



Assessment of the relationship between critical thinking and information literacy in dental students: A cross-sectional study

Background: In the dental profession, which faces complex diagnostic challenges and sensitive decision-making, possessing critical thinking skills is essential for the students of dentistry to analyze evidence and select the best treatment plan. On the other hand, information literacy, as a prerequisite for accessing reliable and up-to-date knowledge, forms the foundation of these decisions. Improving students' information literacy can increase their level of critical thinking skills.

Method: This was a cross-sectional study conducted on 149 undergraduate dental students of Bushehr University of Medical Sciences who had completed at least one semester in 2021. The California Critical Thinking Skills Test (CCTST-form B) and the standard Information Literacy Questionnaire were used to determine the scores of critical thinking and information literacy, respectively, and then the relationship between the two variables was examined. Linear regression model was used for data analysis through SPSS software version 24.

Results: The mean score of critical thinking in students was 9.67 ± 3.77 (out of 34) and the mean score of information literacy was 43.96 ± 10.04 (out of 87). These scores were below the midpoint of the achievable score range for both variables. Also, there was a significant relationship between students' critical thinking and information literacy ($p = 0.020$) so that with the increase of information literacy, the level of students' critical thinking increased.

Conclusion: Due to the fact that dental students do not have the desired level of critical thinking and information literacy, it seems necessary to plan and implement appropriate educational programs so as to promote the students' information literacy and thus improve their critical thinking skills.

Keywords: Medical education, Critical thinking, Information literacy, Dentistry

تقييم العلاقة بين التفكير النقدي ومحو الأمية المعلوماتية لدى طلاب طب الأسنان: دراسة مقطعية

الخلفية: في مهنة طب الأسنان، التي تواجه تحديات تشخيصية معقدة وقرارات حساسة، يُعد امتلاك مهارات التفكير النقدي أمراً أساسياً لطلاب طب الأسنان لتحليل الأدلة واختيار أفضل خطة علاجية. من جهة أخرى، تُشكل محو الأمية المعلوماتية، باعتبارها شرطاً أساسياً للوصول إلى معلومات موثوقة وحديثة، أساس هذه القرارات. ويمكن لتحسين محو الأمية المعلوماتية لدى الطلاب أن يزيد من مستوى مهارات التفكير النقدي لديهم.

الطريقة: أُجريت هذه الدراسة المقطعية على 149 طالباً جامعياً في طب الأسنان بجامعة بوشهر للعلوم الطبية، ممن أتموا فصلاً دراسياً واحداً على الأقل في عام 2021. استُخدم اختبار كاليفورنيا لمهارات التفكير النقدي (CCTST-form B) واستبيان محو الأمية المعلوماتية المعياري لتحديد درجات التفكير النقدي ومحو الأمية المعلوماتية على التوالي، ثم جرى فحص العلاقة بين المتغيرين. استُخدم نموذج الانحدار الخطي لتحليل البيانات باستخدام برنامج SPSS الإصدار 24.

النتائج: بلغ متوسط درجة التفكير النقدي لدى الطلاب 9.67 ± 3.77 (من 34)، بينما بلغ متوسط درجة معرفة المعلومات 43.96 ± 10.04 (من 87). وكانت هذه الدرجات أقل من منتصف النطاق الأمثل لكلا المتغيرين. كما وُجدت علاقة دالة إحصائياً بين التفكير النقدي ومعرفة المعلومات لدى الطلاب ($P = 0.020$), حيث ارتفع مستوى التفكير النقدي لديهم مع ازدياد معرفة المعلومات.

الخلاصة: نظراً لعدم امتلاك طلاب طب الأسنان المستوى المطلوب من التفكير النقدي ومعرفة المعلومات، فمن الضروري تخطيط وتنفيذ برامج تعليمية مناسبة لتعزيز معرفة المعلومات لديهم، وبالتالي تحسين مهاراتهم في التفكير النقدي.

