



An Investigation into the Effectiveness of Virtual Learning during the COVID-19 Pandemic from the Perspective of Professors and Students of Kermanshah University of Medical Sciences

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ABSTRACT

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Background and Objective: Utilizing advances in the information and communication technology industry, virtual learning is as considered a new solution for developing educational justice in the contemporary world. The present study was conducted to investigate the effectiveness of virtual learning courses during the COVID-19 pandemic from the perspective of professors and students of Kermanshah University of Medical Sciences.

Methods: This cross-sectional study was conducted among 27 professors and 149 students in 2022-2023. A demographic questionnaire and a standardized questionnaire for assessing the effectiveness of the virtual learning course, which includes 10 components, were used to collect data.

Findings: The results showed that there was no significant difference between the opinions of professors and students in the mean total score of the effectiveness of the virtual learning course, although students had more positive opinions about the effectiveness of this type of learning. The mean value for the component of organizing educational materials was higher for professors (18.96 ± 2.31) compared to students (16.90 ± 4.36) ($p < 0.003$). Furthermore, the mean value for the component of flexibility was 6.23 ± 2.27 among students, and 4.85 ± 1.76 among professors, and the component of feedback was 12.74 ± 4.14 among students and 10.15 ± 3.29 among professors, and this difference was significant for both components ($p < 0.003$). No significant difference was observed in the remaining components.

Conclusion: Based on the results of this study, in order to help expand virtual learning, we can take advantage of things such as holding training courses for professors, providing the necessary facilities, as well as providing incentive programs.

Keywords: *Medical Sciences, Students, Virtual Courses, E-Learning, Education.*

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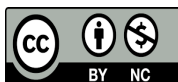
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Introduction

On March 11, 2020, the World Health Organization declared COVID-19 a global pandemic (1). With the rapid spread of the disease, most countries, including Iran, implemented unprecedented social distancing measures to contain its spread, one of the most important of which was the temporary closure of educational institutions and the absence of face-to-face classes. In this regard, Kermanshah University of Medical Sciences, like other higher education centers, was forced to develop distance learning and use alternative educational methods in critical situations. One of the effective approaches in such situations is the use of virtual learning, which provides the possibility of learning at any time and place (2). This method encompasses all forms of teaching and learning that are implemented and supported by electronic tools and proceeds based on the construction of knowledge through individual experience. Information and communication technologies, whether networked or non-networked, are considered the main platform for virtual learning (3).

Virtual learning offers advantages such as easy access to educational content, the possibility of conducting online tests and forming virtual discussion groups. However, limitations such as disruption in learning, reduced educational interactions, lack of access to physical facilities (such as laboratories), and lack of motivation to learn among learners are considered as its challenges (4). Despite all the advantages of virtual learning, many experts have pointed out the shortcomings of this type of education. In this regard, Dreyfus believes that virtual learning cannot guarantee the emergence of creative ideas and the quality of information, nor provide users with knowledge of all realities and the possibility of a meaningful life for learners. In his opinion, students realize that being in class, being with the teacher and being with other students in the class, are components that give them a sense of connection with the class and they do not want to lose this feeling. Attending a face-to-face class is such a positive experience that most students feel compelled to attend, even in adverse weather conditions. According to Dreyfus, in virtual learning environments, the professors are unable to accurately assess students' level of engagement with the content or to determine how engaged they are with the topics. Furthermore, it is much more difficult to identify and guide students' creative and emerging ideas in this environment. Therefore, it is imperative that the educational and training implications of virtual universities be examined more carefully and thoughtfully (5).

During the COVID-19 pandemic, one of the main challenges was the inability to hold practical courses and in-person training in universities, especially in the medical sciences. In order to reduce the burden on hospitals and prevent the spread of the disease, many medical universities replaced face-to-face learning with virtual learning (6, 7). However, the integration of virtual education systems such as Navid, Skyroom, and Adobe Connect with the teaching process was accompanied by obstacles that affected the quality of education. Despite the attractiveness of virtual learning, it is essential to evaluate and ensure the quality of this method, because without systematic review, it is not possible to improve and ensure its effectiveness (8). Implementing virtual courses without analyzing their effectiveness can lead to the failure of these programs. Since measuring the effectiveness of educational programs is crucial for any organization, especially universities, which are considered as research institutions, the present study was conducted to examine the effectiveness of virtual learning from the perspectives of professors and students of Kermanshah University of Medical Sciences during the COVID-19 pandemic.

