



Available Online through

www.ijptonline.com

INFORMATION LITERACY COMPETENCY STANDARDS AND CRITICAL THINKING IN HIGHER EDUCATION

Dr. Rita Rezaee¹, Ghadir Pourbairamian², Dr. Nahid Zarifsanaiey^{*3}

¹Quality improvement in clinical teaching Research Center, Education Development Center, Shiraz University of Medical Sciences, Shiraz, Iran.

²Student Research Committee, Shiraz University of Medical Sciences, Shiraz, Iran.

³Department of E-learning, Virtual School, Center of Excellence for e-Learning in Medical Sciences, Shiraz University of Medical Sciences, Shiraz, Iran.

Email: nzarifsanaee@gmail.com

Received on 04-03-2016

Accepted on 25-03-2016

Abstract

Judgment on clinical solemn occasions, decision making to maintain the vitality in complex problems and thinking in difficult situations requires critical thinking in the health field. Creating a standard framework of information literacy can be a foundation for critical thinking and independent learning that creates a balance between the capacity of curiosity, creativity and judgment in students. In this study, we measured the standards of information literacy, critical thinking skills, as well as examine the relationship between these standards and skills among students of medical sciences in Ardebil in different fields and years of study. This survey took place on a sample of 400 people from 13 different fields and from different entrances using two standard tests and information literacy questionnaire. Survey results show that students don't have enough ability and skill in all five standards of information literacy and critical thinking skills and the scores of students in these variables is far from desired. The total score of students in information literacy is 45.43 from 87 (52.22%) and the total score of students in critical thinking is 11.73 from 34 (34.5%). It was also found that there is a positive and significant correlation between information literacy and critical thinking ($P < .005$, $r = .468$). Students' poor score in critical thinking skills and information literacy standards, poor change of these skills during study time and the importance of these two issues in clinical decision making and improving the level of clinical skills, shows the importance of paying more attention to this issue in the health field and make changes and doing activities to improve them in the programs of health ministry.

Keywords: Critical Thinking, Information Literacy, Medical Sciences, Students.

Introduction

Critical thinking is one of the types of thoughts and is highly important in educational field (1). It is a cognitive process in which one judges and makes decisions by studying reasons, analyzing available data and drawing conclusions (2). On the other hand improving the ability to produce knowledge, understanding information and using them in an effective way are the research foundations of self-directed students and life-long learning. Achieving such an important goal is conceivable through the Functional discussion of information literacy (3). Based on given definition of ALA¹ an individual with information literacy is a person who has the ability to know when there is a need for information and is able to locate, evaluate, and effectively use that information and finally comprehend how to learn.

Five information literacy standards are:

Standard one: The information literate student determines the nature and extent of the information needed.

Standard two: The information literate student accesses needed information effectively and efficiently.

Standard three: The information literate student evaluates information and its sources critically and incorporates selected information into his or her knowledgebase and value system.

Standard Four: The information literate student, individually or as a member of a group, uses information effectively to accomplish a specific purpose.

Standard five: The information literate student understands many of the economic, legal, and social issues surrounding the use of information and accesses and uses information ethically and legally (4).

The education of critical thinking leads to the motivation for learning, obtaining problem-solving, decision-making and creativity skills (5). It also is one of the components of clinical decision-making and a criterion for clinical efficacy of professionals and medical students. It is considered as an important factor of promotion in professional independence too (6). Critical thinking is a vital factor in medicine based on evidences [6]. In addition the WFME¹ has identified critical thinking as one of the standards of medical education. Critical thinking has five core skills as: evaluation, inference, analysis, deductive reasoning, and inductive reasoning (7).

In terms of critical thinking the results of Burris and Garton showed that the average critical thinking among agriculture students of university of Missouri, United States of America was 21.3 (SD¹ = 4.36). The range of score was between 10 to 33 for critical thinking. The lowest score of critical thinking belonged to new students {freshmen} while the highest

one was for junior students. This indicated that the increase of experience in students reinforces the critical thinking skills of them (8). Amini and Fazlinejad in their study in Shiraz University of Medical Sciences represented that the average total scores of critical thinking test among the students of this university was 15.3 with standard deviation of 3.33 by use of CCTST¹, form B(9).

