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Critical thinking skills of undergraduate students of educational sciences at Tehran universities

Habilidades de pensamiento crítico de estudiantes universitarios de ciencias de la educación en las universidades de Teherán

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ABSTRACT:

The present study aims to investigate the critical thinking skills of students in the educational sciences of Tehran universities. The population of study is undergraduate students of educational sciences of Tehran universities and the sample is 200 students of educational sciences selected using the stratified random sampling method. Data were collected using the California Critical Thinking Skills Test and analyzed using the one-sample t-test and multivariate analysis of variance. The results showed that the total score of critical thinking among undergraduate students of educational sciences was lower than the assumed mean value.

KEYWORDS: Critical Thinking, Curriculum, Educational Sciences, Tehran Universities.

RESUMEN:

El objetivo del presente estudio es investigar las habilidades de pensamiento crítico de los estudiantes de ciencias educativas de las universidades de Teherán. La población del estudio son estudiantes universitarios de ciencias educativas de las universidades de Teherán y la muestra es de 200 estudiantes de ciencias educativas seleccionados mediante el método de muestreo aleatorio. Los datos se recolectaron usando la prueba (CCTS) y se analizaron usando la prueba t de una muestra y el análisis de varianza multivariante. Los resultados mostraron que la puntuación total del pensamiento crítico entre los estudiantes universitarios de ciencias de la educación fue inferior al valor medio supuesto.

PALABRAS CLAVE: Ciencias de la Educación, Currículum, Pensamiento Crítico, Universidades de Teherán.

1.INTRODUCTION

One of the biggest goals of any education system is to accomplish critical thinking. Critical thinking is, by definition, any type of guided thinking that evaluates, rectifies, replaces and reconstructs phenomena and deals with higher levels of learning, i.e. analytic learning. The essence of critical thinking consists of suspended judgment and/or a healthy and constructive doubt and belongs to the category of thoughtful and rational thinking. The ability to think critically is one of the key factors in accomplishing a successful life and a prerequisite for exercising individual independence. For Gothman, critical thinking constitutes a central and core ability that protects individuals against indoctrination and belief induction. According to Kaviani Mehr, Salimi, and Liaghat (Kaviani Mehr et al.: 2015, pp. 86-99), rational (critical) thinking helps people in making decisions concerning difficult choices they confront in different spheres of life and being trained in critical thinking makes people think and act rationally in different circumstances.

Therefore, the promotion of critical thinking skills is an important principle in higher education and enables universities to train students with better and improved ability to analyze and reason. Halpern (Halpern: 1999) believes that the teaching of critical thinking should be the main goal of higher education and curriculums, educational activities, and higher education policy-making should be centered around this fundamental faculty. Halpern, a prominent curriculum planning theorist, emphasizes the role of developing critical thinking skills, and their inclusion in curricula, in order to have knowledgeable students and human beings and holds that the sole propose of education should be to enforce students' debating, arguing and reasoning skills so as to enable them to differentiate personal beliefs from facts, sophistication from logical reasoning and competence from incompetence. This is important in cultures that have been bombarded with information from all sides and especially true for universities, which embody, and champion, the development of critical thinking (Vojdani: 2015, pp. 133-152; Pakdel, & Ashrafi: 2019).

Curriculums that focus on teaching critical thinking challenge students' epistemic assumptions regarding the nature of knowledge and the process of acquiring knowledge, and criticize the absolute sovereignty of science which underpins a higher level of intellectual growth and enhances scientific thinking. It also needs to be a priority of higher education policies due to the ever-changing world of today and the era of information explosion we are living in. Iran's higher education system, influenced by the growing scientific and technological developments in the world and its challenges, has passed the Third Plan and the Fourth Development Plan Law in its educational policymaking, which focuses on the promotion of knowledge and scientific thinking, developing the scientific spirit and enhancing the educational and scientific status of the country, encouraging the spirit of research and development, and promoting creative thinking and the development of knowledge as a vision for all-round progress (Hashemi et al.: 2014, pp. 99-123).

People who think critically seek valuable information, not immediate information, while those who are incapable of critical thinking rely on immediate external information, rather than their thinking process, to validate their thinking. Learning activities need to be defined accordingly to be able to offer appropriate learning environments that nurture critical individuals and contribute to the development of students' thinking skills (Radulovic, & Stancic: 2017, pp. 9-25). To this end, many educational centers and universities have incorporated thinking models, definitions, and related educational policies into their general education curriculums and it is no surprise that words such as analytical thinking, rational (logical) thinking, problem-solving, and creative thinking are repeatedly mentioned in the texts and literature related to curriculum planning and/or the goals of training courses (Han, & Brown: 2013, pp. 110-127).