Methods

After approval by the Ethics Committee of Kermanshah University of Medical Sciences with the code IR.KUMS.REC.1400.687, this cross-sectional study was conducted among faculty members and students in the second semester and above at Kermanshah University of Medical Sciences (Faculties of Medicine, Pharmacy, Dentistry, Nursing-Midwifery, Paramedical, Health and Nutrition) in 2022-2023. Based on the study by Fathi Vajargah et al. (9), the required sample size was calculated as 183 students and 32 professors considering a confidence level of 95% and an estimation accuracy of 3 points. Moreover, to compare the effectiveness score between the two groups, at least 9 people were determined in each group. Therefore, a sample size of 215 people (183 students and 32 professors) was considered in this study. The standardized Kressly's questionnaire was used to collect data (10). To examine the face and content validity of the questionnaire, the opinions of 10 professors and 10 students were used, all of whom confirmed the accuracy and appropriateness of the questions. Furthermore, the reliability of the questionnaire was calculated using Cronbach's alpha coefficient for students (0.93) and professors (0.88), which indicates the high reliability of the measurement tool. The questionnaire consisted of two parts: 1. Demographic characteristics, 2. 61 questions in the form of 10 components including: content, teaching and learning activities, page design, educational materials, feedback, flexibility, workload, assistance (support), ability to motivate students, and assessment methods. The questionnaire was designed by Digit application and its link was placed in the WhatsApp groups of students and faculty members of the university. After completion, the questionnaire data were entered into SPSS version 23 and the required data were tested using descriptive and analytical statistical methods.

Results

176 people completed the questionnaires, which included 149 (84.7%) students, 90 (60.4%) of whom were female, and 27 (15.3%) professors, 17 (63%) of whom were male. The average point of students was 16.34 ± 1.65 (out of 20). The highest percentage of participants was at the undergraduate level with 59.7% and the lowest percentage was at the associate level with 0.7%. Most students (94 [63.1%] students) used mobile phones to participate in virtual classes. 18 (66.7%) professors used laptops and 2 (7.4%) professors used computers for virtual teaching (Tables 1 and 2).

Table 1. Frequency distribution of students by gender, employment status, faculty of study, education level, type of device used, and access to the Internet (n=149)

Variable	Number(%)
Gender	
Male	59(39.6)
Female	90(60.4)
Employment status	
Employed	21(14.1)
Unemployed	128(85.9)
Faculty of study	
Medicine	24(16.1)
Dentistry	6(4.0)
Pharmacy	8(5.4)
Nursing and Midwifery	32(21.5)

Paramedics	18(12.1)
Health	29(19.5)
Nutrition	15(10.1)
Rehabilitation	17(11.4)
Education level	
Associate degree	1(0.7)
Bachelor's degree	89(59.7)
Master's degree	21(14.1)
PhD	38(25.5)
Type of device used	
PC	6(4.0)
Laptop	49(32.9)
Cell phone	94(63.1)
Tablet	0(0)
Access to internet	
Yes	147(98.7)
No	2(1.3)

Table 2. Frequency distribution of professors by gender, academic rank, and teaching experience (n=27)

Variable	Number(%)
Gender	
Male	17(63)
Female	10(37)
Academic rank	
Instructor	2(7.4)
Assistant Professor	18(66.7)
Associate Professor	5(18.52)
Professor	2(7.4)
Teaching experience	
Under 5 years	16(59.3)
Between 5 and 10 years	5(18.5)
Between 10 and 15 years	0(0)
Between 15 and 20 years	1(3.7)
Over 20 years	5(18.5)
Type of device used	
PC	2(7.4)
Laptop	18(66.7)
Cell phone	5(18.5)
Tablet	2(7.4)

There was no significant difference between the opinions of professors and students, although students had more positive opinions about the effectiveness of the virtual education course than professors. The mean value of the component of educational materials organization in the opinion of professors (2.31 ± 18.96) was significantly higher than that of students (4.36 ± 16.90) ($p < 0.003$). Moreover, the mean value of the

component of flexibility in students was 2.27 ± 6.23 and in professors was 1.76 ± 4.85 , and the mean value of the component of feedback in students was 4.14 ± 12.74 and in professors was 3.29 ± 10.15 , and this difference was significant in both components ($p < 0.003$) (Table 3).

