



# Critical Thinking Disposition in the First- and Last-Year Medical Students and its Association with Achievement Goal Orientation

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## Abstract

**Background:** Since medical students play an important role in public health system as well as the treatment of patients, the need for critical thinking in them is extensively felt. The current study aimed at evaluating the level of critical thinking disposition (CTD) in the first- and last-year medical students and its association with goal orientation in Ahvaz Jundishapur University of Medical Sciences in 2016.

**Methods:** The current cross sectional study used critical thinking disposition inventory (CTDI) developed by Rudd and Ricketts, and achievement goal questionnaire-revised (AGQ-R) developed by McGregor and Elliot to collect data. The questionnaires were distributed among 255 students of which 204 (80%) students completed them. Data were analyzed using *t*-test and Pearson correlation coefficient.

**Results:** Of the 204 studied subjects, 104 were the first-year and 100 the last-year medical students. The mean age of the first and last year of medical students was 18.930.86 and 24.601.31 years, respectively. Moreover, 47 first-year and 66 last-year subjects were female. The mean score of CTD for the first- and last-year students were  $69.82 \pm 10.60$  and  $71.48 \pm 11.86$ , respectively, lower than the average range. Based on the *t*-test results, there was no significant difference between this group students ( $P = 0.310$ ). The mean score of CTD and AGQ for all the study participants was  $70.75 \pm 11.12$  and  $28.22 \pm 7.76$ , respectively; a significant correlation was observed between critical thinking disposition and achievement goal orientation ( $P = 0.001$ ,  $r = 0.294$ ).

**Conclusions:** The results of the current study indicated that the CTD score was lower than average range in the first- and last-year students; besides, lack of difference between first and last year students emphasized that educational processes should be propelled toward employment of approaches to promote and strengthen critical thinking disposition.

**Keywords:** Critical Thinking Disposition, Achievement Goal Orientation, Medical Students, Medical Education

## 1. Background

Critical thinking is a type of reasonable, regular, purposeful, effective, logical, and outcome-based thinking, which scientifically evaluates and analyzes all available data and comments. Hence, teaching this type of thinking is among the basic needs of human life for decision making and deep understanding of different issues. Education of critical thinking results in motivation in learning, acquiring problem-solving and decision-making skills, and creativity (1-3).

Critical thinking includes two aspects of skills and disposition, and such a type of thinking is just emerged under the light of positive tendency (4). Critical thinking disposition recently attracted the attention of researchers; it is considered as an aspect of personality, desires, and ten-

dencies of individuals that indicate the type of their critical thinking. Disposition and skills of critical thinking are basically the desirable consequences of educational processes (5, 6). Ricketts and Rudd indicated that tendency toward critical thinking is formed based on an intrinsic motivation; they also considered innovativeness, maturity and engagement as the components of critical thinking disposition (7). It is obvious that adequate tendency toward development and application of skills is essential, and critical thinking without tendency toward such factors is impossible (2).

Different studies indicated that disposition toward critical thinking affects personal and social achievements, problem-solving ability, and creativity. People with high disposition toward critical thinking can predict affairs and seek opportunities to employ argumentation ability in

decision-making and problem-solving by the reasoning ability (8).

Critical thinking is the ultimate goal of higher education and the basis of clinical reasoning. By strengthening this type of thinking, the care provider can make proper medical decisions and provide better health care services. Experts emphasize on critical thinking skills to promote the quality of medical education. In terms of accreditation of colleges, critical thinking is a key point and a criterion to measure the growth of such thinking among students (9-11). According to the World Federation for Medical Education (WFME), critical thinking is one of the standards of medical education (12).

Growth and development of critical thinking help the students to improve their skills in thinking and reasoning instead of memorizing the information; this issue is particularly important in medical education and other care-related careers, to such an extent that is essential to have the problem-solving and decision-making abilities to provide a proper health care for patients. Hence, to teach medical students about providing proper health care for patients in the current modern era, education should be promoted by the strengthen of critical thinking. Therefore, to be aware of the status of this type of thinking in educations provided in universities, the level of critical thinking should be appraised in the students (13-15).

The achievement goal theory and its correlation with disposition toward critical thinking is another variable considered by the researchers, which plays a significant role in the quality of learning process, academic achievement, success, and competency. Without benefitting from adequate motivation and self-confidence, it is impossible to create commitment, effort, and perseverance (16).