Information literacy provides a basis for constant advances of people in all work courses as citizens and informed members of the society by helping them in construction of a learning framework to comprehend how to learn. Information literacy enhances the evaluation, management and use of information skills among students (10-11). It constitutes the “life-long learning” basis. Information literacy enables learners to reinforce their own self-direction (12). In the context of information literacy, Seneviratne and Wickramasinghe performed a research on determining the status of information literacy skills of undergraduate students at the University of Moratuwa, Colombo. Their results showed that the average total scores of critical thinking (from 0 to 1000) for The Faculty of Architecture was 420, for IT¹ faculty was 340, and 360 for the faculty of engineering (12). Siamak et.al performed a study about the condition of information literacy of the students at Qom University of Medical Sciences. The research results indicated that the average obtained score of information literacy by respondents was $31/84 \pm 10/25$ for the whole questionnaire. The average score of information literacy among different faculty students respectively was: $32/70 \pm 9/97$ for the students of paramedical sciences, $28/73 \pm 9/53$ for the school of public health, $32/52 \pm 10/50$ for the school of nursing and midwifery, and $36/61 \pm 10/60$ for the students of medical science faculty. According to these results the information literacy of most students was in inappropriate level(13).

Many students pass their educational courses while their knowledge about research and data recovery (information literacy) is low. They also know nothing about relative dependence between information literacy and learning and specifically the life-long learning, self-directed learning, and E-learning which are necessary for effective learning especially in medical sciences based on new theories. Thus studying the status of information literacy and its awareness can be useful in development of educational objectives (14-15).

Furthermore establishing a standard framework of information literacy can provide basis for critical thinking and independent learning, because this framework makes balance between the capacities and abilities of curiosity, creativity and judgment of students. On the other hand to deal with issues, make decision about them and also judge them it is

necessary to have adequate knowledge and information and even actively use them. Accordingly people should be equipped by critical thinking to become an information literate and it is also essential the critical thinking process in information literacy be educated and experimented (16).

Based on aforementioned subjects and also because of the vital and key role of critical thinking and information literacy in education particularly medical education, life-long learning, decision-making (17).and teaching at the besides it is important to study the correlation and dependence of these two concepts. It should be noted that these two concepts are closely related with information and decision-making (17-19).and have common concepts and terms in their indicators, standards and definitions. The analysis of correlation and dependence of information literacy and critical thinking could provide valuable information which is useful in educational progress especially medical education. So the author studies the status of information literacy, critical thinking, and their interrelation among the students of Ardabil University of Medical Sciences in this research. The status of critical thinking and information literacy skills among the students of medical sciences should be examined in order to understand the quality of provided educations. Thus it is doubtful that the university education could be useful and provided effective learning yet. It is essential to evaluate the critical thinking and information literacy to analyze the effectiveness of the educational programs.

Materials and Methods

This study is a basic-applied research based on the purpose of research and is a descriptive – correlation in terms of data collection.

The research population of this survey is bachelor, master and PhD students of 13 different fields among five faculties that 400 individuals were selected by stratified random sampling as the sample population.

Two standard questionnaires of the California critical thinking skills test-form B and information literacy questionnaire for students as an actual measurement were used in data collection of this research.

The CCTST- form B contains 34 multiple choice questions (19 questions with 4 choices and 15 questions with 5 choices) with one correct answer in five cognitive skills of critical thinking namely analyze, evaluate, inference, deductive reasoning, and inductive reasoning. Grading method is based on giving one score instead of each correct answer and thus the total valid answers are the whole score of an individual. The final score of the test is 34 and achieved score in each part of test is variable between 0 to 16 so that it is set at least the score 9 for analyze part, score 11 for inference part, 16

for deductive reasoning and 14 for inductive reasoning. Hence there are 6 scores for everyone including 5 score for critical thinking in each part and one total score for critical thinking(18-21).Validity and reliability of this test has been proved (22-24).

The standard time of answering to the questions of this test is 45 minutes (25-26).After giving specified samples in each field, the students which were in sample population anonymously answer to the questionnaire in a quiet, calm, and suitable place with the Presence of the researcher. This test was held three times and in each time the students of two or three different fields took part in 45 minutes test.

