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Brief Report

Investigating the Effectiveness of Online Learning in the Post-Coronavirus (COVID-19) Era from the Perspectives of Students and Faculty Members of Selected Universities of Medical Sciences in Iran

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Abstract

Background: Online learning is a form of virtual learning that is being organized and implemented across universities of medical sciences in developing countries.

Objectives: The present study aimed to investigate the effectiveness of online learning from the perspectives of students and faculty members at selected universities of medical sciences in the post-coronavirus (COVID-19) era in Iran.

Methods: This descriptive-analytical study was conducted in 2023 at Zanjan University of Medical Sciences, Iran University of Medical Sciences, and Shahed University among faculty members and undergraduate students of nursing, midwifery, anesthesiology, and operating room. A stratified random sampling method and the Online Learning Effectiveness Assessment Questionnaire were employed in this study. Descriptive statistics and inferential statistical tests, such as Chi-square, Fisher's exact test, and Pearson's correlation coefficient, were used for data analysis.

Results: This study involved 286 students and 61 faculty members. From the perspectives of faculty members, online learning components, including teaching-learning activities, feedback, flexibility, assistance, motivation, and evaluation, demonstrated a desirable effectiveness, while the components of content, page design, and educational materials exhibited a moderate effectiveness. However, workload was deemed to have an undesirable effectiveness. From the students' perspectives, the components of content, teaching-learning activities, page design, feedback, workload, assistance, motivation, and evaluation were reported to have a desirable effectiveness, whereas educational materials and flexibility were reported to have an undesirable effectiveness.

Conclusion: The effectiveness of online learning in the post-COVID-19 era has been reported to be high among both students and faculty members. Given that online learning infrastructure was established compulsorily during the COVID-19 era and this method of instruction has not been abandoned in the post-COVID-19 era, its blended use with in-person instruction can enhance the quality of education among students and faculty members.

Keywords: Online Learning; Faculty Members; Students; University of Medical Sciences; Virtual learning; Post-Coronavirus Disease 2019

Background

Virtual learning is a form of distance learning in which the virtual space becomes the platform for teaching and learning (1). Online learning is a subset of virtual learning, encompassing an extensive set of technology applications and learning processes, such as computer-based learning, web-based learning, virtual classrooms, and digital interactions (2).

Given that online learning infrastructure has long been established for students and faculty members in

developed countries, this method is still in its basic and initial stages of development and implementation in developing countries (3). With the outbreak of coronavirus disease 2019 (COVID-19), rapid changes occurred in virtual learning in developing countries, which mandated the use of online learning across various educational levels for both students and faculty members (4).

Among the most crucial benefits of online learning during and after the COVID-19 pandemic are flexibility, the elimination of unnecessary and costly commutes to attend in-person courses, and the absence of disruptive factors in learning, such as power-driven behaviors (5, 6). While the cost of conducting online courses is relatively low, their implementation necessitates appropriate computer equipment and the required software (7).

The results of various studies demonstrate that, alongside the advantages of online learning, its disadvantages comprise limitations in telecommunications and communication infrastructure, lack of access to computers and related services, insufficient time for faculty members to develop and present educational materials, reduced social interaction in online classes (8), lack of control over student cheating, and rapid changes in software systems (9-12).

With the outbreak of the COVID-19 pandemic, universities of medical sciences were compelled to shift to online learning. Given that the necessary infrastructure for this mode of instruction had not been effectively and efficiently established in developing countries, this shift culminated in significant challenges in university education, particularly in universities of medical sciences, for both students and faculty members (13).

Medical education, which is in direct relationship with patient life, is viewed as one of the most crucial pillars of maintaining public health (14) and must possess sufficient and perfect accuracy in terms of the quality and quantity of educational methods, particularly virtual and online learning (15). Given that the majority of educational courses in universities of medical sciences in Iran and worldwide involve clinical practice and bedside patient interaction, implementing this type of education online, with live question-and-answer sessions, necessitates an evaluation of the effectiveness of online learning presentation and the impact of this method compared to in-person bedside learning.

