The higher education management in medical universities during the COVID-19 pandemic

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Abstract

Background: The use of electronic technology plays a key role in the change in higher education management. This study aimed to assess the necessity of adaptation of electronic learning systems management during the COVID-19 pandemic.

Methods: The present study was mixed research. Its statistical population in the qualitative section included 50 experts in higher education management of medical universities. The statistical population in the quantitative section included 242 department heads of 65 medical universities selected according to Morgan's table. Purposeful sampling was used in the qualitative section and cluster random in the quantitative section. The interview was used in the qualitative section and a researcher-made questionnaire was used in the quantitative section. Qualitative data analysis was performed with MAXQDA 2019 software and quantitative data analysis was performed with SPSS software.

Results: In the qualitative section, 9 general categories were obtained. In the quantitative section, the results of the one-sample t-test in the dimensions of development of technology and electronic service, expansion of virtual and integrated education, enhancing the quality of learning, expanding research, access to scientific resources, the efficiency of the educational system and optimization of capital and financial affairs of the current status of higher education management in medical universities were determined.

Conclusion: For the development of e-learning at the university level during the COVID-19 pandemic, it is necessary to know the motivating factors and barriers well and use the gained experience to select appropriate strategies to accelerate the development process of e-learning.

Keywords: COVID-19; Education; Education, Graduate; Pandemics.

Introduction

The outbreak of the COVID-19 disease has closed universities in most countries of the world and caused serious changes in the universities and educational centres and educational problems for students in the country (1). Also, increasing internet technology and e-learning play a key role in the change in higher education management and new educational needs

and theological changes highlight the necessity of adapting e-learning systems with them (2). In line with what was stated above, Buheji & Ahmed stated that "*combining foresight with efforts to solve the problem*" will create more future-oriented generations for us, so that they demonstrate participatory actions in the face of complex human challenges with high preparedness and accessibility (3). At the same time, universities are thinking of launching virtual education systems for students. However, the important point is the evaluation of students' learning and their challenges and solutions.

The most important methods of evaluation of learners in virtual learning are tests (practical, oral, written, multiple-choice, short answer, true and false, etc.), projects, electronic portfolios, online chat and discussion groups, interviews, telephone evaluation, simultaneous audio-visual communication, peer assessment, essay writing, joint group assignments, self-evaluation, book assignments and e-mail (4). There is also a difference in the views of faculty members of different departments on the role of virtual universities in the excellence and progress of the country in the fields of science, technology and international relations. Rezaei Radbian has stated that adding mobile education to traditional education is effective in increasing students' motivation for progress, self-concept and self-confidence in the courses (5). Due to the Coronavirus crisis, there is a need for research on the role of higher education management in these conditions in Iranian universities of medical sciences. It should be noted that the achievements of this study will be useful for all stakeholders, including policymakers, managers of higher education, especially medical higher education and various levels of management, students and society. Due to the importance of e-learning and distance learning, this study was an attempt to clarify the current status of higher education management during the COVID-

19 pandemic. We hope that the results of the present study to be used by managers and planners.

Methods

The present study was mixed-method research. This method is a research approach that can provide a complex picture of a phenomenon by measuring both quantitative and qualitative research findings.

-Data collection tools in the qualitative section

Interviewing is one of the data collections tools that can be used to deepen the assessment of perceptions, attitudes, interests and aspirations of the subjects. Before the interview session, an introduction about the management of higher education in medical sciences during the coronavirus and the key points of the interview were explained to the group of experts via phone and in some cases in person, and before starting the session, they were given sheets containing questions and a short opportunity to get acquainted with the questions and focus more. After recording the interviews, the full text of the interview was transcribed. After implementing the texts of the interviews, the researcher extracted the initial codes using Max Q1-10 software. The data collection method in this study was semi-structured and unstructured interviews. The main question in the interview was "What are the characteristics and dimensions of higher education management in the medical sciences during the COVID-19 pandemic"? It should be noted that this main question was in the form of several questions and was hidden in them. The researcher also tried to use exploratory questions during the interview to gain a deeper understanding of the phenomena. Also, during the interview, the researcher has contributed to a better implementation of the interviews by taking notes of the points mentioned by the interviewees and

considering the key points mentioned in the interview to gain a better and deeper understanding. In this step, the researcher used interviews to seek the experiences and views of experts and thinkers in the field about the identified dimensions and components. In this regard, the researcher interviewed 25 of these people. The average interview time was 45 minutes per person.

-Data collection tools used in a quantitative section was researcher-made questionnaire as follows

A) researcher-made questionnaire extracted from the indicators of the qualitative stage and review of texts): To collect information in this research, 2 researcher-made questionnaires were used .The first research questionnaire: The most important tool used for data collection was researcher-made. The research questionnaire had two sections. The first section dealt with the personal characteristics of the respondents. The second section of the questionnaire examined the importance of higher education management indicators according to the indicators, dimensions and components identified in the qualitative section and review of texts. This questionnaire consists of 60 items (corresponding to the indicators extracted in the qualitative section) the dimensions and components include the following items. The researcher-made questionnaire was first examined based on explanatory factor analysis to discover its initial factor structure. After determining the validity

using the opinions of experts, the reliability of this questionnaire was evaluated with the opinion of 50 people using Cronbach's alpha.

