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Application of Features of Virtual Curriculum Components of Virtual Courses in Medical Sciences

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Abstract

Background & Objective: With regard to the quantitative expansion of virtual education in universities of medical sciences, the quality and coordination of curriculum with features of virtual education environment must be considered. Therefore, this study aimed to evaluate the application of features of virtual curriculum components in virtual education courses in medical sciences.

Materials and Methods: This descriptive and cross sectional study was conducted on all virtual MSc students of Tehran and Shahid Beheshti Universities of Medical Sciences, Iran. Sample size was estimated at 140 using Cochran sample size formula, and subjects were selected by stratified random sampling. Data were collected using a researcher-made questionnaire, the validity of which was evaluated and confirmed using CVA and CVR indexes. In addition, the reliability of the research tool was estimated at the Cronbach's alpha of 0.77. Moreover, data analysis was performed in SPSS version 19 using one sample t-test.

Results: In this study, the mean features of objective, content, role of e-instructor and assessment components in the virtual courses in medical sciences was at a relatively realized level (2.33-3.66).

Conclusion: Curriculum designers and specialists can review the curriculum design of virtual courses in medical sciences based on the features of the virtual curriculum components.

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Introduction

The emergence and development of new technologies have brought important changes in the field of higher education. Medical education has undergone profound and fundamental changes due to widespread advances in information and communication technology. Medical schools around the world, especially in developed countries, have invested heavily in new technologies to provide high-quality education and improve the quality of health care services (1). The emergence of virtual universities around the world promises a major and fundamental transformation in the training of students in various medical disciplines through the use of e-learning technologies. The International Virtual Medical School and Virtual Campus of the King's College of University of London are among the most famous examples of providing virtual education centers of medical sciences at the undergraduate, resident, and professional levels in the world (2).

In general, the benefits of e-learning and virtual education have outweighed its constraints, making it an attractive choice for professors and students in terms of improving competencies and updating knowledge and skills in continued medical education, facilitating the possibility of continuing education at higher levels, and promoting lifelong learning culture. Nonetheless, a very important point that should not be neglected is that designing and establishing a virtual education system and successful and effective e-learning courses that have high effectiveness in medical universities require attention to some requirements and necessities. Some of the most important requirements that need planning and detailed evaluation by curriculum designers and planners are the organizational, technical and pedagogical requirements (3). Among the pedagogical requirements, the curriculum plays an important role as the axis and circuit of educational activities and one of the most important factors in the realization of learning objectives.

Generally, a curriculum should be able to respond to the needs of the target community in the light of technological changes. In order for the curriculum in virtual environments to be able to provide more credibility and access to the depth and meaning of the provided education through the use of ICT capacities, provide opportunities to form and create active network based learning communities, and constantly respond to needs (4), its features must be completely explained and operationalized in virtual educations. In other words, the curriculum should be designed in a way that it can support virtual learning environments.

The results of the studies evaluated indicated

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that despite the progress achieved in recent years, the e-learning system in Iran's medical sciences universities has some shortcomings, compared to the leading countries in this area. The necessity for the success of the implementation of the e-learning system is that the pedagogical infrastructures should be provided and strengthened in addition to the technical and cultural infrastructures (5). In fact, in addition to technical issues, such as potential weaknesses in virtual and e-education systems, pedagogical issues are considered as the design weakness of educational design (6). Studies have shown that the principles and standards for virtual courses have not been sufficiently considered in the curriculum design of universities that offer virtual education (7).

The e-learning system of universities of medical sciences in Iran is on the path to development. One of the considerable issues in development and innovation packages of the education system of medical sciences in Iran is developing virtual education and e-learning in medical sciences. Considering that one of the most important outcomes of developing virtual education in medical sciences is the updating of curricula in order to be used in virtual education environments, the present study aimed to evaluation the application of features of virtual curriculum components (e.g., objective, content, role of electronic instructor, assessment and evaluation) of virtual education courses in medical sciences.

Materials and Methods

This descriptive and cross sectional study was conducted on MSc students in the fields of virtual medical education and e-learning medical sciences in Tehran University of Medical Sciences and Shahid Beheshti University of medical sciences, Iran during the academic semester of 2017-2018. In total, 140 subjects were selected using stratified random sampling and Cochran sample size formula. The inclusion criterion was participation of students in virtual classes of their field, whereas exclusion criterion was incomplete questionnaires. The majority of questionnaires were completed electronically and distributed and collected using Google Docs.