Due to the recognized importance of medical education, educational practices in Iran have been shifting toward innovation and the expansion of necessary infrastructure in the post-COVID-19 era (16). However, studies indicate that online medical education in the post-COVID-19 era still faces challenges in infrastructure, the teaching and evaluation process, ethics, and information security (17). Additionally, despite the increased utilization of online learning in medical sciences, fear and anxiety in the face of the complexities and unknowns of online learning as a significant barrier to the adoption of this method (18) and existing university rules and regulations have imposed limitations on its implementation (16).

Given the aforementioned points and the fact that most research on online medical education has focused on the COVID-19 era, the present research was conducted to investigate the effectiveness of online learning in the post-COVID-19 era from the perspectives of students and faculty members at selected universities of medical sciences in Iran.

Objectives

The present study aimed to investigate the effectiveness of online learning from the perspectives of students and faculty members at selected universities of medical sciences in the post-coronavirus (COVID-19) era in Iran.

Methods

Study Design: This descriptive-analytical study was conducted in 2023. The study population consisted of all faculty members and undergraduate students in nursing, midwifery, anesthesiology, and operating room from three universities of Zanjan University of Medical Sciences, Iran University of Medical Sciences, and Shahed University.

The total student population was 1500, and the total number of faculty members was 90. Based on Cochran's formula, and accounting for a 10% attrition rate, a sample of 286 students and 61 faculty members was selected.

Participants and Sampling: A stratified random sampling method was conducted among faculty members and students of nursing, midwifery, anesthesiology, and operating room from three universities of Zanjan University of Medical Sciences, Iran University of Medical Sciences, and Shahed University. The sample size was determined based on

Almahasees et al.'s (10) study, using a d-value of 5%, a 95% confidence level, a Z-value of 1.96, and p and q values of 0.5 (Equation 1).

(Equation 1) $$n = \frac{Nz^2pq}{Nd^2+z^2\,pq}$$

Inclusion criteria for faculty members included holding a minimum of a master's degree, having at least two semesters of experience in online learning for students, and a willingness to participate in the research. Questionnaires with at least 10% of questions left unanswered were considered an exclusion criterion.

Data Collection: The present study was approved by the Research Ethics Committee of Zanjan University of Medical Sciences. Through the Research Vice-Chancellor of Zanjan University of Medical Sciences, the necessary coordination was made with the Research Vice-Chancellors of Shahed and Iran Universities via correspondence. One collaborator from each university was invited to participate in the research. Initially, a list of faculty members and students at the specified levels was obtained from the education departments of the selected faculties. Subsequently, based on a systematic sampling method, and according to the calculated sample size for each field of study at each university, the names and details of the selected students were determined. The research collaborators provided the participants with the questionnaires while explaining the study's objective, complying with the principle of data confidentiality, and adhering to ethical considerations.

Instruments: The Online Learning Effectiveness Assessment Questionnaire in universities from the perspectives of both students and faculty members, designed by Taban and Yasini (2017), was employed in this study. The Cronbach's alpha coefficient for this questionnaire was determined to be 0.86 for students and 0.92 for faculty members (19). In the present research, the internal consistency method – Cronbach's alpha coefficient was used. Accordingly, the questionnaire was administered to 30 students and faculty members of the universities of medical sciences, and the Cronbach's alpha coefficient of the questionnaire was estimated to be 0.97 and 0.95, respectively. The questionnaire consisted of two sections: Demographic information pertaining to students, including age, gender, university of study, field of study, academic semester, ethnicity, place of residence, access to virtual learning resources, and family income level; and for another faculty members, including age, gender, education level, academic rank, participation in electronic learning (e-learning) courses, access to virtual learning resources, experience in virtual teaching, membership in the medical staff, and income status.