Second research questionnaire: In this questionnaire, all components of the previous questionnaire were used, but it was used to assess the current status.

-Library studies

To collect theoretical foundations and relevant previous studies on the dimensions, components and various indicators of higher education management, which includes Internet search and review of domestic and foreign scientific articles, the researcher made extensive efforts in this area.

-Data analysis method

First, qualitative data and then quantitative data were analyzed. Qualitative data analysis was done in MAXQDA 2019 software.

In the qualitative section, the data analysis, the coding process were done in this way:

First, the text of the interview was analyzed in detail. Then, the text of the interviewswas carefully reviewed to gain a general understanding. Interpretive summaries were then coded based on the obtained themes, which was the open coding step.

Then, the extracted codes were matched with the text of the interview and compared

Table 1. Number of questionnaire items

Row	Dimensions and components	Number of items
1	Component of development of technology and electronic services	10
2	Component of expanding virtual and integrated education	6
3	Component of increasing the quality of learning	7
4	Component of the educational system efficiency	6
5	Component of research expansion	5
6	Component of access to scientific resources	5
7	Component of the expansion of international relations	3
8	Component of optimizing capital and financial affairs	4
9	Component of management monitoring and evaluation	8
10	Component of education flexibility	6

to identify common meanings and axial coding and selective coding were performed. The basis of content segmentation in data analysis will be any meaning, content and theme that cover the objective of the study. At the end of qualitative data analysis, the proposed research model concerning qualitative analysis has been presented.

In the qualitative section, after 50 interviews, theoretical saturation of the codes was obtained and the interviews stopped after implementing 9 general categories, descriptive code was obtained.

In the quantitative section, data were analyzed using SPSS software. Based on the measurement model (correlation of latent variables or hypothetical structures with the observed variables) and the structural equation model of relationships between latent variables), the proposed model will be presented.

Research tools validity and reliability

Reliability of research tools examines how accurate research tools are in measuring concepts. In other words, it indicates the level of error in the measurement. A good test should have several desirable characteristics such as objectivity, ease of implementation, ease of interpretation, reliability and validity. Reliability is one of the characteristics of good measurement tools. It indicates to what extent the tool achieves the same results under the same conditions. The reliability coefficient ranges from zero (unreliability) to +1 (full reliability) (6). Reliability was measured by Cronbach's alpha (internal consistency of the tool) and it was obtained higher than 0.97. To assess the validity, face and content validity were used. In this regard, the opinion of 15 experts (initial approval of the tool by experts), content validity (the degree of expert agreement of the tool) and construct validity were used and the validity of the questionnaires was approved.

Results

Qualitative section

To identify and determine the dimensions, components and indicators of the model of higher education management during Coronavirus in medical universities, by reviewing the texts and considering the theoretical foundations and library studies, several dimensions, components and indicators were identified. To complete the research, face-to-face interviews were implemented with 50 experts and specialists in this area. The demographic characteristics of these subjects are presented in Table 2.

Based on the statistical calculations, 62% of participants in medical universities were male and In terms of education, respondents with a Ph.D. degree 58% had the highest percentage and the most work experience in the 11 - 20 years group at 44% and in the 41- 50 years age group at 44% and the highest response group were nurses at 30%.

The results of the one-sample t-test analysis are presented in Table 3:

According to the results in the dimension of applying technology to empower students, the mean role of higher education management during COVID-19 in the use of technology in empowering students was 3.19 (SD=.93592), effective use of technology in learning was 3.29(SD=1.009), development of technology following the needs of society was 2.302(SD=1.165), Development of technology in online test 3.28(SD=1.165), empowerment at a knowledge level 3.30(SD=1.061), empowerment at the comprehension level 3.3015(SD=1.084), empowerment at the application level 2.28(SD=1.037), empowerment at the analysis and review level 2.28(SD=1.93), empowerment at the composition level 3.3015(SD=1.084), empowerment at the application level 2.28(SD=1.037),

Table 2. Statistical sample and demographic information in the qualitative stage

	Variable	Number	frequency
Gender	Male	31	62%
	Female	19	38%
Education Degree	Masters	19	38%
	Ph.D.	29	58%
	Specialty	2	4%
Employment history (year)	Less than 10 years	21	42%
	11-20 years	22	44%
	21-30years	4	8%
	Over 30years	3	6%
age	Less than 40 years	12	24%
	41-50 years	22	44%
	Over 51years	16	32%
Field of study	Health Education	4	8%
	Nursing	15	30%
	Health Information Technology	2	4%
	Health services management	9	18%
	Environmental Health	1	2%
	Professional health	1	2%
	Physician	3	6%
	Physiology	1	2%
	Anatomy	1	2%
	Cardiovascular	1	2%
	Internal	1	2%
	Orthodontic	1	2%
	Biostatistics	1	2%
	bacteriology	1	2%
	Tongue	1	2%
	Medical Physics	1	2%
	Radiology	1	2%
	Hematology	1	2%
	Education management	4	8%

Empowerment at the analysis and review level 2.28 (1.093), Empowerment at the evaluation level 2.32 (SD=1.145) was detected.