2. MATERIAL AND METHODS

Studies have shown that critical thinking skills can contribute to self-efficacy (Motaghi et al.: 2017, pp. 46-59), emotional intelligence (Vahedi et al.: 2015, pp. 47-57), information-seeking behavior (Khowsrojerdi, & Ghorban-Jahromi: 2007, pp. 133-151; Nooradi: 2017, pp. 71-75), self-directed learning (Ghanbari Hashem Abadi et al.: 2013, pp. 15-21) academic achievement (Nosrati: 2017, pp. 5-26) and social skills (Paivio: 2014). In general, the necessity and importance of critical thinking for students can be summarized as follows:

1. Equipping students with critical thinking skills will help them realize that scientific discoveries and advances per se cannot guide society, but that it is the society and its individuals who must control and guide scientific discoveries and advances in the best possible manner (Gunn et al.: 2008, pp. 165-183).
2. Critical thinking enables students to effectively evaluate and organize the information acquired through reading books, the Internet, and the university on current theories, existing standards and the methods used, and to gauge their validity, authenticity, and reliability through reasoning (Jawarneh et al.: 2008).

3. Critical thinking enhances students' research, problem-solving, decision-making, utilizing different perspectives, and lifelong learning capabilities. Taken together, these capabilities empower students to solve national, scientific, and practical problems (Jawarneh et al.: 2008; Glicker, & Merenstein: 2007, pp. 54-57; Mohammadi, & Yekta: 2018, pp. 1-7).
4. Critical thinking enables students to not only have enough knowledge and information about their specialty but also to make more informed decisions about society, politics, changing world issues and the ethical challenges of daily life in today's complex world and provide the right solutions for them (Abrami et al.: 2008, pp. 1102-1134; Stapleton: 2011, pp. 14-23).
5. Critical thinking enables students to understand how different norms can affect their thinking and how to fully evaluate, and test, their ideas based on research and reasoning. This way, critical thinking skills develop students' scientific and logical literature to better understand and cope with, the world (Gunn et al.: 2008, pp. 165-183).

This is survey research in methodology:

The population of this study is undergraduate students of the educational sciences from select universities in Tehran (students of Allameh Tabatabai, Shahid Beheshti, Farhangian, Tehran, Kharazmi and Al-Zahra Universities). The sample is 200 students of the mentioned universities who were selected by using the Cochran sample size formula based on the stratified random sampling method.

Variables	Groups	Number	Gender	
			Female	Male
Universities	Farhangian	20	10	10
	Allameh Tabatabai	36	16	20
	Shahid Beheshti	36	19	17
	Tehran	36	21	15
	Kharazmi	36	20	16
	Al-Zahra	36	36	-
Total		200	122	78
Sum total		200		

Table 1: Participants by gender and university

2.2. Data collection tools:

California Critical Thinking Skills Test – B (CCTST-B) with 34 multiple-choice questions and three subscales of analysis (9 questions), evaluation (13 questions) and inference (12 questions) was used to measure students' critical thinking skills. The test was designed by Facione and the theoretical basis for its design and development was the definition offered by the American Philosophical Association (Facione: 1990; Laureano et al.: 2018, pp. 4-7). To score the test, there is a standard key with one correct answer and one score for each question and the range of the subjects' scores will be, in total, between 0 and 34 throughout the test.

3. RESULTS

As mentioned earlier, the sample size was 200. The age of the participants in the study is reported in Table 2.

Group	Minimum	Maximum	Mean	Standard deviation
Undergraduate Students of Educational Sciences	19.0	29.0	21.365	1.4041

Table 2: The age of the participants

As can be seen from the table, the age range of the participants was between 19 and 29 years. The mean age was 21.36 and the standard deviation was 1.40. Table 3 reports the frequency distribution of participants' gender by the type of curriculum. 122 (61%) of the participants were female and 78 (39%) were male.

Groups	Frequency	Percentage
Female	122	61.0
Male	78	39.0

Table 3: Frequency distribution of participants' gender

Question 1: What is the level of critical thinking skills of undergraduate students of educational sciences at Tehran universities?

Variable	Aspects	Mean	Mean difference	t	df	sig
Undergraduate Students of Educational Sciences	Analysis	3.9900	-2/01	-10/89	99	0.001
	Evaluation	5.6700	-1/32	-6/25	99	0.001
	Inference	4.2400	-2/76	-16/11	99	0/001
	Total score	13.9000	-6/09	-13/44	99	0/001

Table 4: The results of one-sample t-test on students' level of critical thinking skills

To investigate this question, the one-sample t-test was used. Based on the results in the table above, a statistically significant difference can be seen between the actual mean and the assumed total score and the aspects involved in students' critical thinking. Given that the critical thinking questionnaire cut-off score for the total score was 20 and the scores for the three subscales of analysis, evaluation, and inference were reported at 6, 7, and 7 respectively (Assadi et al. 2013, pp. 1-7), therefore, these values were considered as the assumed mean (Kalogeropoulos et al.: 2020). As can be seen from the table above, the actual mean value in all three aspects of critical thinking, as well as the total score of students, is lower than the assumed mean value. Therefore, it can be asserted that the level of critical thinking skills of undergraduate students of educational sciences at Tehran universities is low.

