

# Curriculum Components of Virtual Programs at a Medical University: The Students' Perspective

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## ABSTRACT

**Background:** The design quality of a virtual program is highly instrumental to the success of that program. Accordingly, proper curriculum planning in virtual universities necessitates the integration of specialized features in the design and codification of curriculums. Despite the central role of virtual curriculums in higher education, one can hardly find relevant literature on this topic in Iran's medical universities. The present study sought to assess the students' opinions about the features of the curriculum offered for virtual programs at Tehran University of Medical Sciences (TUMS), in Tehran, Iran.

**Methods:** A descriptive survey was performed in the first half of 2019-2020 academic year. The statistical population included 150 students attending the virtual programs at TUMS. Among them, 108 were selected by stratified random sampling and 102 responded to the questionnaire. The research instrument was the questionnaire for virtual teaching curriculums created by Azizi et al., and its reliability stood at 0.90 as measured by Cronbach's alpha.

**Results:** The findings revealed that the students' opinions about the objectives (M=3.97, SD=0.07), content (M=3.10, SD=0.24), educational software (M=3.03, SD=0.31), interaction (M=3.18, SD=0.34), assessment (M=3.29, SD=0.42) and the overall quality of the curriculums (M=3.70, SD=0.39) at TUMS were rated above the average score in each category.

**Conclusion:** From the students' perspective, the overall quality of the curriculum developed for the virtual courses at TUMS was found to be at a desirable level (above average).

**Keywords:** Medical Sciences, Virtual curriculum, Virtual programs, Components

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## Introduction

Today educational systems are faced with numerous challenges such as fast-paced knowledge production (1, 2), intricacies of designing a continuing and lifelong education system, ever-growing demand to enter academia, difficulties in gaining access to information and research materials, and

maintaining a proper status consistent with the phenomenon of globalization (3). To overcome these challenges, various methods have been introduced, the most notable of which was proposed in the World Declaration on Higher Education at UNESCO World Conference in Paris in 1998. This declaration states that institutions of higher education should be the

first organizations that enjoy the potential benefits of information and communications technology (4, 5) and in this regard, they should develop modern teaching environments that suit the information age and utilize virtual systems. In this day and age, universities serve as the pioneers of rapid scientific and technological advancements and societies need to keep pace with these changes in order to maintain communication with other societies and avoid isolation. In this era of technological progress, it is the emergence of information and communications technology that has influenced societies more than anything else (6). This technology has eliminated the distances and facilitated communications around the world. In tandem with the fast changes in techniques and skills, and the emergence of new phenomena in information technology and their effect on lifestyles, the process of teaching has also undergone dramatic transformations (7, 8). As societies grew larger, there was a rising demand for education in remote and inaccessible areas where individuals could not attend educational institutions in person, and therefore "distance education" was formed (9, 10). In this respect, virtual learning and e-learning environments make use of suitable multimedia devices and appropriate communication infrastructure (11-13) (e.g. computers, the Internet, fax, cameras, software applications, etc.), so that unlike traditional in-person teaching there is typically no need for physical presence and students can utilize the university services anywhere and anytime (14-16).

Against this backdrop, curriculum as one of the basic elements of higher education can help improve and develop educational systems and, by extension, contribute to the advancement of societies (17, 18). Today, modern technologies have brought about substantial changes in different disciplines, and similarly medical education has undergone fundamental transformations, thanks to the IT advancements. Medical universities worldwide, particularly in developed countries, have allocated

considerable budgets to modern technologies with the aim of improving the quality of educational and health services (19, 20). The rise of virtual universities represents a great evolution in the teaching of students from different disciplines (21, 22). The widespread adoption of e-learning technologies in medical education signifies major changes in this field. The International Virtual Medical School and Virtual Campus of the King's College of University of London are two examples of famous universities offering virtual medical education at undergraduate, residency and professional levels (23). Improving the quality of learning in these virtual universities requires a systemic curriculum wherein the relationship between the elements of curriculum and methods of integrating them with technological capacities is fully considered (24, 25).