Data collection tool was a researcher-made questionnaire, the design of which was carried out by primarily assessing the theoretical foundations of research. Following that, the features of each component in virtual education of medical sciences were extracted. In order to increase the accuracy in designing the items of the questionnaire, a semi-structured interview was carried out with elites and experts in the field of e-learning, curriculum development, and medical education. In the end, a 30-item questionnaire was designed by integrating the data collected from theory foundations and interview with elites. The number of items in each component of objective, content, role of virtual instructor,

and assessment were 7, 11, 7, and 5, respectively. In addition, the content validity of the questionnaire was evaluated and confirmed based on content validity ratio (CVR) (0.83) and content validity index (CVI) (0.93) from the perspective of elites.

Moreover, the reliability coefficient for the total questionnaire was 0.77 while it was 0.76, 0.74, 0.72, and 0.76 for components of objective, content, the role of virtual instructor, and assessment, respectively, reported to be at the desirable level. Data analysis was performed in SPSS version 19 using one sample t-test. Application of features of the virtual curriculum in virtual education courses of medical sciences was assessed based on the desirability level (not realized or unfavorable [1-2.33], relatively realized or favorable [2.33-3.66], and realized and favorable [3.66-5]) (8).

Results

From 140 students, 108 (77.1%) were female and 32 (22.9%) were male. In addition, 57.9% of the students were enrolled in the field of virtual medical education and 42.1% were in the field of e-learning in medical sciences. The main objective of the study was the Determine of the degree of realization of the feature of virtual curriculum components in the electronic education courses in medical sciences from the viewpoint of the students of these courses. In this regard and with the use of the one sample t-test, the results of the research are presented in tables 1-4 separately for each component. According to the results, the mean of objective component (3.05±0.87) was higher than the hypothetical mean (3). With regard to the amount of t obtained (0.802), this difference in the mean was not statistically significant (P=0.424). The objective component in the curriculum of virtual education of medical sciences was relatively realized based on the desirability spectrum (2.33-3.66). In this component, the highest mean was related to the feature of "clear and accurate expression of learning objective" (3.30±1.44) while the lowest mean was related to the feature of "Alignment of objectives with the learners' individual characteristics and differences" (2.82±1.31) (Table 1).

Moreover, mean of content component (3.13±0.70) was higher than the hypothetical mean (3). With regard to the value of t obtained (2.201), this difference in the mean was significant (P<0.05). The use of content features in the virtual education curriculum of medical sciences was almost favorable based on the desirability spectrum (2.33-3.66). In this component, the highest and lowest means were related to the features of "Standard and attractive in terms of web page design" (3. 50±1.35) and "use of practical examples" (2.82±1.36), respectively (Table 2). The mean of component of electronic instructor's role (3.10±0.90) was higher than the hypothetical mean (3). By considering the value of t (1.349)

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and significance level obtained (0.179), this difference in the mean was not statistically significant. Application of features of the component of electronic instructor's role in the virtual education course curriculum in medical sciences was relatively realized based on the desirability spectrum (2.33-3.66). In the component of electronic instructor role, the highest and lowest means were related to the feature of "Ability and mastery of instructor in teaching educational content, guiding and organizing the learning process" (3.49±1.35) and "Suitability and effectiveness of the quality and quality of instructor's feedback to students in the learning process" (2.87±1.36), respectively (Table 3).

According to the results, the mean component of assessment in the virtual curriculum (3.12±0.97) was higher than the hypothetical mean (3). According to the value of t (1.513) and level of significance (0.132), this difference in the mean was not statistically significant. Application of features of assessment component in the curriculum of virtual education courses in medical sciences was relatively realized based on the desirability spectrum (2.33-3.66). In this component, the highest mean was related to the feature of "Coordination and alignment of assessment and evaluation with the objectives, content and learning resources" (3.74±1.31) while the lowest mean was related to the featureof"Learner's engagement in the process of self-assessment" (2.80±1.44) (Table 4).