الكلمات المفتاحية: التعليم الطبي، التفكير النقدي، معرفة المعلومات، طب الأسنان

بررسی رابطه سواد اطلاعاتی و مهارت تفکر انتقادی در دانشجویان دندانپزشکی: یک مطالعه مقطعی

دانتون کے طلبہ میں تنقیدی سوچ اور معلومات کی خواندگی کے درمیان تعلق کا اندازہ: ایک کراس سیکشنل مطالعہ

زمینه و هدف: در حرفه دندانپزشکی، که با چالش‌های پیچیده تشخیصی و تصمیم‌گیری‌های حساس روبرو است، برخورداری از مهارت تفکر انتقادی برای تحلیل شواهد و انتخاب بهترین طرح درمان امری ضروری برای دانشجویان این رشته محسوب می‌شود. از سوی دیگر، سواد اطلاعاتی به عنوان پیش‌نیاز دستیابی به دانش معتبر و روزآمد، پایه این تصمیم‌گیری‌ها را تشکیل می‌دهد. ارتقای سواد اطلاعاتی دانشجویان می‌تواند سطح مهارت‌های تفکر انتقادی آنان را افزایش دهد.

روش: این مطالعه مقطعی بر روی 149 دانشجوی مقطع دکتری عمومی دندانپزشکی دانشگاه علوم پزشکی بوشهر که حداقل یک ترم تحصیلی را گذرانده بودند، در سال 1400 انجام شد. برای سنجش نمرات تفکر انتقادی از پرسشنامه استاندارد CCTST-form B و برای سنجش سواد اطلاعاتی نیز از پرسشنامه استاندارد سواد اطلاعاتی استفاده گردید و سپس ارتباط بین این دو متغیر بررسی شد. تحلیل داده‌ها با استفاده از مدل رگرسیون خطی در نرم‌افزار SPSS نسخه 24 صورت گرفت.

یافته‌ها: میانگین نمره تفکر انتقادی دانشجویان 9.67 ± 3.77 و میانگین نمره سواد اطلاعاتی 43.96 ± 10.04 بود. این نمرات پایین‌تر از میانه دامنه نمره قابل کسب برای هر دو متغیر بودند. همچنین، بین تفکر انتقادی و سواد اطلاعاتی دانشجویان رابطه معناداری مشاهده شد ($P = 0.020$)؛ به طوری که با افزایش سواد اطلاعاتی سطح تفکر انتقادی دانشجویان نیز افزایش می‌یافت.

نتیجه‌گیری: با توجه به این که دانشجویان دندانپزشکی در سطح مطلوبی از تفکر انتقادی و سواد اطلاعاتی قرار ندارند طراحی و اجرای برنامه‌های آموزشی مناسب برای ارتقای سواد اطلاعاتی و در نتیجه بهبود مهارت‌های تفکر انتقادی آنان ضروری به نظر می‌رسد.

واژه‌های کلیدی: آموزش پزشکی، تفکر انتقادی، سواد اطلاعاتی، دندانپزشکی

پس منظر: دانتون کے پیشے میں، جسے پیچیدہ تشخیصی چیلنجز اور حساس فیصلہ سازی کا سامنا ہے، دندان سازی کے طلبہ کے لیے شواہد کا تجزیہ کرنے اور علاج کے بہترین منصوبے کا انتخاب کرنے کے لیے تنقیدی سوچ کی مہارت کا ہونا ضروری ہے۔ دوسری طرف، معلومات کی خواندگی، قابل اعتماد اور تازہ ترین علم تک رسائی کے لیے ایک شرط کے طور پر، ان فیصلوں کی بنیاد بناتی ہے۔ طلباء کی معلوماتی خواندگی کو بہتر بنانے سے ان کی تنقیدی سوچ کی مہارت کی سطح میں اضافہ ہو سکتا ہے۔

طریقہ: یہ بوشهر یونیورسٹی آف میڈیکل سائنسز کے 149 انڈرگریجویٹ ڈینٹل طلبہ پر ایک کراس سیکشنل مطالعہ کیا گیا جنہوں نے 2021 میں کم از کم ایک سمسٹر مکمل کیا تھا۔ کیلیفورنیا کریٹیکل تھنکنگ سکلز ٹیسٹ (سی سی ٹی ایس ٹی فارم بی) اور معیاری انفارمیشن لٹریسی سوائنامہ استعمال کیا گیا تھا، اس کے بعد معلومات اور تنقیدی سوچ کے درمیان تعلق، اسکور اور اسکور کے درمیان تعلق کا تعین کرنے کے لیے متغیرات کی جانچ کی گئی۔ SPSS سافٹ ویئر ورژن 24 کے ذریعے ڈیٹا کے تجزیہ کے لیے لکیری ریگریشن ماڈل استعمال کیا گیا تھا۔