That said, curriculum planning is not restricted to designing and compiling a curriculum in which the necessary principles and criteria are observed. In order to determine their consistency with predetermined objectives and standards, curricula should be studied and analyzed as well. Numerous studies have focused on virtual curriculums, but one can hardly find relevant literature on this topic in Iran's medical education. Moreover, research has mostly concentrated on the features of virtual universities, while curricula have received less attention in these studies. Relevant research is discussed in the following passages.

Seraji et al. (26) identified the features of curricula in Iran's virtual universities and compared them with a guiding model for the design of virtual curriculums. Their findings revealed that some influential factors are not properly reflected in the virtual curricula of three universities, namely the Faculty of Hadith Sciences, Virtual learning Center at Iran University of Science and Technology, and Virtual and Open Teaching Center at Khajeh Nasir Toosi University of Technology. Some of these factors included the approach to codifying goals, content presentation format, deciding about learning strategies and

assessment methods based on the codified guiding model. Distance education models, particularly online teaching, are currently preferred by students due to the flexibility in providing equal educational opportunities for a large number of learners (26). Another study indicates that virtual curricula provide different opportunities for students with physical disabilities, something that could not have been made possible in traditional systems (27). Furthermore, another study entitled “The Effect of Blended Learning Approach on Learner’s Success and Satisfaction in Technical/Vocational Education” indicates that the level of content learning in blended method is higher than that of in-person method. Moreover, learner satisfaction in the former approach is significantly higher than in the latter (28). In another article, the authors contend that different factors are involved in the implementation of electronic learning in medical universities (29). These factors include technical infrastructure, clear educational goals, educational incentives, professors’ abilities, administrative and educational structures, innovative management, and supportive managers (29).

In their study, Meier et al. (30) analyzed the implementation of a simulation-based educational program and a web-based curriculum with the aim of facilitating the transition of medical students from the faculty to surgical internship. They found that the mentioned program and curriculum facilitate the transition process. Arbaugh evaluated instructors’ activities in online courses and concluded that they need to design and organize their virtual courses beforehand so that they can have a more effective interaction with their students in online classes (27). In their systematic review, Jayakumar et al. (31) emphasized that e-learning can be used as an alternative to traditional methods in surgical education. The results showed that e-learning can be applied in different ways like teaching through virtual patients, teaching theoretical principles, and teaching surgical skills (31).

Although a rising number of academic institutions are introducing virtual learning

in their programs, numerous challenges are yet to be addressed in this process. In this respect, Shafiei Sarvestani et al. pointed to the educational, administrative, organizational, infrastructural, evaluative, ethical, supportive, and communicative challenges in virtual teaching (32). Studies generally indicate that despite the advances in e-learning in Iran’s medical universities, this mode of learning still suffers setbacks in Iran compared to pioneering countries. The key to success in this area is to establish pedagogical infrastructure besides technical and cultural infrastructures (33). As discussed in the research background, there is considerable literature on the role of virtual education and virtual curriculums in improving learner performance. However, little research has been conducted on the extent to which educational institutions use virtual curricula and their components, which are specifically designed for virtual education (27, 34). This is also the case with Iran’s medical universities where virtual curriculums have hardly been subject to research in spite of their growing importance in medical education. Therefore, this study aimed to assess students’ opinions about the features of the proposed curriculum for virtual programs at Tehran University of Medical Sciences (TUMS). These features include the goals, content, educational software, level of interaction, and evaluation. The null hypothesis was that the mean scores of curriculum components were equal to or lower than 3 and the alternative hypothesis was that they were higher than 3.

## Methods

### *Study Design*

The statistical population of the present descriptive-survey included 150 university students attending the virtual programs offered by TUMS. The study was conducted in October and December 2019 at TUMS.

### *Participants*

The criteria for participant inclusion were studying in one of the virtual programs of TUMS and willingness to participate

in the study. Those participants who returned incomplete questionnaires were excluded. The sample size was determined using Morgan table and stratified random sampling. A total of 108 respondents were selected, among whom 102 returned the questionnaires. Stratified random sampling was performed in view of the fact that the statistical population consisted of two non-overlapping, homogeneous groups, namely e-learning in medical education group and e-health group.