The section regarding the effectiveness of online learning delivery, from the perspectives of students and faculty members, consisted of questionnaires each containing 55 items and 10 domains, including content (items 1-7), teaching-learning activities (items 8-13), page design (items 14-20), educational materials (items 21-25), feedback (items 26-29), flexibility (items 30-34), workload (items 35-40), assistance (items 41-45), motivation (items 46-49), and evaluation (items 50-55). The questionnaire was scored on a 5-point Likert scale, ranging from very low (score 0) to very high (score 4). The questionnaire scores ranged from 0 to 220. Scores of 0 to 54 indicate a low effectiveness, 55 to 109 indicate a moderate effectiveness, 110 to 164 indicate a high effectiveness, and 165 to 220 indicate a very high effectiveness. The items in this questionnaire were developed based on the dimensions of online learning recommended by Greg Kearsley, whose validity and reliability have been confirmed (20). Moreover, the effectiveness was evaluated at the first level of Kirkpatrick's model (21).

Data Analysis: Following questionnaire collection, data were analyzed using SPSS version 24 (IBM Corporation, Armonk, NY). Descriptive statistics, including the mean, standard deviation, frequency, and percentage, were used to determine the effectiveness of online learning and its related domains. Fisher's exact test and the χ^2 test were also employed to assess the relationship between demographic qualitative variables and qualitative data. Additionally, Pearson's correlation coefficient was used to examine the relationship between demographic quantitative variables and quantitative data due to the normal distribution of the data. Finally, the data were analyzed using SPSS version 24. A $P < 0.05$ was considered statistically significant.

Results

In the present study, 286 students and 61 faculty members participated. The mean age of the students was 22.44 ± 2.20 years, their mean academic semester was 6.16 ± 1.56, the mean age of the faculty members was 44.18 ± 9.27 years, and their mean years of teaching experience was 14.36 ± 9.50 (Table 1).

In the current research, the majority of faculty members (72.1%) and students (54.2%) reported a high effectiveness of online learning delivery (Table 2).

From the faculty members' perspectives, the effectiveness of online learning delivery methods demonstrated a positive and desirable correlation with the components of teaching-learning activities, feedback, flexibility, assistance, motivation, and evaluation (due to correlation coefficients of 0.70 or higher) (r = 0.867, r = 0.775, r = 0.713, r = 0.762, r = 0.702, and r = 0.748, respectively), and a moderate correlation with the components of content, page design, and educational materials (r = 0.641, r = 0.624, and r = 0.548, respectively) (22).

Regarding workload, a negative correlation was reported (r = -0.632). From the students' perspective, the effectiveness of online learning regarding the components of content, teaching-learning activities, page design, feedback, workload, assistance, motivation, and evaluation had positive and desirable correlations (r = 0.822, r = 0.826, r = 0.822, r = 0.776, r = 0.832, r = 0.814, r = 0.706, and r = 0.850, respectively). However, regarding educational materials and flexibility, the correlation was negative (r = -0.704 and r = -0.656, respectively) (Table 3). Furthermore, from the students' perspectives, the highest mean effectiveness of online learning belonged to the flexibility component (16.35 ± 4.21), and the lowest belonged to the feedback component (6.59 ± 3.62). From the faculty members' perspectives, the highest mean effectiveness of online learning belonged to the page design component (19.62 ± 4.61), and the lowest belonged to the motivation component (7.96 ± 3.75). The total score of online learning effectiveness was reported as 111.60 ± 25.39 for students and 130.37 ± 25.90 for faculty members. In terms of the total score of the effectiveness questionnaire, both groups demonstrated a good level (Table 3).