Table 3. Results of the Mann-Whitney U Test comparing the effectiveness of the training course from the perspective of professors and students

From the perspective of professors and students				
Variable	Number	Mean $\pm$ SD	p-value	
Organizing educational materials				
Student	149	16.90 $\pm$ 4.36	0.003	
Professor	27	18.96 $\pm$ 2.31		
Teaching and learning activity				
Student	149	28.38 $\pm$ 8.48	0.954	
Professor	27	28.00 $\pm$ 5.77		
Motivation				
Student	149	12.40 $\pm$ 4.47	0.200	
Professor	27	11.33 $\pm$ 2.78		
Page design				
Student	149	23.44 $\pm$ 6.93	0.800	
Professor	27	22.59 $\pm$ 6.22		
Flexibility				
Student	149	6.23 $\pm$ 2.27	0.618	
Professor	27	4.85 $\pm$ 1.76		
Content				
Student	149	36.08 $\pm$ 10.86	0.618	
Professor	27	34.41 $\pm$ 8.22		
Workload				
Student	149	12.76 $\pm$ 4.32	0.549	
Professor	27	13.07 $\pm$ 3.47		
Feedback				
Student	149	12.74 $\pm$ 4.14	0.003	
Professor	27	10.15 $\pm$ 3.29		
Assistance (support)				
Student	149	15.60 $\pm$ 4.89	0.088	
Professor	27	13.56 $\pm$ 4.02		
Evaluation				
Student	149	31.96 $\pm$ 10.39	0.924	
Professor	27	31.44 $\pm$ 6.72		
Total				
Student	149	196.48 $\pm$ 56.01	0.788	
Professor	27	188.37 $\pm$ 35.59		

Discussion

The results of the study showed that the opinions of professors and students about the effectiveness of virtual education courses were above average. In other words, both groups believed that the effectiveness of virtual courses was desirable, however, this difference was not statistically significant. These findings are consistent with the results of the studies by Fathi Vajargah et al. and Yasini et al. (9, 11). The study of Niromand et al. showed that the majority of participants were satisfied with the new educational system and that the extensive integration of mobile phones into the educational framework provides a flexible educational model and enhances the potential for continuous and lifelong learning (12). However, it is not consistent with the results of the study of Jahanian et al., who concluded in their study that students consider virtual courses to be of low effectiveness (13). Also, the study of Aalaa et al. showed that the diabetes online course can be as effective as traditional educational methods. However, considering the time and cost savings and the opportunity to learn anytime, anywhere, e-learning is recommended for the future and it is necessary for more healthcare providers to be trained to use distance learning (14).

The difference between the results of this study and the findings of other researchers may be due to several factors. One possible reason for this difference is the difference in educational infrastructure and technologies used in different universities. Moreover, the difference in the statistical population and teaching method are other effective factors. Overall, the difference in the results of the studies indicates the influence of several factors such as educational facilities, teaching style, and the level of familiarity of users with virtual learning, which should be considered in the analysis and interpretation of these findings. The results of this study showed that, from the perspective of professors and students, the effectiveness of the virtual training course in the component of organizing educational materials is above average, although the average value of this component was higher for professors compared to students, which was significant. The results of this study were consistent with the study of Fathi Vajargah et al. (9). Also, the results of the study of Yasini et al. reported that the effectiveness of organizing educational materials in virtual training courses was satisfactory for professors and average for students (11). The difference in the evaluation of organizing educational materials between professors and students could be due to several factors; Different understanding of the educational structure, differences in educational expectations, level of familiarity with virtual learning, and quality of educational tools used. The alignment of the results of this study with the studies of Fathi Vajargah et al. and Yasini et al. (9, 11) indicates that this pattern has also been observed in other studies and is probably a general trend in the evaluation of virtual learning. Therefore, it seems that to improve the effectiveness of organizing educational materials in virtual courses, it is necessary to pay attention to the needs and expectations of students, improve the design of course content, and create more opportunities for interaction and educational guidance.

From the perspective of professors and students, the effectiveness of teaching-learning activities in the virtual education course was reported to be moderate and desirable, which was consistent with the results of Parr (15). The results of the findings were not consistent with the results of the research of Fathi Vajargah et al. and Yasini et al., which were consistent with the present study from the perspective of professors and were reported as undesirable from the perspective of students (9 and 11). The reason why the results of this study are not consistent with the findings of Fathi Vajargah et al. and Yasini et al. may be due to differences in the attitudes and experiences of students in different educational courses, the quality of virtual education infrastructures, and the level of readiness of professors and students to use this educational method. Furthermore, the field of study and the nature of the courses (theory or practical) can affect students' attitudes; in fields that require more practical and laboratory work, students may evaluate virtual education as less efficient. On the other hand, differences in teaching methods and the level of use of new educational technologies in different universities can affect the learning experience. Therefore, the difference in the

implementation of virtual learning courses, the level of technical support, and the initial attitude of students and professors towards this educational method are key factors in the inconsistency of the results of this study with previous studies. Considering the moderate level of effectiveness of the teaching-learning component, it is appropriate for university officials, especially those in charge of the virtual education department of university, to make efforts to improve the abilities of professors in this field by utilizing various possible methods, such as holding various pre- and in-service training courses and workshops, as well as preparing and distributing educational bulletins related to teaching-learning activities.