Question 2: Is there a difference between the level of critical thinking skills of undergraduate students of educational sciences in different universities of Tehran?

Source	Variables	Sum of squares	Degrees of freedom	Mean squares	F value	Significance	Eta squared
University	Analysis	160.314	5	32.063	13.885	.001	.269
	Evaluation	160.534	5	32.107	8.408	.001	.182
	Inference	74.762	5	14.952	6.139	.001	.140
	Total score	991.292	5	198.258	15.205	.001	.287
Error	Analysis	436.425	189	2.309			
	Evaluation	721.725	189	3.819			
	Inference	460.362	189	2.436			
	Total score	2464.388	189	13.039			
Total	Analysis	3739.000	200				
	Evaluation	7596.014	200				
	Inference	4142.000	200				
	Total score	42585.036	200				

Table 5: Results of Multivariate Analysis of the Impact of Group (University Type) on Critical Thinking Components

Multivariate analysis of variance was also used to investigate this question. As can be seen in the table above, the significance level for all components and the total score are less than 0.05 ($p < 0.05$). In other words, the data in this table indicate that there is a significant difference between the students of different universities in Tehran in the different aspects of critical thinking. The significant F ratio in the table shows that there is a difference in the level of critical thinking skills of undergraduate students of educational sciences of different universities in Tehran (the value of dependent variable varies according to factor levels) but the location of this difference is not given. Therefore, the Tukey post hoc test was used for closer examination, which allowed us to compare the means one by one. Table 6 reports the results of this test for the total score of critical thinking.

The dependent variable	University (I)	University (J)	Mean difference (I-J)	Standard deviation error	Significance
Critical thinking	Kharazmi	Allameh Tabatabai	-2.9722*	.85514	.008
		Tehran	-.8333	.85514	.926
		Shahid Beheshti	-1.6389	.85514	.395
		Al-Zahra	-6.2500	.85514	.000
		Farhangian	-4.8111	1.01181	.000
		Tehran	2.1389	.85514	.129
	Allameh Tabatabai	Shahid Beheshti	1.3333	.85514	.626
		Al-Zahra	-3.2778	.85514	.002
		Farhangian	-1.8389	1.01181	.457
	Tehran	Shahid Beheshti	-.8056	.85514	.934
		Al-Zahra	-5.4167	.85514	.000
		Farhangian	-3.9778	1.01181	.002
	Shahid Beheshti	Al-Zahra	-4.6111	.85514	.000
		Farhangian	-3.1722	1.01181	.024
Al-Zahra	Farhangian	1.4389	1.00705	.709	

Table 6: The results of the follow-up Tukey post hoc test to investigate the two-way difference of students' critical thinking according to their universities

The above table data for the two-way comparison of students' critical thinking scores in different universities of Tehran according to the means obtained for each university (Tables 4-5) show that:

There is a significant difference between the level of critical thinking of the students of Allameh Tabatabaei University and Kharazmi University. This difference is in the interest of the students of Allameh Tabatabaei University. There is no significant difference between the critical thinking level of students of Kharazmi University and Tehran University.

There is no significant difference between the critical thinking level of students of Kharazmi University and Shahid Beheshti University.

There is a significant difference between the level of critical thinking of the students of Al-Zahra University and Kharazmi University. This difference is in the interest of the students of Al-Zahra University.

There is a significant difference between the level of critical thinking of the students of Farhangian University and Kharazmi University. This difference is in the interest of the students of Farhangian University.

There is no significant difference between the critical thinking level of students of Allameh Tabatabaei University and Tehran University.

There is no significant difference between the critical thinking level of students of Allameh Tabatabaei University and Shahid Beheshti University.

There is a significant difference between the level of critical thinking of the students of Allameh Tabatabaei University and Al-Zahra University. This difference is in the interest of the students of Al-Zahra University.

There is no significant difference between the critical thinking level of students of Allameh Tabatabaei University and Farhangian University.

There is no significant difference between the critical thinking level of students of Shahid Beheshti University and Tehran University.

There is a significant difference between the level of critical thinking of the students of Tehran University and Al-Zahra University. This difference is in the interest of the students of Al-Zahra University.

There is a significant difference between the level of critical thinking of the students of Tehran University and Farhangian University. This difference is in the interest of the students of Farhangian University.

There is a significant difference between the level of critical thinking of the students of Shahid Beheshti University and Al-Zahra University. This difference is in the interest of the students of Al-Zahra University.