The information literacy questionnaire contains 55 questions that some of them have one correct answer and another have more than one. This subject is mentioned in each question in parentheses.

The objective evaluation method is used to score in this questionnaire which means that this questionnaire is standard and normalized and objectivity of answers is available in questions. The scores in this questionnaire which is closed-ended are given in such a way that for each correct answer to the one or multiple choice questions the score one is given. Thus if the respondent correctly answer to the one choice question, he/she will give one score and the score of multiple correct answer question is equal to the number of selected correct choices. Thus, according to the number of questions and related valid options in the questionnaire, the total score for the information literate student is 87 and its 50percentage point is also equal to 43.5. The validity and reliability of the questionnaire has been examined and proved during several stages (27).This questionnaire was distributed by researcher among the students in a different time of critical thinking test in order to keep their accuracy and focus and after completion was gathered.

To analyze data and also to determine the correlation and dependence of variables, the t-test, Pearson product-moment correlation coefficient, linear regression model, and Chi-squared test were used. The obtained data from the questionnaire were studied in terms of tables and diagrams. The whole operation of data analysis was done by use of SPSS 18 statistical software.

Results

In 400 students, 138 were male (34.5 %) and 262 were female (65.5 %).The total score of information literacy was 45.43 of 87 (52.22%). The highest score of information literacy belonged to biochemistry students and the lowest one was for HIT students (table 1).

Table-1: Total score of information literacy.

Field of Study	Number	Average	Percent %	Standard Deviation
Medicine	90	50.49	58.03%	12.47
Dentistry	18	42.00	48.28%	10.02
Biochemistry	4	57.50	66.09%	0.71
Laboratory Sciences	28	41.57	47.78%	10.62
Radiology	22	48.91	56.22%	7.37
Anesthesiology	38	44.84	51.54%	10.23
HIT	18	39.44	45.33%	12.85
Public Health	26	41.85	48.10%	7.94
Occupational Health	18	46.00	52.87%	11.49
Environmental Health	30	45.20	51.95%	9.48
Nursing	48	44.37	51.00%	11.08
Midwifery	32	42.75	49.14%	8.87
Surgery Room	28	43.50	50.00%	10.00
Total	400	45.43	52.22%	10.94

The total obtained score of critical thinking was 11.37 of 34(34.50%). The highest score belonged to medical students and the lowest one referred to HIT students (table 2).

Table-2: Total score of critical thinking.

Field of Study	Number	Average	Percent %	Standard Deviation
Medicine	90	13.09	38.50%	4.033
Dentistry	18	11.33	33.32%	3.535
Biochemistry	4	11.50	33.82%	3.535
Laboratory Sciences	28	11.57	34.03%	2.472
Radiology	22	10.18	29.94%	2.822
Anesthesiology	38	11.37	33.44%	2.499
HIT	18	9.67	28.44%	3.464
Public Health	26	11.08	32.59%	2.397
Occupational Health	18	9.78	28.76%	3.073
Environmental Health	30	10.53	30.97%	5.370
Nursing	48	12.96	38.12%	2.612
Midwifery	32	12.19	35.85%	3.229

Surgery Room	28	11.36	33.41%	3.153
Total	400	11.73	34.50%	3.503

As it has mentioned in the table 3, fifth-year students have the highest score (16.29) while first-year students acquire the lowest score of critical thinking among different academic years.

Table-3: The score of the critical thinking core skills among the students by their academic year.

Academic Year	Number	Average and Standard Deviation					Total Score
		Evaluation	Inference	Analysis	Deductive Reasoning	Inductive Reasoning	
First Year	96	4.04 ± 1.64	3.25 ± 1.54	2.65 ± 1.37	4.81 ± 1.95	4.19 ± 1.51	9.94
Second Year	112	4.43 ± 1.35	3.57 ± 1.60	2.86 ± 1.37	5.27 ± 2.03	4.64 ± 1.68	10.86
Third Year	82	4.63 ± 1.78	4.19 ± 1.31	3.58 ± 1.95	5.90 ± 1.97	5.02 ± 1.94	12.41
Forth Year	82	5.10 ± 1.36	4.24 ± 1.58	3.78 ± 1.25	6.41 ± 1.99	5.22 ± 1.63	14.29
Fifth Year	14	4.86 ± 3.39	5.00 ± 2.24	4.43 ± 1.81	7.43 ± 2.64	5.14 ± 3.53	16.29
Sixth Year	14	5.71 ± 1.80	5.71 ± 1.80	4.86 ± 1.21	7.43 ± 2.07	6.71 ± 2.14	11.73
Total	400	4.57	3.89	3.27	5.67	4.82	11.73