In recent years, different studies were conducted on critical thinking disposition. Results of the study by Salsali et al., on the evaluation and comparison of critical thinking disposition in Asian and non-Asian students showed that the disposition toward critical thinking was lower in Asian students than their non-Asian counterparts (6). In a study by Gezer et al., conducted in Turkey, the level of critical thinking disposition in nursing students was poor (16). Review of the studies showed that the level of critical thinking disposition in Iranian students was rarely higher than medium level and in most of the cases, no significant association was observed between the grade and level of in critical thinking skills and disposition (13, 17, 18). There was a significant difference among the results of some studies regarding the level of critical thinking disposition in the students of different grade levels (13). Some other studies indicated the lack of association between the critical thinking disposition and grade level in the students. Faal Ostadzar in a study in Isfahan, Iran, evaluated the level of criti-

cal thinking disposition among the second grade basic sciences and pre-internship students and reported a poor and unstable level of critical thinking disposition in the students; they also showed no significant difference between the students of the two grades (19).

Achieving a real image of the level of disposition in the students of different grade levels toward critical thinking, by determining the status of this index in the students can assist the education authorities of the university to promote critical thinking skills. Results of the studies performed in Iran also showed inadequacy of data and study in this field; most of the conducted studies emphasized a certain aspect of critical thinking (critical thinking skills) and the other aspect (critical thinking disposition) was less considered (11, 20).

Owing to the role of critical thinking in health system and since, some studies reported undesirable and poor status of skills and disposition toward critical thinking among the last year students (21, 22), authors decided to explore the level of critical thinking disposition in the first- and last-year medical students. The first-year students are newly admitted to the university and are not affected by the educational programs yet; in addition, the level of tendency toward critical thinking in such students is similar to that of pre-university students. On the other hand, the last-year students are undoubtedly affected by the educational programs and teaching methods due to several years of presence at academic environments, and attending different courses can definitely promote and improve the level of critical thinking disposition in such students. The two under study groups were considered as good samples to compare the level of critical thinking disposition and find the effect of curriculums on the improvement of such disposition in the students. Due to the great importance and remarkable role of critical thinking in the professional future of medical students, the need for benefitting from the ability to analyze critical thinking disposition in the complicated and vital environment of the health system, which they should work in it after graduation, and also due to some reports about lower level of critical thinking disposition and clinical judgment of medical students, inefficiency of common teaching methods to promote critical thinking disposition among medical students, and since no comprehensive study was conducted so far in the under study university on the critical thinking disposition, the current study aimed at evaluating the level of critical thinking disposition among first- and last-year medical students, comparing the results, and also evaluating the association between critical thinking disposition and achievement goal orientation in the two groups of first- and last-year medical students of Jundishapur University of Medical Sciences, Ahvaz, Iran in 2016.

## 2. Methods

The current descriptive, cross sectional study was conducted in 2016 academic years on all the first- and last-year medical students of Jundishapur University of Medical Sciences, as the statistical population ( $n = 255$ ). The inclusion criteria were willingness to participate in the study and filling out the questionnaire, and the exclusion criteria were lack of interest to participate in the study and not filling out the questionnaire.

Data collection tool had two parts: First, demographic characteristics of the students including age, gender, and year of admission to school, and the second part included critical thinking disposition inventory (CTDI) developed by Ricketts and Rudd (7) and achievement goal questionnaire-revised (AGQ-R) developed by Elliot and McGregor (22). The validity and reliability of the Persian versions of both questionnaires were confirmed in previous studies (15, 23).

Critical thinking disposition inventory: CTDI is a 33-item questionnaire that appraises three aspects of innovativeness (11 items), maturity (9 items), and engagement (13 items), and the items are scored based on a 5 point Likert scale ranging from 1 (completely disagree) to 5 (completely agree). The reliability coefficient for CTDI was 0.84 in the study by Ricketts and Rudd (7) and 0.66 in the study by Pakmehr et al. (23).

In the present study, reliability was 0.82, 0.69, 0.51, and 0.78 for the total questionnaire as well as innovativeness, maturity, and engagement subscales, respectively, using Cronbach's alpha coefficient. Pakmehr et al., confirmed the structural and factor validity of the questionnaire using confirmatory factor analysis (23). Face validity of the current study questionnaire was also evaluated and confirmed by five experts of educational sciences.

The scores ranged from 33 to 162 in the current study (mean: 99); hence, 99 was considered the medium level in the assessment of level of critical thinking disposition. The scores obtained in the current study ranged 11 - 55 (mean: 33) in innovativeness, 9 - 45 (mean: 27) in maturity, and 13 - 65 (mean: 39) in the engagement subscales (7).

The achievement goal questionnaire-revised: AGQ-R is a 12-item instrument scored based on a 5-point Likert scale from 1 (completely disagree) to 5 (completely agree), including four orientation aspects as mastery-tendency, mastery-avoid, function-tendency, function-avoid (each of three items).