### *Research Procedure*

After obtaining consent from the University Research Council and an ethical license from the Ethics Committee in University of Mazandaran, the necessary coordination was made with Tehran University of Medical Sciences. Finally, the questionnaire was distributed among the selected participants. A total of 102 questionnaires were returned.

### *Data Collection Tools*

The instrument included a questionnaire of the curriculum of virtual teaching by Azizi et al. (2018), (34) with 30 items on a five-point Likert scale ranging from "completely disagree" to "completely agree". The minimum and maximum scores were 30 and 150, respectively. The components of the questionnaire included objective, content, educational software, interaction and evaluation. Objective means how accurately the learning goals are stated, how well the students' needs are met, and to what extent the goals are appropriate to the characteristics, individual abilities, and cultural differences among the students. The "content" component determines the level of coordination between objective and content, as well as specifies whether the content is challenging and up-to-date in accordance with the characteristics of the learning environment. Educational software seeks to determine how compelling and accessible the course content is for the student. In addition, the proportion between the content sections in terms of organization

and arrangement, using a practical example in content, the attractiveness of electronic content in terms of page layout and tutorial of the provided electronic content are considered as some of the items in this component. Interaction means the usability of content, correct use of multimedia in content, effectiveness of quantity and quality of interaction between student and teacher, use of active teaching methods, as well as the efficiency of the quantity and quality of teacher-to-student feedback. Regarding evaluation, paying attention to individual differences in evaluation, accommodating teachers, matching purpose and content in evaluation, determining an evaluation method, using various evaluation methods, and enhancing students' participation in the evaluation process and its continuity are considered as some of the items. The validity of the questionnaire was confirmed based on the content validity index (CVI) (0.93). Further, the reliability was confirmed by using Cronbach's alpha coefficient ( $r=0.90$ ). Table 1 shows the reliability of components of the questionnaire about virtual curriculum status.

### *Ethical Considerations*

This study was approved by the Ethics Committee of the University of Mazandaran (ethical code: IR.UMZ.REC.1397.101). In

compliance with ethical principles, it was conducted after obtaining the participants' consent. They were assured about the confidentiality of data.

### *Statistical Method*

Mean and standard deviation were calculated for data analysis, and one sample t-test was performed for inferential statistics using SPSS version 21.

## **Results**

The present study enrolled a total of 108 students at TUMS, of whom 6 were excluded for they declined to complete the questionnaires. Finally, 58 females (56.86%) and 44 males (43.14%) participated in the study. Furthermore, 60 (58.82%) were

**Table 1.** Components of a virtual education program

Components	Questions	Reliability
Objectives	1-4	0.78
Content	5-9	0.85
Educational software	10-15	0.79
Interaction	16-22	0.84
Evaluation	23-30	0.81

**Table 2.** Virtual curriculum status

Variable	Mean	SD	SE	T	P value
Objectives	3.97	0.07	0.00	3.162	<0.001
Content	3.10	0.24	0.02	2.628	0.009
Educational software	3.03	0.31	0.03	2.343	0.021
Interaction	3.18	0.34	0.03	4.935	<0.001
Evaluation	3.29	0.42	0.04	7.761	<0.001
Virtual curriculum	3.70	0.39	0.03	18.43	<0.001

studying e-learning in medical education and 42 (41.18%) were studying e-health. Table 2 indicates the mean and t-value based on curriculum components of virtual programs including objectives, content, educational software, interaction, evaluation, and virtual curriculum.

Regarding the students' perspectives, objective (3.97), content (3.10), educational software (3.03), interaction (3.18), and assessment (3.29) were higher than the mean. Thus, the components of the virtual curriculum are above the mean (Table 2). Accordingly, all hypotheses were confirmed ( $P < 0.05$ ).