Table 4 shows that the highest score of information literacy belonged to sixth-year students (50.43) and the lowest one is referred to second-year students.

Table-4: The score of the students' information literacy core skills based on academic year.

Academic Year	Number	Average and Standard Deviation					Total Score
		Standard one	Standard Two	Standard Three	Standard Four	Standard Five	
First Year	96	6.85 ± 1.89	9.75 ± 2.60	9.37 ± 2.37	11.02 ± 2.96	6.73 ± 2.20	9.94
Second Year	112	6.86 ± 2.17	9.68 ± 2.86	9.01 ± 2.50	10.73 ± 2.97	6.86 ± 2.86	10.86
Third Year	82	7.51 ± 2.16	10.71 ± 2.86	9.39 ± 2.83	11.58 ± 3.10	7.56 ± 1.64	12.41
Forth Year	82	7.44 ± 1.96	11.49 ± 4.12	8.90 ± 2.73	11.05 ± 3.21	7.32 ± 1.97	14.29
Fifth Year	14	8.57 ± 3.36	11.57 ± 3.55	9.86 ± 3.13	12.28 ± 2.56	7.86 ± 1.46	16.29
Sixth Year	14	9.29 ± 2.81	13.71 ± 3.50	12.86 ± 2.79	13.71 ± 2.29	8.86 ± 3.02	11.73
Total	400	7.25	10.48	9.32	11.20	7.17	11.73

Male students achieved higher score in both critical thinking and information literacy than female. This is mentioned in

table 5.

Table-5: Total score of critical thinking and information literacy based on gender.

Gender	Number	Critical Thinking Score		Information Literacy Score	
		From 34	Percent	From 87	Percent
Female	262	11.51 ± 3.53	33.85%	44.33 ± 10.56	50.95%
Male	138	12.19 ± 3.76	35.85%	47.41 ± 11.48	54.49%
Total	400	11.75 ± 3.50	34.56%	45.40 ± 10.96	52.18%

According to the Pearson correlation coefficient and significance level (.sig) in table 6, there is a significant and direct correlation between all variables of the survey except the relationship between the evaluation skill and the third standard of information literacy, evaluation criteria and the assessment of information resources (0.116-.sig). The correlation coefficient between total information literacy and total critical thinking was 0.468.

Table-6: The correlation matrix between the skills of information literacy and critical thinking.

Critical Thinking Information Literacy		Evaluation	Inference	Analysis	Deductive Reasoning	Inductive Reasoning	Critical Thinking
		Standard One	Pearson Correlation sig.	0.224 0.001	0.393 0.000	0.355 0.000	0.274 0.000
Standard Two	Pearson Correlation sig.	0.213 0.002	0.415 0.000	0.372 0.000	0.338 0.000	0.336 0.000	0.457 0.000
Standard Three	Pearson Correlation sig.	0.116 0.101	0.351 0.000	0.229 0.001	0.168 0.017	0.271 0.000	0.306 0.000
Standard Four	Pearson Correlation sig.	0.216 0.002	0.351 0.000	0.195 0.006	0.257 0.000	0.256 0.000	0.348 0.000
Standard Five	Pearson Correlation sig.	0.178 0.012	0.290 0.000	0.210 0.003	0.226 0.001	0.219 0.002	0.306 0.000
Information Literacy	Pearson Correlation sig.	0.231 0.001	0.441 0.000	0.333 0.000	0.311 0.000	0.346 0.000	0.468 0.000