The validity of AGQ-R was evaluated in a study by Azizi et al.; they calculated Cronbach's alpha as 0.77 (15). In the current study, the validity of total questionnaire was measured using Cronbach's alpha as 0.84. The reliability of AGQ-R was confirmed by exploratory and confirmatory

factor analysis in a study by Ning (24). In the study by Azizi et al., the face and content validity of the questionnaire were evaluated and confirmed by seven professors in psychology of education (15). In the current study, face validity of AGQ-R was confirmed by five professors in educational sciences. The score range obtained in the current study was 12 - 60 (mean: 36); to evaluate the level of achievement goal orientation, 36 was considered as average (15).

After obtaining permission from the medical school, the author referred to classes and different hospital wards to explain the study objectives to the first- and last-year students; then, after obtaining consent and willingness of the students to cooperate with the study, the questionnaires were distributed and collected immediately after completion. The questionnaires were anonymous and the students were assured of confidentiality of their information.

Data were expressed as mean  $\pm$  standard deviation (SD). To compare mean scores between the groups, *t*-test was used; and to evaluate the relationship between variables, Pearson correlation coefficient was employed. Finally, data were analyzed with SPSS version 20 (IBM Corporation, Armonk, NY).  $P < 0.5$  was considered the level of significance. To evaluate the normality of data, the Kolmogorov-Smirnov test was used and since  $P$  value  $> 0.05$  was obtained for the subscales of tendency toward critical thinking and achievement goal orientation in the test, the results confirmed the normal distribution of data and accordingly, parametric tests were used.

## 3. Results

Of the total 255 questionnaires distributed among the students, after exclusion of incompletely filled out or not completed questionnaires, 204 questionnaires were analyzed (80% response rate). Of the 204 students that completed the questionnaires, 104 (50.98%) were the first-year and 100 (49.02%) the last-year students. The mean age of the first-year students was  $18.93 \pm 0.86$  years (ranged 18 to 22) and that of the last-year students was  $24.60 \pm 1.31$  years (ranged 22 to 27). In terms of gender distribution in first- and last-year students, 47 (48.5%) and 66 (68.0%) subjects were female, respectively.

The mean total score of tendency toward critical thinking was  $70.75 \pm 11.12$ ; the mean score of subscales of innovativeness, maturity, and engagement were  $18.63 \pm 4.20$ ,  $24.40 \pm 4.13$ , and  $27.26 \pm 6.02$ , respectively. Table 1 shows the mean score of critical thinking disposition in the two study groups. Based on the study findings, the mean total score of critical thinking disposition in the students was lower than average. Comparison of the mean total score of critical thinking disposition between the first- and last-year students using *t*-test showed no significant difference

between the groups. Comparison of the mean scores of subscales indicated that except for maturity, there were no significant differences between the groups in terms of the two other subscales.

The mean score of critical thinking disposition in males and females were  $70.85 \pm 11.85$  and  $70.53 \pm 10.89$ , respectively; based on the *t*-test results, no significant difference was observed between the genders in terms of critical thinking disposition ( $P = 0.840$ ).

The mean total scores of achievement goal orientation in the first- and last-year students were  $28.22 \pm 7.76$  and  $27.19 \pm 6.98$ , respectively. Results of *t*-test showed no significant difference between the first- and last-year students in terms of achievement goal orientation ( $P = 0.059$ ). The mean score of AGQ was also compared between the genders and no significant difference was observed between males and females in this regard (the mean score of AGQ in females and males were  $27.51 \pm 7.52$  and  $29.21 \pm 6.98$ , respectively;  $P = 0.132$ ).

Based on the results of Pearson correlation coefficient, no significant association was observed between the critical thinking disposition and students' age ( $r = 0.059$ ,  $P = 0.416$ ), but there was a significant relationship between critical thinking disposition and achievement goal orientation in the students ( $r = 0.294$ ,  $P = 0.001$ ).

#### 4. Discussion

The current study was conducted to evaluate critical thinking disposition in the first- and last-year medical students and its association with achievement goal orientation; results showed that the mean total score of critical thinking disposition in the first- and last-year medical students was lower than average. In addition, there was no significant difference between the first- and last-year students in terms of critical thinking disposition. It can be said that there was no superiority for last-year medical students in disposition toward critical thinking to their first-year or recently admitted counterparts. It seems that medical schools do not pay adequate attention to critical thinking disposition in medical education and under such circumstances, students do not receive a proper education in this regard; the point that should be considered as a serious warning. Results of the current study were in agreement with those of Barkhordari (17), Haghshenas and Sajjadian (25), Iranfar et al., (26), and Rezaeian et al. (27), that reported no significant difference between the first- and last-year, and/or internship students in terms of critical thinking disposition.