## Discussion

The present study aims to investigate the curriculum components of virtual programs at Tehran University of Medical Sciences. Based on the results, the curricula of the virtual disciplines at TUMS were rated above the mean score. Based on the results, the objectives of the curriculum of their majors placed above the mean. In this regard, promoting knowledge and skills of the human force using an up-to-date and economical program is what virtual teaching aims at. The objectives of virtual curriculum are established based on the changes in the mission of the academic education and in the light of technological social changes in the

information society. The findings of this study are in line with those of Bagheri Mojaddad et al. and Azizi et al. (34, 35). Based on the literature, setting objectives are considered as the first steps which should be taken for educational designers and curriculum planners (36).

In addition, the content of the virtual curriculum for the students of medical sciences was higher than the mean, which is consistent with the result of another study (34). Additionally, various learning activities are planned using technological capacities so that each student can be encouraged to understand and internalize the educational content. The virtual curriculum allows incorporating numerous resources such as digital libraries, virtual specialized groups, databases, and physical resources (37). In this regard, the attractiveness of the content and its compliance with the standards are regarded as the important factors which provokes the active participation of the students when designing virtual lessons (38). The novelty of the content, being attractive, ease of access for the learners, and promoting high-level thinking are some of the most important characteristics which should be considered while designing electronic learning content. Since the structure of instruction in virtual disciplines have been defined based on virtual education in university, the human resources

and faculty members have experienced the methods of producing e-content. As a result, e-content standards in these disciplines are acceptable for students in Medical Sciences of Tehran University.

As for interaction, the null hypothesis was rejected and the alternative hypothesis was confirmed, which indicates that this component is above the mean. Determining teaching methods and the student-teacher interaction is an important issue in virtual curriculum in which the degree and method of synchronous and asynchronous relationship between students and professors are identified. From the perspective of constructivism, learning is considered to be the construction of meaning for a better understanding of the world around, which leads to uncertainty. Such learning occurs when teaching-learning activities happen in a participatory process formed between participants in the learning environment and all learning tools and facilities (39). In this regard, some studies focused on the role played by instructors as mediators in the virtual courses, which require them to be equipped with the skills of interaction and interpersonal communication (40-43) since interaction with others is considered as an important element of such courses. Many virtual courses are offered in the form of online teaching. In such instruction, the interaction between the student and faculty members increases. In addition to the courses offered virtually, faculty members usually interact with students through social networks due to their technical capabilities. Therefore, it is natural for students to show relative satisfaction about interaction in these courses

Regarding the results of assessing virtual curriculum which are in line with some other studies (44-45), the null hypothesis was rejected and the alternative hypothesis was confirmed. In this regard, some issues such as formative or summative assessment, and their original aspects were discussed in this section. The decisions concerning assessment in the virtual curriculum should provide the grounds necessary for using the capabilities of this virtual learning environment and

prevent students from propensity to cheat. Regarding online assessment in the realm of teaching medical sciences, Palmer found the use of appropriate strategies, and the students were encouraged to use online formative assessment of learning activities (46). Based on the results of this study, assessment in the university is based on the correct methods of virtual evaluation. In fact, virtual faculty of Tehran University of Medical Sciences has launched virtual disciplines in these courses several years ago. Therefore, the relative infrastructure for evaluating students is conducted in a virtual context. In fact, many faculty members have a process evaluation instead of emphasizing final evaluation in such an environment. Some of the assessments are performed through assignments done through the computer environment, and accordingly a virtual testing system is established. Thus, virtual evaluation has an acceptable score in this field for many participants.

Since the statistical population included the students at Tehran University of Medical Sciences, the findings cannot be generalized to the virtual courses and disciplines of other universities of medical sciences. Thus, it is suggested to involve students and teachers in research and activities results in making educational content and its improvement, establishing teacher-learner interactions in the process of teaching-learning in the system of academic virtual teaching, developing technological infrastructures such as increasing internet speed and bandwidth of the university implementing virtual teaching, and promoting quantitative and qualitative data banks and databases. In addition, it is recommended to employ the experience of successful countries, as well as reconstructing and revising previous experiences. Having a realistic view and avoiding superficial and aimless measures is necessary for the success of every educational program, and virtual teaching is no exception.