نتیجہ: طلباء میں تنقیدی سوچ کا اوسط اسکور 9.67 ± 3.77 تھا (34 میں سے) اور معلوماتی خواندگی کا اوسط اسکور 43.96 ± 10.04 (87 میں سے) تھا۔ یہ اسکور دونوں متغیرات کے لیے قابل حصول سکور رینج کے وسط پوائنٹ سے نیچے تھے۔ اس کے علاوہ، طلباء کی تنقیدی سوچ اور معلومات کی خواندگی ($P = 0.020$) کے درمیان ایک اہم تعلق تھا تاکہ معلوماتی خواندگی میں اضافے کے ساتھ، طلباء کی تنقیدی سوچ کی سطح میں اضافہ ہوا۔

نتیجہ: اس حقیقت کی وجہ سے کہ دانتون کے طلباء کے پاس تنقیدی سوچ اور معلومات کی خواندگی کی مطلوبہ سطح نہیں ہے، مناسب تعلیمی پروگراموں کی منصوبہ بندی اور ان پر عمل درآمد ضروری معلوم ہونا ہے تاکہ طلباء کی معلوماتی خواندگی کو فروغ دیا جا سکے اور اس طرح ان کی تنقیدی سوچ کی مہارت کو بہتر بنایا جا سکے۔

کلیدی الفاظ: طبی تعلیم، تنقیدی سوچ، معلوماتی خواندگی، دندان سازی۔

INTRODUCTION

Critical thinking is a self-regulated and purposeful judgment process that leads to problem-solving and appropriate decision-making in the individual (1). As a fundamental learning tool, it acquaints students with the art of reasoning and logic, increases their readiness for dynamic situations outside the classroom, and equips them with essential skills for better understanding and living (2). Given its pivotal role, promoting critical thinking is essential in teaching health care professionals (3).

Critical thinking is a self-regulated and purposeful judgment process that leads to problem solving and appropriate decision making in the individual. From the point of view of many educators and philosophers, the development of critical thinking is not only the main goal of the education system of any society, but also as a basic condition and one of the main missions of university education (3).

The World Federation for Medical Education (WFME) considers critical thinking to be one of the standards of medical education (4). Critical thinking is necessary for students who are present at patients' beds and will take care of the seriousness of the treatment in the future, as well as for students who play a role in the health of individuals, including dental students. They must have enough training and experience in this field to be able to make the best decision in the critical moments and use the best solution. Otherwise, they will not be able to perform their duties well as a therapist (5). Today, when there is a huge amount of information in society and the phenomenon of false information loss, the use of information technology alone cannot be the answer to information seeking behavior. Rather, effective information retrieval and the use of information literacy require critical thinking skills, including reasoning from existing information, inferring information, analyzing, and then evaluating information (2).

Information literacy means having the necessary techniques and skills to use information tools (6). The skill of effectively accessing the information needed has become invaluable in the age of communication by spending less time and cost as the basic literacy of knowledge-based societies (7). An information literate is someone who can choose a topic and the appropriate information for that topic and know the search policy in different sources of information. One who can analyze the collected data for evaluation, relevance, quality, and usefulness can correctly direct the information towards knowledge production (8). Information literacy enhances students' assessment, management, and application skills and enables learners to strengthen their self-direction (9).

The development of students' intellectual skills has always been a complex issue in education.

However, in the current information age, the sheer volume of societal information output has surpassed the capacity for critical thinking about it. Consequently, there is growing concern among educational professionals regarding students' limited ability to employ critical thinking skills despite their recognized importance as an essential tool for learning (10).

In this regard, the role of educational centers as a source of information and the role of lecturers as a transmitter of information should be changed; and instead of memorizing the information presented, students should increase their thinking and reasoning skills and apply it after analyzing and processing the information. In order to make this change and to cultivate more critical thinking, it is necessary to evaluate the current situation of students in this field (11).