The results indicated that the effect of virtual learning courses on the ability to motivate teachers is unfavorable and moderate in students. In their study, Arabmazar Yazdi et al. showed that the use of new technologies is not effective in increasing student satisfaction and interactions and that it is the instructor who is effective, not the method of delivering the course (16). Studies also show that among the many and diverse factors affecting learning and academic progress of learners, motivation plays a prominent and even more important role. Therefore, proper recognition and analysis of learners' motivation is of great importance for the efficiency and effectiveness of teaching and learning activities (17). The results of the study by Badali et al. showed that if virtual learning is problem-oriented, it will increase academic motivation in medical students (18).

In this study, the results showed that the effectiveness of the content and page design of the training course is above average and is at the desired level for professors and students. The results of the present study regarding the perspective of professors and students are consistent with the results of Fathi Vajargah et al. (9). In other words, both groups believe that the effectiveness of the content and page design is desirable. Moreover, the results of a study by Yasini et al. showed that although the effectiveness of the page design component is at the desired level from the perspective of professors and students, the effectiveness of the content is not at the desired level from the perspective of these two groups (11). It is also consistent with the study by Song, which showed that the visual content provided through the website obtained the highest score among the dimensions of virtual learning (19). However, it is inconsistent with the results of Ghaedi et al., who concluded in their study that the content of the curriculum is inappropriate from the perspective of students and professors (20).

According to professors, the level of flexibility of virtual learning was below average and undesirable, but it was desirable according to students, and this difference was statistically significant. The findings of studies by Song and McGorry showed that flexibility is an important factor in designing an online curriculum (19, 21).

Regarding the effectiveness of workload, the results showed that from the perspective of professors and students, the effectiveness of the workload of the virtual education course is desirable, which is in line with the results of the study by Fathi Vajargah et al. (9). A review of the research background on workload shows that no research has been conducted on this subject. In examining the effectiveness of the feedback provided, the research findings indicated that students evaluated it at an average level, and the results showed that professors were not satisfied with the feedback provided. Gray et al. acknowledged in their study that students in virtual classes are satisfied with receiving feedback (22), but Al-Nofaie concluded in his study that in the comparison between synchronous and asynchronous virtual learning, students preferred asynchronous learning due to its flexibility, and the results also indicated that students preferred traditional teaching methods over virtual education and evaluated interactions in virtual classes as less than in-person classes (23).

According to students, the effectiveness of providing assistance to learners was average and undesirable. This finding is consistent with the results of a study by Ghaedi et al., which found that students considered the level of support they received in the virtual environment to be weak (20). The effectiveness of evaluating virtual education courses was considered desirable by professors and students. The results of studies by Zarei Zavaraki et al. and Maroufi et al. show that researchers and educators consider the evaluation methods of educational programs such as virtual testing to be desirable (24, 25), which is consistent with the results of our study. It is recommended that in order to prevent some students from seeking profit, students be evaluated in person, even in virtual courses.

One of the limitations of the present study was the limited sampling. This study was conducted only based on the opinions of professors and students of a specific university, so the findings may not be generalizable to other medical universities in the country. Moreover, the lack of a long-term study of effectiveness, the lack of control of intervening variables, the limitations of measurement tools that did not cover all qualitative aspects of this type of education, the lack of comparison with other educational methods, and the lack of attention to the impact of individual differences and academic fields were other limitations of the study. The level of effectiveness of virtual learning may vary in medical fields that require practical skills.

Given the widespread use of electronic tools in the world, and also considering the limitations of traditional education and the advantages of e-learning or hybrid education, it seems inevitable to use new technologies in educational systems. Given the novelty of this concept, there is a need to conduct research studies to evaluate the effectiveness of different methods of providing virtual learning and to examine it in different medical disciplines. The cultural-social differences of our country further highlight the importance of conducting this type of study and also localizing virtual learning methods in accordance with educational needs, social conditions, and available facilities. The effectiveness of virtual education on learning and satisfaction of learners and professors can vary depending on the method used and different disciplines in medical sciences. It can be said that considering the advantages, effectiveness, and acceptability of e-learning, this method can be recommended for medical education in Iran. In order to help expand virtual learning, measures such as holding training courses for professors, providing the necessary facilities, and providing incentive programs can be taken.

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