There is a significant difference between the level of critical thinking of the students of Shahid Beheshti University and Farhangian University. This difference is in the interest of the students of Farhangian University.

There is no significant difference between the critical thinking level of students of Farhangian University and Al-Zahra University.

4. CONCLUSIONS

Today, experts in the field of education agree that critical thinking must not only constitute one of the goals of education but must be an integral part of it, for critical thinking is that type of thinking that leads to the best solution through analysis, evaluation, selection and application and this is what the world needs today. Given the findings of the current study, from the results of the critical thinking test, which is a well-known criterion-based test, and after comparing the scores obtained by undergraduate students of educational sciences, it can be concluded that the critical thinking skills of these students stand at a low level.

The result is not unique to this study and most previous research in other disciplines supports this fact.

There can be different potential reasons for this issue. In addition to individuals' diverse family backgrounds, the unpreparedness of society to present and criticize favorable and unfavorable viewpoints and, in short, an overall absence of the spirit of questioning phenomena in society, the prevailing conditions governing the educational system (especially in higher education) are not conducive to the development of students' intellectual capacities. The reason is that curriculums and/in educational systems focus more on preserving and reproducing existing knowledge and less on nurturing 'excellent' mental skills such as problem-solving, creative thinking, and critical thinking.

In other words, the fact that the educational system is, mostly, content and textbook-based, knowledge is presented and offered in the form of definitive facts. Educators focus on, and encourage, the literal reproduction and reiteration of the information recorded from the textbook and classroom sessions lead to students being superficially content with the minimum degree of mastery required to obtain acceptable scores and reluctant to analyze, distinguish and critique phenomena.

In addition, since in the humanities, evaluation is by nature associated with judgment and appraisal, the generally insulated intellectual space in the society, and the resultant distrust thereof, and the fact that there may be costs and consequences for making one's views public, may deter students from entering this field, i.e. the humanities. It should not be overlooked that in addition to the impact of students' family backgrounds and their talents and capacities, as well as the impact of previous educational measures and practices on the learner, the individual may sometimes 'think' based on the type and circumstances of the situation in which he or she finds him/herself.

The degree of importance of a situation in relation to the individual and his or her feelings and perceptions about that situation, their personalities and traits, their self-esteem and their intellectual potency to be able to critically weigh phenomena and their perceptions of the acceptance of their views are important factors that contribute to critical thinking, or lack thereof.

Therefore, providing appropriate and supportive classroom settings to encourage students to engage in critical thinking is an unquestionable and serious requirement. Otherwise, one may have sufficient

knowledge in a subject, have a positive attitude to critical thinking and may have good reasoning and analytical skills and awareness but due to a lack of opportunity to practice, s/he may not be able to display and use this capability. Knowledge, attitude, and practice are three essential elements of thinking.

Thus, lecturers, besides doing their utmost to 'impart' knowledge to the students, should themselves be familiar with critical thinking skills and, in turn, familiarize students with these skills. Knowledge and skill go hand in hand to enable the mobility of thought in an interactive and open-ended context. If the environment in the classroom is rigorous and authoritarian and different opposing ideas are not allowed to be put forward and discussed, and there is no conducive environment for the discussion and exchange of thoughts, critical thinking will neither begin nor develop. Interactive classroom settings and participatory teaching-learning processes are among the most effective factors in enhancing critical thinking. Students' attitudes and personalities are also effective in fostering critical thinking. Students who have been raised in a system that encourages and rewards obedience, silence, and acceptance are hardly able to question, criticize, and scrutinize phenomena and are reluctant to think critically or may even find their expediency in silence and acceptance, in which case, we regret to acknowledge that the efforts of the lecturers to develop and cultivate critical thinking will not succeed.

Another important point to keep in mind is that to teach critical thinking skills, a balance must be struck between the lesson content and the teaching process, for with the current volume of the course content and the limited classroom time available, it is not easy to develop these skills. Many course contents are unnecessary and repetitive, in which case, by identifying and applying the curricular priorities needed by students in each discipline and subject, their intellectual abilities can be developed. Providing the opportunity to practice critical thinking skills not only offers learners diverse learning experiences but also helps them feel content with having accomplished these skills. The subject area, of course, is also effective in learners' willingness to engage in critical thinking and its enhancement. In disciplines in which there is greater consensus and there is a high degree of certainty, compared to other disciplines and subject areas that are prone to diverse opinions, viewpoints and schools of thought and practice, students may have less propensity for critical thinking.

In sum, given the philosophy of higher education and its important mission, which is to nurture independent thinkers, and considering the fact that critical thinking has failed to find its due place in Iranian higher education, it is recommended that educational experts and policymakers, especially in higher education, take the issue of critical thinking more seriously, as it indeed is, and take the necessary steps to develop this important intellectual skill.

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