.89	12.47±4.16	9.71	0.000

SD=Standard deviation

Table 4: Comparison of the mean scores of critical thinking and its subscales in faculties and students

Variable	Student	Faculties	t	P
Evaluation	5.09±2.37	4.88±2.06	0.502	0.616
Inference	3.91±1.983	3.69±1.62	0.671	0.504
Analysis	3.49±1.71	3.87±1.52	1.271	0.26
Deductive reasoning	4.54±2.15	5.31±2.15	1.995	0.048
Inductive reasoning	6.62±2.83	5.46±2.10	2.530	0.013
Total score of critical thinking	12.49±4.43	12.44±3.76	0.069	0.945

showed that there is no statistically significant difference between the level of critical thinking of students and faculties ($P = 0.94$). The comparison of the scores of the subscales of critical thinking showed that there is a statistically significant difference between students and faculties only in the two subscales of deductive and inductive reasoning ($P < 0.05$) [Table 5].

Discussion

The findings of this study, which was conducted to compare the level of critical thinking of faculties and students of basic sciences in Ahvaz Jundishapur University of Medical Sciences, showed that there is no significant difference between the average level of critical thinking of teachers and students. Since no study was found in this field in Iran, it was not possible to compare the results with similar studies. However, in general, the findings of the study indicated that the level of critical thinking in both teachers and students is low and weak. According to the total score of the critical thinking skills test, which is equal to 34, the average score of 12.44 and 12.49, respectively, by the teachers and students in this study, which is less than one-half of the total score, is a reason for this claim. Achieving these averages is a very weak point for these two educated classes

Comparing the mean scores of critical thinking of teachers and students with the global standard (15.89) indicated that there is a significant difference between the scores of critical thinking in this study with the global standard.^[17] This result is based on the findings of studies of many researchers, including Yousefi Saeedabadi in Mazandaran (2009), Javidi in Mashhad (2010), Darban in Tehran (2016), Shakurnia in Ahvaz (2017), Fatehi Khozani in Isfahan (2019), and Hosseini in Hamedan (2021), which has reported low and weak levels of critical thinking in teachers and students.^[6,9,12,13,18,19] In finding the cause of this problem, we can point to the lack of attention to the development of critical thinking in the curriculum, teaching methods of university faculties, and the low level of implementation of mechanisms for the development of critical thinking in universities.

Given this dilemma, some researchers in the field of critical thinking development strategies have emphasized the

interest, ability, and key role of faculties as a key factor in strengthening critical thinking in universities.^[20,21] By holding critical thinking training courses for professors and use through various teaching methods such as problem-based learning and participatory learning, critical thinking skills strengthened and developed in professors and provided the ground for the growth and development of critical thinking in the university.

Review of studies shows that in none of the Asian studies, critical thinking skills in students have been evaluated positively. In contrast, in studies conducted in Western countries, this skill has been evaluated positively.^[1,22] It seems that one of the reasons for the differences in the results of studies is the dominant culture in the study population, so that in Western countries compared to countries Asian is a culture that facilitates the ability of people to think critically, and based on existing studies, it can be seen that traditional beliefs in Asian countries, even in a developed country such as Japan, have influenced teaching methods and communication between student and instructor.

One of the important tasks of university faculties is to train thoughtful, analytical and critical thinking students. However, critical thinking skills cannot be taught easily and without planning. This thinking can be transmitted through curricula and in the current situation, by fundamentally changing the curriculum and changing the attitude and strengthening the skills and abilities of faculties in the field of critical thinking skills, it is possible to pave the way for the growth and strengthening of this type of thinking in universities.^[23] Educational experts believe that the weakness of students' critical thinking is the result of the dominance of traditional methods in universities. Therefore, paying attention to the role of faculties in this field is one of the basic principles for the growth and development of critical thinking; Because teachers, due to direct and effective interaction with students, are the main axis of change and have the ability to motivate and empower students in terms of insight, attitude and critical skills.

The findings of this study indicate a lack of sufficient skills among most university faculties in the field of critical thinking, which leads to a lack of effective role in cultivating students' critical thinking. In the studies conducted in this field in our country, the level of critical thinking of teachers has been evaluated as low to moderate and weak.^[12,13]

In a study examining the barriers and shortcomings of developing critical thinking in universities, Vajdani^[20] suggested strategies for developing critical thinking in universities, including holding continuing education courses for university faculties to learn about critical

Table 5: Comparison of the mean scores of critical thinking and its subscales in faculties and students

Variable	Student	Faculties	t	P
Evaluation	5.09±2.37	4.88±2.06	0.502	0.616
Inference	3.91±1.983	3.69±1.62	0.671	0.504
Analysis	3.49±1.71	3.87±1.52	1.271	0.2.6
Deductive reasoning	4.54±2.15	5.31±2.15	1.995	0.048
Inductive reasoning	6.62±2.83	5.46±2.10	2.530	0.013
Total score of critical thinking	12.49±4.43	12.44±3.76	0.069	0.945

thinking and its teaching methods. He stated that, "Teachers need to start with change in order to cultivate critical thinking in students. They need to know critical thinking and its components well, and they need to acquire critical thinking skills themselves and know that from "By being a 'critical teacher,' they can stimulate, facilitate, and reinforce critical thinking in the classroom."

Comparison of critical thinking subscales in the sample showed that there is a significant difference between teachers and students in the two subscales of deductive reasoning and inductive reasoning. Deductive reasoning is stronger in faculties and inductive reasoning is stronger in students. Deductive reasoning is a method in which to draw conclusions from general or partial premise, and inductive reasoning is another method of inference that draws conclusions from partial premise; or from a part to a whole.^[24]

In fact, faculties analyze and draw conclusions using deductive reasoning and logical thinking. In contrast, students draw conclusions through inductive reasoning, presentation and explanation of evidence, and generalizability of information. Since no study was found in this field, it was not possible to compare the results with similar studies. Differences in faculties and students may be due to previous experiences or cultural differences. Careful study of this heterogeneity requires further study in this area.

The comparison of the level of critical thinking by gender showed that the level of critical thinking of male students in some dimensions was significantly higher than male students, which is consistent with the results of some studies that have reported higher levels of critical thinking in males.^[9,20] However, in comparing the critical thinking of professors to gender thinking, a statistically significant difference is observed between the critical thinking of male and female professors, which needs to be addressed in a future study.

Among the limitations of this study is that about 20% of the students and faculty did not complete the questionnaires completely. This point can be effective in generalizing the results and can be considered as one of the main limitations of the research. Second, this study was performed on faculties and students of a field of study in a university. Therefore, care should be taken in generalizing the findings and comparing the results with other disciplines and universities

Limitation and recommendation

A more comprehensive study in which critical thinking is measured in students and faculty of different faculties can provide valuable information. It is recommended to

select a larger study sample from universities of medical sciences of the country in further studies

Other limitations of the study include the questionnaire used to assess the critical thinking of the participants. The large volume and difficulty of the questionnaire questions, its time consuming and the reluctance of faculties and students to complete the questions were among the executive problems of the research that imposed restrictions on the facilitators.

Conclusion

The results of the study indicate the weakness of critical thinking in students and faculties, which indicates the need to teach critical thinking skills at the university level. According to the results of this study and the importance of critical thinking skills, planners and faculty. Their curricula should pay more attention to developing critical thinking skills. According to the sensitivity of medical education and the importance of critical thinking skills in the health system and the diagnosis and treatment of patients, it is suggested that similar research be conducted in other universities of medical sciences.

Ethic code

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Conflicts of interest

There are no conflicts of interest.

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