### **Ethical Considerations**

This study was approved by the Ethics Committee of the University of Mazandaran

(ethical code: IR.UMZ.REC.1397.101). All participants were fully aware of the nature and the confidentiality of the study and were assured that the information provided would remain confidential.

### Conflict of Interest

Authors declare no conflict of interest.

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### References

- 1 Darling-Hammond L, Flook L, Cook-Harvey C, Barron B, Osher D. Implications for educational practice of the science of learning and development. *Applied Developmental Science*. 2020 Apr 2;24(2):97-140. doi: 10.1080/10888691.2018.1537791
- 2 Bratianu C, Hadad S, Bejinaru R. Paradigm shift in business education: a competence-based approach. *Sustainability*. 2020 Jan;12(4): 1348. doi: 10.3390/su12041348
- 3 Fox P & Hundley S. The Importance of Globalization in Higher Education. 2011. *Intech Open*. doi: 10.5772/17972
- 4 Woo EH, White P, Lai CW. Impact of information and communication technology on child health. *Journal of paediatrics and child health*. 2016 Jun;52(6):590-4. doi:10.1111/jpc.13181
- 5 Buabeng-Andoh C. ICT implementation and practices: factors influencing students' pedagogical use of ICT in Ghanaian secondary schools. *International Journal of Information and Communication Technology Education (IJICTE)*. 2015 Apr 1;11(2):1-3. doi: 10.4018/ijicte.2015040101
- 6 Cascio WF, Montealegre R. How technology is changing work and organizations. *Annual Review of Organizational Psychology and Organizational Behavior*. 2016 Mar 21;3:349-75. doi: 10.1146/annurev-orgpsych-041015-062352
- 7 Lemeshchenko-Lagoda V, Kryvonos I, Kolodii O. Integration of information and communication technologies into the process of learning the course of English for specific purposes as one of the requirements for sustainable future development. *InE3S Web of Conferences 2020 (Vol. 166, p. 10005)*. EDP Sciences. doi: 10.1051/e3sconf/202016610005
- 8 Pazilah FN, Hashim H, Yunus MM. Using Technology in ESL Classroom: Highlights and Challenges. *Creative Education*. 2019 Nov 30;10(12): 3205. doi: 10.4236/ce.2019.1012244
- 9 Traxler, J. Distance learning—Predictions and possibilities. *Education Sciences*. 2018, 8(1); 1-13. doi: 10.3390/educsci8010035
- 10 Maboe KA. Use of online interactive tools in an open distance learning context: Health studies students' perspective. *health sa gesondheid*. 2017;22(1):221-7. doi: 10.4102/hsag.v22i0.1003
- 11 Abdul-Kader, H. M. E-learning systems in virtual environment. In 2008 ITI 6th International Conference on Information & Communications Technology International Arab Journal of Information Technology. 2009; 8(1):71 – 76. doi: 10.1109/ITICT.2008.4806644
- 12 Peterson-Ahmad MB, Pemberton J, Hovey KA. Virtual learning environments for teacher preparation. *Kappa Delta Pi Record*. 2018 Oct 2;54(4):165-9. doi: 10.1080/00228958.2018.1515544
- 13 Valverde-Berrocoso J, Garrido-Arroyo MD, Burgos-Videla C, Morales-Cevallos MB. Trends in Educational Research about e-Learning: A Systematic Literature Review (2009–2018). *Sustainability*. 2020 Jan;12(12):5153. doi:10.3390/su12125153
- 14 Alves P, Miranda L, Morais C. The Influence of Virtual Learning Environments in Students' Performance. *Universal Journal of Educational Research*. 2017;5(3):517-27. doi: 10.13189/ujer.2017.050325
- 15 Hamid Z, Peng CF, Shaharom MS, Ter