Discussion

The present study aimed to investigate the effectiveness of online learning in the post-COVID-19 era from the perspectives of students and faculty members of selected universities of medical sciences in Iran. From the faculty members' perspectives, online learning had a desirable effectiveness regarding the components of "teaching-learning activities, feedback, flexibility, assistance, motivation, and evaluation," and a moderate effectiveness regarding the components of "content, page design, and educational materials." From the students' perspectives, online learning exhibited desirable effectiveness regarding the components of "content, teaching-learning activities, page design, feedback, workload, assistance, motivation, and evaluation," but a negative correlation was reported with the components of "flexibility and educational materials." In this context, the results of Yasini et al.'s study revealed that, from the faculty members' perspectives, the components of "course content, organization of educational materials, course flexibility, and workload" had a desirable effectiveness, while the components of "teaching-learning activities, web page design, feedback provided during the course, and student assistance" had a moderate effectiveness. From the students' perspectives regarding holding the online learning course, the effectiveness of the course content and page design was evaluated as desirable, the effectiveness of teaching-learning activities and student assistance as undesirable, and the effectiveness of organizing educational materials, provided feedback, and the flexibility of the educational course as moderate (19). This was partially inconsistent with the findings of the present study, which could be attributed to differences in the research population, the time of the study, and the improvement of required infrastructure of online learning in recent years. Additionally, most students who had previously been educated through traditional, in-person methods were reliant on limited resources for studying and exams. In contrast, online learning, due to its high flexibility for using up-to-date resources and student faster and easier access to educational resources, is possibly perceived as unfavorable due to learning overload.

The findings of Hammed et al.'s research demonstrated that the majority of students were satisfied with the number of online classes and their organization, content, and preparation.

Among various teaching methods, live online lectures were the most common, and most students preferred the use of this method (23). The results of the present study demonstrated that most students positively evaluated the teaching-learning activities and feedback in relation to effectiveness.

From the students' perspectives in the present study, the highest mean effectiveness of online learning belonged to the flexibility component, and the lowest belonged to the feedback component. From the faculty members' perspectives, the highest mean effectiveness of

online learning belonged to the page design component, and the lowest belonged to the motivation component.

As shown by the findings of Abbasi's research, the majority of faculty members agreed that the capability for magnifying visual elements on a separate page existed, and that the final media was compatible with various computers, operating systems, and browsers, and was acceptable to students (24). In this regard, the present study also indicated that, from the faculty members' perspectives, page design had a greater impact on online learning effectiveness compared to other components of online learning. In Zarei et al.'s study, the lack of an appropriate motivational system was identified as one of the obstacles to virtual learning, and the quality of virtual learning was reported to be lower than that of in-person instruction (25). In Abbasi et al.'s research, the level of student learning motivation using virtual methods during the COVID-19 pandemic was reported to be low (24). The results of the aforementioned studies (24, 25) aligned with the findings of the present study. In the present research, from the faculty members' perspectives, the lowest mean effectiveness of online learning belonged to the motivation component, which could be attributed to the reduced student interaction in online classes. Face-to-face interaction and the use of body language in traditional in-person classes are crucial for the quality of teaching and learning, and enhance information transfer, reception, analysis, and memorization in in-person settings (26).

In the current research, the majority of faculty members (72.1%) and students (54.2%) reported a high effectiveness regarding online learning delivery methods. In this regard, the results of Yasini et al.'s study revealed that faculty members perceived the content of the virtual learning course as having a desirable effectiveness, and among students, the effectiveness of the educational course content was also reported as desirable across all components (19). The findings of a study demonstrated that although online learning faced challenges, 50% of studies reported moderate satisfaction with distance learning, while 36% were highly satisfied and 17% were dissatisfied (11).

The results of a study conducted in Pakistan, which aimed to examine students' perceptions of e-learning during the COVID-19 pandemic, revealed that 77% of students held a negative view of e-learning (27). Additionally, according to the results of Abbasi et al.'s study, the use of online learning reduces professor-student interaction (24); whereas, in the present study, more than half of the students reported a high effectiveness of online learning. This discrepancy may be attributed to differences in the necessary infrastructure for virtual learning in different countries.