Students in the 21st century need to improve their information literacy and critical thinking skills in order to succeed and make progress in learning (12). Given the importance of the subject and the fact that attention to critical thinking skills, especially in medical education, is considered vital by UNESCO for 21st century learner (13), the Dental Accreditation Committee, in its new standards, has also emphasized the importance of teaching analytical and critical thinking and applying the principles and scientific methods of medicine based on the promotion of this skill throughout students' educational programs (14). (Commission on Dental Accreditation, 2022) Although theoretical and empirical studies suggest an interrelationship between information literacy and critical thinking as key components of lifelong learning and clinical decision-making (9), significant gaps persist. Specifically, there is a scarcity of research focusing on dental students, who require these skills, to navigate complex clinical problems and evidence-based practice. Furthermore, no prior study has examined this relationship among the dental student population at Bushehr University of Medical Sciences. Therefore, this study was designed with a dual purpose: first, to determine the baseline levels of critical thinking skills and information literacy among dental students at this university, and second, to empirically investigate the relationship between these two constructs in this specific context. The findings will provide valuable local data to inform about the development of tailored educational programs aimed at simultaneously fostering these essential competencies.

METHODS

Selection and Description of Participants

The present study is a cross-sectional study performed on undergraduate dental students of Bushehr University of Medical Sciences in 2021. The sample included 149 dental students who were

enrolled in the study by the census. Inclusion criteria were: (1) being an active student in the undergraduate dental program, (2) having completed at least one academic semester, and (3) willingness to participate in the study. Exclusion criteria were: (1) unwillingness to continue participation at any stage, (2) filling questionnaires incompletely (missing more than 10% of items), and (3) being a guest or transfer student from other universities. A demographic information form and two questionnaires on critical thinking and information literacy were used for data collection. Demographic information included age, gender, marital status, and academic year.

Technical Information

The California Critical Thinking Skills Test (CCTST-form B) was used to assess students' critical thinking skills. This standard questionnaire includes 34 multi-choice questions that measure five core cognitive skills of critical thinking: analysis, evaluation, inference, deductive reasoning, and inductive reasoning. The total score ranges from 0 to 34.

The Persian version of the CCTST has demonstrated acceptable psychometric properties. In a study by Jafari et al. (2020) conducted on a similar population of Iranian medical students, the internal consistency for the total score, as measured by Cronbach's alpha, was reported as 0.74, confirming its acceptable reliability for use in this context (15).

Students' information literacy was assessed using the Standard Information Literacy questionnaire developed by Davarpanah et al. (16). This instrument comprises 55 items that evaluate various dimensions of information literacy, including the ability to define information needs, access information sources, evaluate information critically, and use information ethically and effectively.

The questionnaire employs a multiple-response format; some items have a single correct answer, while others require the identification of multiple correct options. Scoring was performed by awarding one point for each correctly identified option across all questions. Consequently, the total score is derived from the sum of all correct responses, with a maximum achievable score of 87. A score above the midpoint of 43.5 indicates a performance level above average.

The validity of the questionnaire has been previously established through content validity approval by a panel of librarians and information science specialists (16). In the present study, the reliability of the questionnaire was re-assessed and confirmed, demonstrating good internal consistency with a Cronbach's alpha coefficient of 0.81.

Statistics

After completing the questionnaires by students, the

collected information was entered into SPSS software version 24. In order to extract descriptive information for qualitative variables, frequency table was used and for quantitative variables, mean and standard deviation indices were calculated. Independent t-test, one-way analysis of variance, Pearson correlation coefficient and multiple regression model were used for data analysis. The significance level of statistical tests was considered less than 0.05.

RESULTS

The demographic characteristics of the participants are presented in Table 1. Of the 149 students, 99 (66.4%) were female and 132 (88.6%) were single. Participants were, on average, 21.72 ± 1.83 years old.