Discussion

It can be concluded based on the results that the average obtained score by the students in each of the five standards of information literacy is approximately in the same level. All achieved scores are slightly higher than the average (50%) in

five standard of information literacy. Research findings suggest that the average score of information literacy for the students of Ardabil University of Medical Sciences is 45.43 of 87 which means it is slightly higher than the average of total score (43.5). This achieved score indicates the information literacy among these students is weak and undesirable and it needs more effort and planning to improve. These results also show that the average score among the students of HIT (45.33%), laboratory sciences (47.78%), public health (48.10%), dentistry (48.28%), and nursery (49.14%) is lower than the average 50%. The master students of biochemistry (66.09%) and medical students (58.03%) have more skills in information literacy than other students, although their score is also far from the desirable level and needs to be improved and planned. However the ability in information literacy is higher in upper-level students than freshmen but this is not a specific rule, since the score of second-year and forth-year students respectively is lower than that of the first and third-year students. Somehow this undermines the positive effect of educational year on the increase of information literacy skill. Research findings indicates the average total score of critical thinking is about one-third of the total score (score 34) for students. It points that the students do not have required ability in this skill and university educations could not cover this skill. Moreover by comparing the total score of critical thinking skills in different fields it can be concluded there is no considerable difference in students' skills in critical thinking so that the medical students with 13.09 score were the top and bachelor students of occupational health engineering with 9.78 were the bottommost in this skill. Comparing the score of students during the educational years shows that the score of critical thinking gradually growth by the increase of academic years, but the sixth-year students were lower skilled than the fifth-year students. Although there is a difference between these two skills among the students of first and last year, but this difference is insignificant and it suggests that university courses have been not effectively useful in these two skills' learning. Comparing the score of male and female students in critical thinking skills indicates unimportant difference between them, nevertheless males' score was more than that of females' in each five critical thinking skills. This result is extensible to the total score of critical thinking. This outcome has repeated in the achieved scores of information literacy skills to the extent that the scores of male students were slightly higher than females in each five skills. The total score of information literacy among males (54.49%) was also higher than that of females (50.95%).

For the first step it was essential to do ANOVA for the total scores and skills of critical thinking and information literacy in several fields in order to study the correlation and dependence of research variables. The findings of this test showed

the sig value (significance level) or P-Value in educational fields is less than 0.05 in all skills of critical thinking, standards of information literacy, and also the total information literacy and critical thinking. This means that the difference between the average of groups or as the same educational fields in all of these issues is significant at 95% confidence Interval. Thus analyzing the relationship between these skills could be performed confidently in educational fields. The results of the Pearson correlation coefficient along with the significance value (.sig) are provided in the form of matrix for each pair of variables in table 6. As it can be observed in this table, the correlation between all variables is significant except the relationship between the third standard of information literacy and the evaluation skill of critical thinking.

As it was mentioned the relationship between total critical thinking and total information literacy (.sig-0.000, r-0.468) is significant, positive, and medium in order of correlation level. Therefore based on the main purpose of this research it can be concluded that there is a direct relationship between the students' critical thinking level and their information literacy. This result is proved in this study as it can be seen all students gain low scores in both information literacy and critical thinking. We can refer to Chang's research in this regard which stated there is a significant and direct relationship between the skills of critical thinking and information literacy (28). Eyvazi also suggested in his study that the skills of critical thinking and that of the information literacy have significant and direct relationship and the analytic and inference skills of an individual with high information literacy are high and for low information literate is low(28). Morady et.al performed a survey in Shiraz University of Medical Sciences which showed that there is a significant and direct relationship between the skills of critical thinking and information literacy. They also suggested the skills of analysis, evaluation; inference, deductive reasoning, and inductive reasoning have direct and positive relationship (15).

Information literacy and critical thinking have several similarities and overlaps in the survey which was performed in the United States libraries (30). This research among the three major population universities in New Jersey indicated that the critical thinking and information literacy are closely related in many components of the research process (31). Vezzosi suggested that most of the studies about the relationship between critical thinking and information literacy reinforce the critical thinking (32). Thus it can be concluded that the performed research about the relationship between information literacy and critical thinking in our country and other countries are aligned with the result of this study and all of them discuss about the relationship between information literacy and critical thinking.