- TC, Raman K. The concept and use of the virtual learning environment in teaching: a literature review. *International Journal of Academic Research in Business and Social Sciences*. 2018 Jun;8(6):1293-301. doi: 10.6007/IJARBSS/v8-i6/4517
- 16 Laeeq K, Memon ZA. An integrated model to enhance virtual learning environments with current social networking perspective. *International Journal of Emerging Technologies in Learning (iJET)*. 2018 Sep 29;13(09):252-68. doi: 10.3991/IHET.V13I09.8000
  - 17 Madani RA. Analysis of Educational Quality, a Goal of Education for All Policy. *Higher Education Studies*. 2019;9(1):100-9. doi: 10.5539/hes.v9n1p100
  - 18 Walker M. Universities and a Human Development Ethics: a capabilities approach to curriculum. *European Journal of Education*. 2012 Sep;47(3):448-61. doi:10.1111/j.1465-3435.2012.01537.x
  - 19 Maharana B, Biswal S, Sahu NK. Use of information and communication technology by medical students: A survey of VSS Medical College, Burla, India. *Library Philosophy and Practice (e-journal)*. 2009 Jun 1;281. <https://digitalcommons.unl.edu/libphilprac/281>
  - 20 Kumar P. Application of information and communication technology (ICT) by medical students: A study of Government Medical College, Chandigarh, India. *International Journal of Library and Information Science*. 2012 Feb 28;4(3):45-51. doi:10.5897/IJLIS.9000015
  - 21 Sejzi AA, Aris B, Yahya N. The phenomenon of virtual university in new age: trends and changes. *Procedia-Social and Behavioral Sciences*. 2012 Oct 8;56:565-72. doi: 10.1016/j.sbspro.2012.09.689
  - 22 Abdollahi D. A study of pedagogical aspects of a virtual university. *International Journal of Educational and Psychological Researches*. 2018 Jan 1;4(1):12. doi: 10.4103/2395-2296.229140
  - 23 Kim S. The future of e-learning in medical education: current trend and future opportunity. *Journal of educational evaluation for health professions*. 2006;3. doi: 10.3352/jeehp
  - 24 Harasim L. The virtual university: A state of the art. *Advances in computers*. 2002 Jan 1;55:1-47. doi:10.1016/S0065-2458(01)80025-5
  - 25 Pazilah FN, Hashim H, Yunus MM. Using Technology in ESL Classroom: Highlights and Challenges. *Creative Education*. 2019 Nov 30;10(12):3205. doi: 10.4236/ce.2019.1012244
  - 26 Ebrahimpour M & Sobhaninezhad M. Assess the current and favorable status of the curriculum Virtual university from the students' point of view. *Training & Learning Researches*. 2016.22(7):89-106. doi: 10.22070/2.7.89
  - 27 Arbaugh JB. Sage, guide, both, or even more? An examination of instructor activity in online MBA courses. *Computers & Education*. 2010 Nov 1;55(3):1234-44. doi: 10.1016/j.compedu.2010.05.020
  - 28 Mohammadi M, Marzoughi R, Salimi, GH & Mansoori S. The Effect of Blended Learning Approach on Learner's Success and Satisfaction in Technical/Vocational Education. *Studies in Learning & Instruction*. 2017,9(1): 91-108. doi: 10.22099/JSLI.2017.4171
  - 29 Mazlom M, Mansoori S & Okhovat M.A. Factors influencing the use of e-learning in shahid sadoughi university of Medical science according to interpretive structural model. *Journal of Medical Education and Development*. 2018,13(3): 194-208. doi: 10.18502/jmed.v13i3.335
  - 30 Meier AH, Henry J, Marine R, Murray WB. Implementation of a Web-and simulation-based curriculum to ease the transition from medical school to surgical internship. *The American journal of surgery*. 2005 Jul 1;190(1):137-40. doi: 10.1016/j.amjsurg.2005.04.007
  - 31 Jayakumar N, Brunckhorst O, Dasgupta P, Khan MS, Ahmed K. e-Learning in surgical education: a systematic review. *Journal of surgical education*. 2015 Nov 1;72(6):1145-57. doi: 10.1016/j.