Table 1: The results of one sample t-test to examine mean (SD) feature of objective in virtual education courses in medical sciences

	Feature of objective	Mean (SD)	t	df	P-value
1	Alignment of objectives with the learners' individual characteristics and differences	2.82±1.31	-1.544	139	0.125
2	Clear and accurate expression of learning objectives	3.30±1.44	2.508	139	0.013
3	Objectives meet the learner's needs and interests	2.90±1.21	-0.907	139	0.366
4	Flexibility of objectives (Diverse and cultivating Creativity)	3.10±1.40	0.842	139	0.401
5	Focusing of the learning objectives on promotion of competencies, skills, and high level thinking (such as Critical thinking, problem solving skills)	2.84±1.34	-1.385	139	0.168
6	Alignment of objectives with the course content	3.13±1.34	1.196	139	0.234
7	Alignment of objectives with the features of virtual learning environment	3.29±1.49	2.317	139	0.022
8	Total objective	3.05±0.87	0.802	139	0.424

Table 2: The results of one sample t-test to examine mean (SD) feature of content in virtual education courses in medical sciences

	Feature of content	Mean (SD)	t	df	P-value
1	Challenging and cultivating skills and high level thinking	2.87±1.22	-1.239	139	0.218
2	Being up-to-date and in line with the latest achievements and developments of medical education	3.14±1.44	-1.172	139	0.243
3	Interesting and engaging educational content	3.19±1.34	1.702	139	0.091
4	Easy access to learning content	3.27±1.38	2.373	139	0.019
5	Coordination and alignment between the content's sections in terms of organization	3.37±1.39	3.149	139	0.002
6	Standard and attractive in terms of web page design (text, fonts, style of writing, animations, diagrams, tables and photos, colors, and highlighting to create emphasis)	3.50±1.35	4.368	139	0.000
7	Use of practical examples in the content	2.82±1.36	-1.489	139	0.139
8	Observing the aspect of "self- learning"	3.02±1.52	0.257	139	0.797
9	Use of hyperlinks, hypertext and search capabilities	2.96±1.49	-0.284	139	0.777
10	Applicability (applicable in real and practical situations)	2.91±1.51	-0.667	139	0.506
11	Multimedia capability in the right way (text, sound, image individually and in combination)	3.05±1.14	-0.519	139	0.605
12	Total content	3.13±0.70	2.201	139	0.029

Table 3: The results of one sample t-test to examine mean (SD) feature of e-instructor in virtual education courses in medical sciences

	Feature of e-instructor	Mean (SD)	t	df	P-value
1	Suitability and effectiveness of the quantity and quality of interaction between the learner and teacher	2.94±1.50	-0.449	139	0.654
2	Ability to encourage students to participate and learn actively	3.10±1.46	0.867	139	0.388
3	Use of different teaching methods (such as lecture, group discussion, brainstorming)	3.12±1.41	4.014	139	0.312
4	Suitability and effectiveness of the quality and quality of instructor's feedback to students in the learning process	2.87±1.36	-1.117	139	0.266
5	Playing of facilitating, participatory and counseling roles by the e-instructor in the learning process	3.04±1.55	0.326	139	0.745
6	Considering the learning differences in learners (in terms of time and speed of learning, learning style)	3.14±1.72	0.978	139	0.330
7	Ability and mastery of instructor in teaching educational content, guiding and organizing the learning process	3.49±1.35	4.289	139	0.000
8	Total e-instructor	3.10±0.90	1.349	139	0.179

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Table 4: The results of one sample t-test to examine mean (SD) feature of assessment in virtual education courses in medical sciences

	Feature of assessment	Mean (SD)	t	df	P-value
1	Coordination and alignment of assessment and evaluation with the objectives, content and learning resources	3.74±1.31	6.679	139	0.000
2	Clarity of assessment criteria and strategies for the learner (in terms of scoring, type of assessment)	3.27±1.28	2.498	139	0.014
3	Use of different assessment methods (exam, quiz, self-assessment, writing an article)	2.96±1.40	-0.302	139	0.763
4	Learner's engagement in the process of self-assessment	2.80±1.44	-1.580	139	0.116
5	Continuity of the assessment	2.83±1.36	-1.429	139	0.155
6	Total assessment	3.12±0.97	1.513	139	0.132

Discussion

The present study was performed to evaluate the application of features of virtual curriculum components (e.g., objective, content, the role of e-instructor, and assessment) of virtual education courses in medical sciences. According to the results of the present research, the level of using the features of objective component in the curriculum of virtual education courses in medical sciences was at the relatively realized level. In this regard, our findings are in line with the results obtained by Bagheri Majd et al. (9) and Dadashzadeh (10). Targeting and setting goals are considered as the basis of the curriculum. In this respect, targeting is the first step taken by curriculum planners to design a curriculum (11). Any negligence and simplicity in targeting can have negative effects on other curriculum components. The importance of objectives is also evident in the discussion of changing curricula, in a way that any change in the curriculum entails a change in goals.