Conclusion

Research results indicated that the students are not in proper level in both information literacy and critical thinking and they are far from the desirable level. They also showed there is a direct and closed relationship between critical thinking and information literacy and their core skills. The students who have low information literacy are not successful in critical thinking. That is probably because of their overlap in some of their variables. Based on these results and also some other similar findings it can be inferred that the students at the Medical Sciences' Universities of Iran are not in desirable level of critical thinking and information literacy which are the essential backgrounds to make the best and most appropriate decisions in the most critical moments in health field. Educational courses of universities have failed to promote these skills among the students and there is not any special concentration on these two fields.

References

1. Lloyd M, Bahr N. Thinking Critically about Critical Thinking in Higher Education. *International Journal for the Scholarship of Teaching and Learning*. 2010; 4(2). Available from: http://academics.georgiasouthern.edu/ijstol/v4n2/articles/PDFs/_LloydBahr.pdf - external link.
2. Farajollahi M, Hosein ZA, Hormozi M, Sarmadi MR, Zarifsanayee N. A conceptual model for effective distance learning in higher education. *Turkish Online Journal of Distance Education*. 2010; 11(3).
3. Rezaee R, Shokrpour N. Performance assessment of academic departments: CIPP model. *European Journal of Social Sciences*. 2011;23(2):227-36.
4. Association of College and Research Libraries, A division of the American Library Association. *The Information Literacy Competency Standards for Higher Education*. Chicago, Illinois: American Library Association; 2004. Available from: <http://www.ala.org/acrl/sites/ala.org.acrl/files/content/standards/standards.pdf>
5. Banning M. Measures that can be used to instill critical thinking skills in nurse prescribers. *Nurse Educ in Practice*. 2006; 6(2): 98-105.
6. Karamizadeh Z, Zarifsanayei N, Faghihi AA, Mohammadi H, Habibi M. The study of effectiveness of blended learning approach for medical training courses. *Iranian Red Crescent Medical Journal*. 2012 Jan;2012(1, Jan):41-4.

7. WFME, AMSE. WFME Global Standards for Quality Improvement in Medical Education. Copenhagen: Kandrupsbogtrykkeri A/S; 2007. Available from:
http://www.eua.be/fileadmin/user_upload/files/newsletter/EUROPEAN-SPECIFICATIONS-WFME-GLOBAL-STANDARDS-MEDICAL_EDUCATION.pdf
8. Burris S, Garton BL. An Investigation of the Critical Thinking Ability of Secondary Agriculture Students. *Journal of Southern Agricultural Education Research*. 2006; 56(1): 18-29.
9. AminiM, Fazlinejad N. Critical thinking skill in Shiraz University of medical sciences students. *Hormozgan Medical Journal*. 2010; 14(3): 213-218 (Persian).
10. Rezaee R, Ebrahimi S. Clinical Learning Environment at Shiraz Medical School. *ActaMedicaIranica*. 2013 Jan 1;51(1):62
11. Hoseini S, Soltani F, BabaeBeygi M, ZarifSanaee N. The effect of educational audiotape programme on anxiety and depression in patients undergoing coronary artery bypass graft. *Journal of clinical nursing*. 2013 Jun 1;22(11-12):1613-9.
12. Seneviratne TM, Wickramasinghe VM. Information Literacy Skills of Undergraduates of University of Moratuwa. *Journal of the University Librarians Association of Sri Lanka*. 2010; 14(1): 15-30.
13. Siamak M, Alipour NodoushanKh, Khalighi N. Measurement of the Information Literacy Level in the Students of Qom University of Medical Sciences during 2010–2011. *Qom Univ Med Sci J* 2013;7(Suppl 1):23-30 (Persian).
14. Eskola EL. Information literacy of medical students studying in the problem-based and traditional curriculum. *Information Research*. 2005; 10(2): 221- 239. Available from: <http://informationr.net/ir/10-2/paper221.html>
15. Moradi R, Ali AabadiKh, KhazayiA, Rasouli B. Relationship between Critical Thinking and Information Literacy of Medical Sciences Students. *Bimonthly EducStrateg Med Sci*. 2014; 7 (3) :141-147(persian).
16. Rezaee R, Yazdani Z, Shokrpour N. Comparison of Learning Organization Indicators in 2 Universities in Shiraz as Viewed by the Personnel. *The health care manager*. 2014 Oct 1;33(4):342-8.
17. Moattari M, Moosavinasab E, Dabbaghmanesh MH, ZarifSanaiey N. Validating a Web-based Diabetes Education Program in continuing nursing education: knowledge and competency change and user perceptions on usability and quality. *Journal of Diabetes & Metabolic Disorders*. 2014 Jun 24;13(1):1.