Table 1. Demographic characteristics of participants

Variable	Frequency (%)	
Gender	Female	99 (66.4)
	Male	50 (33.6)
Marital status	Single	132 (88.6)
	Married	17 (11.4)
	1	18 (12.1)
Years spent at the university	2	24 (16.1)
	3	28 (18.8)
	4	26 (17.4)
	5	29 (19.5)
	6	24 (16.1)
Age Mean (SD)	21.72 (1.83)	

The descriptive results of the information literacy score and the critical thinking score and its domains are shown in Table 2. Based on the results, the mean scores of students' critical thinking and information literacy were 9.67 ± 3.77 and 43.96 ± 10.04 , respectively. The mean scores for both critical thinking and information literacy were below the midpoint of the total achievable scores (17 for critical thinking and 43.5 for information literacy), indicating a less-than-desirable level among the students.

The results of univariate analysis of demographic variables with critical thinking score are presented in Table 3. An independent samples t-test showed no significant difference in critical thinking scores between males and females ($p = 0.099$). However, married students showed significantly higher critical thinking scores than single students ($p = 0.007$). One-way ANOVA revealed no statistically significant differences in critical thinking scores across different academic years ($p = 0.232$). Additionally, no significant correlation was found between age and critical thinking score ($r = 0.097$, $p = 0.238$).

Pearson correlation coefficient was calculated to investigate the relationship between critical

Table 2. Descriptive results of information literacy and the critical thinking score

Scale	Minimum	Maximum	Mean (SD)
Critical thinking	2	17	9.67 (3.77)
Analysis	0	6	2.75 (1.78)
Evaluation	0	7	3.56 (1.70)
Inference	0	8	3.35 (1.70)
Deductive reasoning	2	10	5.39 (2.34)
Inductive reasoning	0	6	3.40 (1.44)
Information literacy	24	66	43.96 (10.04)

Table 3. Univariate analysis of the relationship between demographic variables and critical thinking score

Variable		Mean $\pm$ SE	p-value
Gender	Female	10.04 $\pm$ 3.84	0.099
	Male	8.96 $\pm$ 3.56	
Marital status	Single	9.37 $\pm$ 3.72	0.007
	Married	12.00 $\pm$ 3.41	
Years spent at the university	1	7.66 $\pm$ 2.68	0.232
	2	9.38 $\pm$ 3.55	
	3	10.29 $\pm$ 4.13	
	4	9.81 $\pm$ 4.22	
	5	10.28 $\pm$ 4.04	
	6	9.92 $\pm$ 3.17	
Age (correlation)		r = 0.097	0.238

thinking and students' information literacy. The results showed that there is a significant relationship between critical thinking and students' information literacy ($r = 0.19$, $p = 0.022$). This means that with increasing information literacy, students' critical thinking scores increased.

Using multiple linear regression model, the relationship between critical thinking variable and information literacy with control of demographic variables was investigated (Table 4). According to this analysis, information literacy variable had a significant effect on the mean score of students' critical thinking ($\beta = 0.07$, $p = 0.020$) so that for one unit of increase in students' information literacy score, their critical thinking score increases by an

average of 0.07. The mean score of critical thinking of the second year and higher students was significantly higher than that of the first year students ($p < 0.05$). The mean score of critical thinking of married students was higher than that of the single students ($p = 0.017$). Other demographic variables, i.e., age and gender, had no significant effect on students' critical thinking score ($p > 0.05$).

DISCUSSION

The findings of this study demonstrated a significant positive relationship between information literacy and critical thinking skills among dental students, indicating that higher information literacy is associated with enhanced

Table 4. Multiple regression analysis summary to predict critical thinking

Variable		Regression Coefficient	SE	p-value
Information literacy		0.07	0.03	0.020
Age		0.36	0.29	0.226
Gender	Male	-	-	-
	Female	0.73	0.64	0.258
Marital status	Single	-	-	-
	Married	2.52	1.04	0.017
Years spent at the university	1	-	-	-
	2	2.57	1.27	0.045
	3	2.28	1.27	0.011
	4	3.48	1.36	0.013
	5	4.00	1.54	0.011
	6	3.68	1.84	0.048

critical thinking abilities. Furthermore, the mean scores of both skills were below the midpoint of the achievable score range, highlighting an area requiring educational intervention.