Although it was expected that the internship students (the highest grade in medical education) should benefit from higher levels of critical thinking disposition and use

it more than their counterparts in lower grades due to higher educational level and direct contact with clients, and higher professional sensitivity regarding patients' health and life, findings indicated the lack of significant difference between the first- and last-year medical students in terms of critical thinking disposition; however, lack of difference indicates that medical curriculum has inconsiderable effects on the disposition of medical students toward critical thinking. In other words, critical thinking disposition is not considered in medical curriculum as an important goal and its developmental methods are not foresighted and implemented. From possible factors leading to such results, educational systems and university curriculums, teachers and teaching methods, students' evaluation system, and inadequate motivation of students are noteworthy (28).

In a review study by Chan on critical thinking disposition in medical education, results showed that shifting pedagogical approaches from passive trainings and memorizing methods to active and problem solving methods promotes the disposition toward critical thinking (29). Findings of a study on medical students in China reported a significant relationship between critical thinking disposition and problem-based learning (30). Therefore, since educational environments create appropriate opportunities and atmospheres for interaction, and provide contexts to promote critical thinking disposition, it would be worthy if the educational authorities of universities provide the context for development and promotion of critical thinking skills among senior medical students by paying enough attention to disposition toward critical thinking.

Findings of the current study indicated that of the total components forming critical thinking disposition, the mean score of maturity subscale was significantly higher in the last-year students; the results indicated the influence of more experience of studying at university on this type of thinking in seniors compared with freshmen. Some studies reported a significant difference between the first- and last-year students in the mean score of critical thinking disposition or some of its subscales (20). The content of educational programs, method of teaching, and educational environment and atmosphere can significantly affect the critical thinking disposition in different universities; controversial and various results of different studies can be explained by such factors. Definitely, educational environments, which create appropriate opportunity and atmosphere for interaction, provide context for the promotion of critical thinking disposition.

According to the results of the current study, no significant difference was observed between male and female students in terms of the score of critical thinking disposition. Results of studies by Mousazadeh et al. (31), and

**Table 1.** Comparison of the Mean Score of Critical Thinking Disposition and its Three Subscales Between First- and Last-Year Students

Variable	First-Year Students	Last-Year Students	t	P Value
Innovativeness	18.48 ± 4.05	18.81 ± 4.45	-0.538	0.590
Maturity	23.53 ± 3.68	25.03 ± 4.37	-2.578	0.010
Engagement commitment	27.81 ± 6.06	27.64 ± 6.08	0.195	0.840
Total score of critical thinking disposition	69.82 ± 110.60	71.48 ± 11.89	1.022	0.310

Haghshenas and Sajjadian (25), also confirmed the current study findings. These studies conducted on critical thinking disposition, also reported no significant difference between male and female students in this regard (5, 31). In addition, no significant association was observed between the total score of critical thinking disposition and students' age; the results were consistent with those of Gharib et al. (28), although more disposition and use of critical thinking skills were expected by age and experience increase (28).

Results of the current study also indicated a significant relationship between critical thinking disposition and achievement goal orientation; similar results were reported by Azizi et al. (15), Dehghani et al. (32), and Poondej et al. (33). Findings of some studies indicated that people with higher achievement goal orientation, benefit from extensive insights and use problem solving and critical thinking strategies to solve different problems. In fact, achievement goal orientation is associated with the level of success, tendency, and interest to deal with challenging issues and benefitting from related deep learning and critical thinking strategies (15).

Since achievement goal orientation is a method to judge personal competence and beliefs about different achievements, students should be directed to use criteria in the definition of competency mostly relying on exact understanding of personal skills and abilities. Nevertheless, results of some studies indicated that the type of achievement goal orientation was associated with the level of success and tendency toward dealing with different problems and critical thinking (34). Hence, teachers can promote the level of critical thinking disposition in students by motivating them and making them interested in future.

Difficulty with access to medical students, particularly medical intern students, in hospitals and their lower interest to complete the questionnaire were among the limitations and problems to perform the current study.

#### 4.1. Conclusion

Results of the current study indicated that the status of critical thinking disposition in medical students was instable and lower than average, based on the employed

scale; in addition, there was no significant difference between the freshmen and seniors in the level of disposition. But, a significant and positive association was observed between the achievement goal orientation and tendency toward critical thinking disposition.

Since people working in health sectors play a key role in public and community health, policy-makers and educational authorities should create the context to increase critical thinking skills and disposition by reforming the programs and providing appropriate educational facilities and environments.

To promote the critical thinking disposition, a revision in the educational system seems necessary.

Results of the current study can be considered as basic data for further curriculum intervention.

Since factors such as curriculum and teaching methods can significantly affect the students' tendency, it is recommended that university curriculums and teaching methods be revised to promote critical thinking disposition in students. Shifting to dialogue-driven teaching approaches is of great importance to promote critical thinking disposition in students.

#### Supplementary Material

Supplementary material(s) is available [here](#) [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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#### Footnote

**Ethical Considerations:** The current study was approved by the Ethics Committee of Jundishapur University of Medical Sciences (No. AJUMS.REC.13960550).

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