The limitations of the present study comprise the lack of generalizability of the findings to other educational disciplines and populations, particularly to first-world countries (given their greater expertise in virtual learning infrastructure compared to other nations), and the lack of investigation into various online learning methodologies due to time and financial constraints. Therefore, it is recommended that future studies explore online learning across diverse academic disciplines and populations.

Conclusion

The suspension of in-person classes at universities of medical sciences due to the COVID-19 pandemic created significant challenges for the education of medical students and substantially altered teaching methods for both students and faculty members. The findings of the present study reveal that the effectiveness of online learning in the post-COVID-19 era has been reported to be high among both students and faculty members. Given that online learning infrastructure was established compulsorily during the COVID-19 era and this method of instruction has not been abandoned in the post-COVID-19 era, its blended use with in-person instruction can enhance the quality of education among students and faculty members.

Supplementary Material(s): is available here [To read supplementary materials, please refer to the journal website and open PDF/HTML].

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Conflict of interests: There is no conflict of interest.

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Table 1. Demographic characteristics of students and faculty members

Demographic Characteristics of Students				
Variable		**Frequency**	**Percentage**	**P-Value**
Gender	Female	158	55.2	0.454*
	Male	128	44.8	
University of study	Zanjan	173	60.5	0.132**
	Shahed	41	14.3	
	Iran	72	25.2	
Field of study	Nursing	207	72.4	0.133**
	Midwifery	32	11.2	
	Operating room	26	9.1	
	Anesthesiology	21	7.3	
Ethnicity	Native	168	58.7	0.449*
	Non-native	118	41.3	
Place of residence	Dormitory	149	52.1	0.654*
	Rented house	20	7.0	
	With family	117	40.9	
Access to virtual learning resources	Poor	20	7.0	0.506**
	Moderate	114	39.9	
	Good	152	53.1	
Family income level	Low	32	11.2	0.068**
	Moderate	238	83.2	
	High	16	5.6	
Demographic Characteristics of Faculty Members				
Gender	Female	42	68.9	0.904**
	Male	19	31.1	
Education level	Master	25	41.0	0.833**
	Doctorate	32	52.4	
	Post-doctorate	4	6.6	
Academic rank	Instructor	27	44.3	0.720**
	Assistant professor	23	37.6	
	Associate professor	9	14.8	
	Professor	2	3.3	
Participation in electronic learning	Yes	48	78.7	0.192*
	No	13	21.3	
Access to virtual learning resources	Poor	11	18.0	0.064**
	Moderate	36	59.0	
	Good	14	23.0	
Experience in virtual teaching	Yes	55	90.2	0.245**
	No	6	9.8	
Membership in the medical staff	Yes	28	45.9	0.024**
	No	33	54.1	
Income status	Low	26	42.6	0.016**
	Moderate	33	54.1	
	High	2	3.3	

*χ^2 test, **Fisher's exact test

Table 2. Frequency distribution of online learning effectiveness from the perspectives of faculty members and students

Online Learning Effectiveness		Frequency	Percentage
Faculty Member's perspectives	Low	0	0
	Moderate	11	18
	High	44	72.1
	Very high	6	9.8
	Total	61	100

Students' perspectives	Low	2	0.7
	Moderate	122	42.7
	High	155	54.2
	Very high	7	2.4
	Total	286	100

Table 3. The relationship between effectiveness and components of online learning from the perspectives of students and faculty members

Online Learning Components	Online Learning Effectiveness	
	From students' perspectives	From faculty members' perspectives
	Pearson's correlation coefficient (r)	
Content	0.822	0.641
Teaching-learning activities	0.826	0.867
Page design	0.822	0.624
Educational materials	-0.704	0.548
Feedback	0.776	0.775
Flexibility	-0.656	0.713
Workload	0.832	-0.632
Assistance	0.814	0.762
Motivation	0.706	0.702
Evaluation	0.850	0.748
P-value	< 0.0001	< 0.0001