This finding is consistent with a body of research conducted in both Iranian and international contexts. For instance, studies by Mohammadi et al. (17) in Iran, Eivazi (18), and Wu (19) have all reported a direct and significant correlation between critical thinking and information literacy or its components. Similarly, in the health professions domain, Pu et al. (4) found that clinicians perceived the critical thinking skills of medical and dental students as average or below average, underscoring a universal concern that aligns with our findings. Our results reinforce these consistent findings, suggesting that the relationship between these two skill sets is robust across different educational environments. Some studies offer more nuanced insights. For example, the work of Azami et al. (20) corresponds with the broader theme by identifying significant relationships between information literacy and specific subscales like analysis and inference. This nuance underscores the importance of investigating not just the overall construct but also its underlying dimensions, a perspective supported by the correlations observed in our own data.

The correlation observed between information literacy and specific subscales like analysis and deductive reasoning in our study suggests that information-literate students are better equipped at deconstructing information and applying logical reasoning. This finding is consistent with the findings of Kong (12), who demonstrated that technology-enhanced learning environments, which foster information literacy, significantly promote students' critical thinking, particularly in analysis and inference.

The findings from this study and the broader evidence base suggest that targeted educational interventions can enhance these competencies. Integrating active learning methods, such as problem-based learning (PBL) and case-based discussions, which require students to seek, analyze, and apply information to solve complex problems, has been shown to effectively promote both critical thinking and information literacy skills (3, 12). Specifically, to strengthen deductive reasoning, teaching strategies focusing on applying general principles to specific cases—a core component of clinical reasoning—are recommended.

This study has several limitations that should be considered. First, its cross-sectional design prevents any inference of causality between information literacy and critical thinking. Second, the use of self-reported questionnaires might be subject to bias. Third, the study was conducted in a single university, which may limit the generalizability of

the findings to other dental student populations. Finally, while we used standard tools, the reliability of the critical thinking questionnaire, though acceptable, was not high. Future research should address these limitations by employing longitudinal or interventional designs to establish causal relationships. Qualitative studies could provide deeper insights into the experiences and challenges students face in developing these skills. It is also recommended to investigate the effectiveness of specific educational modules, such as integrating information literacy workshops into the dental curriculum, on improving critical thinking outcomes. Replicating this study in other dental schools across the country would also help to validate our findings.

Therefore, this study adds to the evidence that information literacy and critical thinking are interconnected skills that are underdeveloped among dental students. Given their importance for evidence-based practice and lifelong learning, curriculum developers and educators should prioritize the integration of pedagogical strategies that simultaneously foster both competencies. Overcoming the identified limitations in future

CONCLUSION

studies will help in creating more effective educational programs.

This study, in line with the broader body of international and national research (4, 10, 18), confirms a significant positive relationship between information literacy and critical thinking among dental students. More critically, it highlights that the competency levels in these essential skills are suboptimal, falling below the midpoint of achievable scores. This consistent finding across different contexts underscores an urgent need for a paradigm shift in dental education. Moving forward, curricular reforms must strategically integrate pedagogical interventions, such as problem-based learning and dedicated information literacy training, to simultaneously foster these interconnected competencies. Enhancing these skills is not merely an academic exercise but a fundamental prerequisite for cultivating future dentists who are capable of evidence-based practice, sound clinical reasoning, and lifelong learning.

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Ethical Considerations:

Ethical issues including plagiarism, informed consent, misconduct, data fabrication and/or falsification, double publication and/or submission,

redundancy, etc. have been completely observed by the authors. The protocol of this study was approved by the Ethics Committee of Bushehr University of Medical Sciences (Code: IR.BPUMS.REC.1398.033).

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Conflict of Interest: The authors declare that they have no competing interests.