- jsurg.2015.05.008
- 32 Shafiei Sarvestani M, Mohammadi M, Afshin J & Raeisy L. Students' Experiences of E-Learning Challenges; a Phenomenological Study. *Interdisciplinary Journal of Virtual Learning in Medical Sciences*.2019,10(3): 1-10. doi: 10.30476/IJVLMS. 2019. 45841
- 33 Dargahi H, Ghasemi M. Comparative Study of Electronic Medical Education in Studied Countries. *Journal of Payavard Salamat*. 2010;3(3):55-69. [Persian]. URL: [http:// payavard. tums.ac.ir/article-1-114-en.html](http://payavard.tums.ac.ir/article-1-114-en.html)
- 34 Azizi, Seyed Mohsen; Farajollahi Mehran; Seraji; Farhad; Khatouni Alireza and Sarmadi, Mohammad Reza. Application of Virtual Curriculum Component Characteristics to Virtual Medical Education Courses. *Development of Education in Medical Sciences*. 2018;11 (31): 70-62.[Persian]. URL: [http:// zums.ac.ir/edujournal /article-1-990-fa.html&sw=](http://zums.ac.ir/edujournal /article-1-990-fa.html&sw=)
- 35 Bagheri Majd R, Ghale'ei A, Mohajeran B, Sedghi Bokani N, Eslahi M. Comparison of Commitment to Pedagogy in E-Learning and Traditional Training in Iran Higher Education System. *Education Strategies in Medical Sciences*. 2014;7(4):221-7. [Persian]. URL: <http://edcbmj.ir/article-1-576-fa.html>
- 36 Yaghoubi M, Ali Asgari M, Abbassi E & Niknam Z. Inquiry in Designing Conceptual Model of Curriculum: A Synthesis Approach. *Journal of Education Strategies in Medical Sciences*.2019,12(1): 92-101. doi: 10.29252/edcbmj.12.01.12
- 37 Seraji, F; Attaran, M & Ahi, M. E-learning: Fundamentals, Design, Implementation and Evaluation. Hamedan: Bu Ali Sina University Press. 2018[Persian].
- 38 Bond M, Bedenlier S. Facilitating Student Engagement through Educational Technology: Towards a Conceptual Framework. *Journal of Interactive Media in Education*. 2019; 1(11): 1-14. doi: 10.5334/jime.528
- 39 Enayati Novinfar, A; Seraji, F and Gholamali, M. Presenting a Virtual Curriculum Implementation Model Based on the Participatory Learning Approach in Higher Education. *Educational Measurement and Evaluation Studies*. 2018;8 (23): 152-117 [Persian].
- 40 Karim AA, Embi MA, Din R, Shah PM. An Emic perspective of students' learning information skills and constructing knowledge in Malaysian higher education. *Procedia-Social and Behavioral Sciences*. 2010 Jan 1;9:299-307. doi: 10.1016/j.sbspro. 2010 . 12.154
- 41 Karim AA, Din R, Razak NA. Investigating students' ways of learning information skills in Malaysian higher education. *Procedia-Social and Behavioral Sciences*. 2011 Jan 1;15:3849-54. doi: 10.1016/j.sbspro.2011.04.384
- 42 Karim AA, Shah PM, Din R, Ahmad M, Lubis MA. Developing Information Skills Test for Malaysian Youth Students Using Rasch Analysis. *International Education Studies*. 2014;7(13):112-22. doi: 10.5539/ies.v7n13p112
- 43 Pinheiro MM, Simões D. Constructing knowledge: An experience of active and collaborative learning in ICT classrooms. *Procedia-Social and Behavioral Sciences*. 2012 Nov 9;64:392-401. doi: 10.1016/j.sbspro.2012.11.046
- 44 Hakimzadeh R, Afandideh N. Qualification of E-Learning Medical Education Courses of Tehran University of Medical Sciences. *Education Strategies in Medical Sciences*. 2014;7(4):257-64.
- 45 Sharifi Z, Nasr A, Monajemi A. The mount of realization of technical characterization and the assessment of course in developing and designing virtual courses of universities. *Journal of Educational Technology*. 2012;6(3):211-21.
- 46 Palmer E. The design, development and evaluation of an online, interactive, formative assessment tool for medical education (Doctoral dissertation).