Results obtained from the evaluation of content use from the perspective of students showed that the features of content in the curriculum of virtual education courses in medical sciences were higher than the mean and at the level of relatively realized. In this regard, our findings are in congruence with the results obtained by Kakaei and Hakimzadeh (12) and Kazemi Gharechi et al. (13). The component of content has a significant impact on the success of e-learning courses. In fact, content plays an important role in the realization of objectives in the framework of e-learning curriculum.

Presenting up-to-date and new content to virtual learners, having the power of attraction and the ability to make the learner more interested in learning (14), promoting high-

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level thinking and ease of access for learners, and coordinating the components of curriculum together are among the most important features and necessities that must be observed in the design of e-learning content. In addition, observing the multimedia standards, including text, fonts, type of writing, animation, diagram, tables and figures, colors, bolding for emphasis, and self-learning capability are some other important notes in the issue of content design. Results obtained from assessing the application of component of role of e-instructor and its features in the curriculum of virtual education field of medical sciences indicated that the features of role of e-instructor were at the level of relatively realized. In this regard, Nobakht et al. (15) marked that the quality of components of feedback, interaction and support in the electronic course of medical science field was unfavorable. In addition, Badger & Roberts (16) reported that the instructors in online courses had a weak mediating role in discussions that require interaction skills and interpersonal communication.

In terms of the component of role of instructor, characteristics of learner-teacher interaction and feedback of instructors to students in virtual learning environments were not satisfactory. In this respect, it should be pointed out that changes in the form of communication and interaction with learners require the adapting of instructors with e-learning environments (17). In virtual educations, instructors have a heavier duty, compared to instructors in traditional courses since, in addition to knowledge and mastery of roles, competencies, and duties of instructors in traditional education; they must have the proper knowledge and accurate skills for teaching in e-learning environments.

Regarding the component of assessment and its features in the curriculum of virtual education courses in medical sciences, results were indicative of a relatively realized level, which is consistent with the results obtained by Hakimzadeh and Afandideh (18), Sharifi et al. (19), and Dadashzadeh (10). In this regard, Palmer (20) concluded in a research on online assessment of medical education that students' motivation toward the use of online formative assessment could be improved if proper evaluation strategies existed. Furthermore, it was shown that there is sufficient evidence on how such an evaluation system can improve the student learning products.

Learner engagement in the process of self-assessment is an extremely important factor in virtual education. In fact, it improves the level of cooperation, responsibility and motivation of students. It is also crucial to use methods that are compatible with the features of the virtual learning environment. Some evaluation methods can only be implemented in traditional environments or need to undergo some changes to be used in e-learning environments. Therefore, the compatibility of

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measurement and evaluation methods for e-learning environments should be ensured. Moreover, evaluation should be continuous and not limited to a specific time (for example, the end of the course). Evaluation should be considered as part of the learning process and as a step towards improving the quality of learning. Continuity of evaluation can be an expression of the flexibility of virtual learning.

Conclusion

According to the results of the present study, the curriculum of virtual education courses in medical sciences was relatively favorable in four components of objective, content, role of e-instructor and assessment. Therefore, revising and redefining the designing of the curriculum of virtual education courses in medical sciences must be put on the agenda by curriculum designers and planners. As such, the features identified in the four components of the virtual curriculum in the present study will be a suitable guide in e-learning. In the present study, we aimed to draw a relatively clear image of the current condition of the curriculum of virtual courses in Tehran and Shahid Beheshti Universities of Medical Sciences. Therefore, the identified features of curriculum components in this study can be considered to improve the quality and achieve the desired status in these courses. One of the major drawbacks of the present study was lack of generalizability of the results to the virtual courses of other medical universities since it was only performed in Tehran and Shahid Beheshti Universities of Medical Sciences. It is recommended that studies similar to the present study be repeated in virtual courses of other universities of medical sciences by expanding the area of space and paying attention to other components. In addition, researchers can be present in classes of virtual courses on medical sciences to have direct observation and phenomenological exposure so that they could evaluate the use of features of virtual curriculum and improve the accuracy and depth of research findings in this regard.

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