REFERENCES

1. Abasi P, Sepahi V, Khoshay A, Iranfar S, Timareh M. Critical thinking disposition and its relationship with self-esteem in pre-clinical and clinical medical students of Kermanshah University of medical sciences. *Iranian Journal of Medical Education*. 2013;13(6):498-508. URL: <http://ijme.mui.ac.ir/article-1-2605-en.html>
2. Moradi R, Kh AA, Khazayi A, Rasouli B. Relationship between Critical Thinking and Information Literacy of Medical Sciences Students. *Education Strategies in Medical Sciences*. 2014;7(3):141-7. URL: <http://edcbmj.ir/article-1-582-en.html>
3. Kahlke R, Eva K. Constructing critical thinking in health professional education. *Perspect Med Educ*. 2018;7(3):156-65. DOI: 10.1007/s40037-018-0415-z
4. Pu D, Ni J, Song D, Zhang W, Wang Y, Wu L, et al. Influence of critical thinking disposition on the learning efficiency of problem-based learning in undergraduate medical students. *BMC med educ*. 2019;19(1):1. DOI: 10.1186/s12909-019-1595-x
5. Shirazi F, Heidari S. The relationship between critical thinking skills and learning styles and academic achievement of nursing students. *The Journal of Nursing Research*. 2019;27(4):e38. DOI: 10.1097/jnr.0000000000000307
6. Khosravi S, Aghaei A, Karimi F. Investigating the information literacy skill of students in Kermanshah University of medical science based on information literacy standards of ICRL in 2000. *Revista Publicando*. 2018;5(16 (1)):561-80. URL: <https://revistapublicando.org/revista/index.php/crv/article/view/1523>
7. YektaKooshali MH, Ramezani A, PourNajafi S, Esmaeilpour BM. The relationship between information literacy and critical thinking among students: a cross-sectional study. 2018; 6(5):1-8. URL: <http://jne.ir/article-1-798-en.html>
8. Bundy A. Australian and New Zealand information literacy framework, Principles, standards and practice. Australian and New Zealand Institute for Information Literacy. 2004;2.
9. Rezaiee R, Pourbairamian G. Relationship between Critical Thinking and Information Literacy in Students of Ardabil University of Medical Sciences. *Journal of Health*. 2016;7(3):365-76. URL: <http://healthjournal.arums.ac.ir/article-1-998-fa.html>
10. Abrami PC, Bernard RM, Borokhovski E, Waddington DI, Wade CA, Persson T. Strategies for teaching students to think critically: A meta-analysis. *Rev Educ Res*. 2015 Jun;85(2):275-314.
11. Ulanovskaya I. The Role of Educational Practice in the Learning of Basic Psychological Concepts (Based on Practical Training of 1st year Master Students Studying "Cultural-Historical Psychology and Activity Approach in Education"). *Psychological Science and Education*. 2015;20(3):102-20. DOI: 10.17759/pse.2015200311
12. Kong SC. Developing information literacy and critical thinking skills through domain knowledge learning in digital classrooms: An experience of practicing flipped classroom strategy. *Comput Educ*. 2014;78:160-73. DOI: 10.1016/j.compedu.2014.05.009
13. Rieckmann M. Education for sustainable development goals: Learning objectives. UNESCO publishing; 2017 Mar 20.
14. Commission on Dental Accreditation. Accreditation Standards for Dental Education Programs. Chicago, IL: American Dental Association; 2022.
15. Afsahi SE, Afghari A. The relationship between mother tongue, age, gender and critical thinking level. *Journal of Applied Linguistics and Language Research*. 2017;4(1):116-24. URL: <https://www.jallr.com/index.php/JALLR/article/view/479>
16. Davarpanah M, Siamak M, Qasemi A. Information literacy assessment of students. Tehran: Dabizesh. 2008. [In Persian]
17. Mohammadi Z, Bigdeli Z, Yilagh MS. The Multiple Relationship between Information Literacy and Critical Thinking among Graduate Students of Shahid Chamran University of Ahvaz. *Journal of Studies in Library and Information Science*. 2021;13(2):110-22.
18. Eivazi H. The relationship between critical thinking skills and information literacy. Qazvin: University of Imam Khomeini of Qazvin. 2012.
19. Wu C-P. Exploring the relationship between self-regulating Intentional Internet search (IIS) and critical thinking skills [dissertation]. Syracuse University; 2008.
20. Azami Z, Salehiniya H. The relationship between critical thinking and information literacy among students of the school of Management and Medical Information Sciences of Tehran University of Medical Sciences, Iran. *Strides in Development of Medical Education. Journal of Medical Education Development Center* 2016; 12(5):625-33. URL: <https://civilica.com/doc/1850369>