18. Facione NC, Facione PA. Critical Thinking and Clinical Judgment, A Teaching Anthology. In: Critical Thinking and Clinical Reasoning in the Health Sciences: An International Multidisciplinary Teaching Anthology. Cisneros, R. California: California Academic Press; 2008, p.1-13.
19. Ennis RH. Critical Thinking Assessment. *Teory into Practice*. 1993; 32(3): 180-186. Mehrinejad SA. Adaptation and normalization of California Critical Thinking Skills Test. *Advances in Cognitive Sciences*. 2007; 9(3): 63- 72 (Persian).
20. Mashofi M, Movahedpour A, Refahi S, Amani M, Sharghi A. Comparison of first and final year nursing students' critical thinking skills in Ardabil Azad medical sciences university In: 10th Iran Medical Education Conference; 2009. may 2-7; Shiraz: Shiraz medical sciences university (EDC Journal- Sabz); 2009. p. 418 (Persian).
21. Facion PA, Facion NC. *The California Critical Thinking Skills Test and National League for Nursing Accreditation Requirement*. Millbrae, CA: Academic Press; 1994.
22. Khalili H, Hosseinzadeh M. Investigation of reliability, validity and normality Persian version of the California Critical Thinking Skills Test; Form B (CCTST). *Journal of Medical Education*. 2003; 3(1): 29-32.
23. Mehrabi M, Alipoor A, Saeed N. Evaluation of Critical Thinking among Students of Shiraz Payam-e-Nour University. *Media*. 2011; 2(1): 19-23 (Persian).
24. Shin K, Jung DY, Shin S, Kim MS. Critical Thinking Dispositions and Skills of Senior Nursing Students in Associate, Baccalaureate, and RN-to-BSN Programs. *J Nurs Educ* 2006; 45(6): 233-237.
25. May BA, Edell V, Butell S, Doughty J, Langford C. Critical Thinking and Clinical Competence: a Study of their Relationship in BSN Seniors. *J Nurse Educ* 1999; 38(3): 100-110.
26. Siamak M, Davarpanah M. Construction and Validation of a Scale for the Assessment of Undergraduate Student's Information Literacy. *Library and Information Science*. 2009; 12(1): 119-147 (persian).
27. Chuang J. The relationship between junior higher schoolteachers critical thinking skills with information literacy and their integration of information technology into curriculum in Taiwan. *Nurs Educ*. 2009; 42(11): 498-508 (Persian).
28. Haji Hiedari H, Yazdian A. Assessment and application of the five-level model of critical media literacy: A case study of college students of the Islamic Republic of Iran Broadcasting. *Glob Media J*. 2011; 6(2): 30-57 (Persian).

29. Schroeder R. Merging Critical Thinking and Information Literacy Outcomes Making Meaning or Making Strategic Partnerships? In: Wilkinson CW, Brucch C. Transforming information literacy programs: intersecting frontiers of self, library culture, and campus community. Chicago: ACRL; 2012, p. 131-151.
30. Rezaei R, Mehrabani G. A comparison of the scorings of real and standardized patients on physician communication skills. *Pakistan journal of medical sciences*. 2014 May; 30(3):664
31. Schroeder R. Merging Critical Thinking and Information Literacy Outcomes Making Meaning or Making Strategic Partnerships? In: Wilkinson CW, Brucch C. Transforming information literacy programs: intersecting frontiers of self, library culture, and campus community. Chicago: ACRL; 2012, p. 131-151.
32. Vezzosi M. Critical thinking and reflective practice: The role of information literacy. Newcastle: Lavorideglistudenti MAIS (University of Northumbria); 2004. Available from:
<http://dspace-unipr.cineca.it/bitstream/1889/91/2/BP100%20Vezzosi.pdf>