-According to the results in the dimension of Scientific development of educational content and the quality of learning expansion of research, the mean role of opening educational programs 3.213 (SD=1.0803), designing online courses 3.1150 (SD=1.129), availability of study resources 3.09 (SD=1.165), Educational strategies 3.05 (SD=1.029), Self-centered learning 3.3350 (SD=1.02464), Learning quality 3.05 (SD=1.19501), real internship environment 3.1150 (SD=1.02464), strengthening scientific and educational exchanges 3.3458 (SD=1.149), International research cooperation 3.1308 (SD=1.209), access to comprehensive, global and specialized information 3.0376 (SD=1.212), knowledge-based technologies 3.2383 (SD=1.264), international educational cooperation 3.0654 (SD=1.149) was detected.

According to the results of the dimension of Explaining the educational system the mean role of virtual theoretical education 2.9393 (SD=1.180), practical education3.1308 (SD=1.195), virtual testing 2.9860 (SD= 1.00103),

Table 3. Current status of higher education management components in the country's medical universities

Dimension	Component	Mean	SD	Statistic t	Mean difference	df	sig	Result
Applying technology to empower students	The effectiveness of technology in learning	3.19	.93592	43.239	3.185	232	0.000	Desirable
	An effective way of learning in teaching methods	3.2956	1.009	43.601	3.29557	232	0.000	Desirable
	Development of technology following the needs of society	2.302	1.165	40.464	-2.296	232	0.000	Undesirable
	Development of technology in online test	3.28	1.165	40.764	3.284	232	0.000	Desirable
	Empowerment at a knowledge level	3.30	1.061	42.620	3.303	232	0.000	Desirable
	Empowerment at the comprehension level	3.3015	1.084	43.034	3.30151	232	0.000	Desirable
	Empowerment at the application level	2.28	1.037	44.099	-2.283	232	0.000	Undesirable
	Empowerment at the analysis and review level	2.28	1.093	42.121	-2.276	232	0.000	Undesirable
	Empowerment at the composition level	2.22	1.098	40.608	-2.262	232	0.000	Undesirable
	Empowerment at the evaluation level	2.32	1.145	40.602	-2.323	232	0.000	Undesirable
Scientific development of educational content and the quality of learning Expansion of research	opening educational programs	3.2132	1.0803	41.183	3.213	232	0.000	Desirable
	Designing online courses	3.1150	1.129	36.724	-2.112	232	0.000	Undesirable
	Availability of study resources	3.09	1.165	36.666	-2.082	232	0.000	Undesirable
	Educational strategies	3.05	1.129	33.905	3.051	232	0.000	Desirable
	Self-centered learning	3.3350	1.02464	43.303	-2.323	232	0.000	Undesirable
	Learning quality	3.05	1.19501	36.065	-2.055	232	0.000	Undesirable
	Real internship environment	3.1150	1.02464	36.724	-2.112	232	0.000	Undesirable
	Strengthening scientific and educational exchanges	3.3458	1.149	43.122	-2.352	232	0.000	Undesirable
	International research cooperation	3.1308	1.209	37.702	-2.134	232	0.000	Undesirable
	Access to comprehensive, global and specialized information	3.0376	1.212	31.890	-2.035	232	0.000	Undesirable
	Knowledge-based technologies	3.2383	1.264	39.994	-2.238	232	0.000	Undesirable
	International educational cooperation	3.0654	1.149	36.638	-2.065	232	0.000	Undesirable
Explaining the educational system	Virtual theoretical education	2.9393	1.180	32.973	0.93253	232	0.000	Desirable
	Practical education	3.1308	1.195	34.548	0.130842	232	0.000	Undesirable
	Virtual testing	2.9860	1.00103	36.994	0.985983	232	0.000	Desirable
	Educational technologies	3.2290	1.061	41.215	-2.22897	232	0.000	Undesirable
	Educational methods	3.2570	1.18601	43.903	3.25701	232	0.000	Desirable
Monitoring and educational evaluation	Monitoring the education process	3.1682	1.00227	40.573	3.16822	232	0.000	Desirable
	Quality of online education courses	3.2430	1.19501	41.574	-20.2499	232	0.000	Undesirable
	Continuous evaluation	3.2488	1.05849	42.029	-2.2483	232	0.000	Undesirable
	Providing feedback	3.2243	1.13462	41.049	-2.2230	232	0.000	Undesirable
	Alternative methods	3.1221	1.216	37.631	-2.1207	232	0.000	Undesirable
	Skills assessment	3.2056	1.14203	44.274	-2.2061	232	0.000	Undesirable

educational technologies 3.2290 (SD= 1.061), educational methods 3.2570 (SD=1.18601) was detected.

According to the results of Monitoring and educational evaluation the mean role of monitoring the education process 3.1682 (SD=1.00227), Quality of online education courses 3.2430 (SD=1.19501), Continuous evaluation 3.2488 (SD=1.05849), providing feedback 3.2243 (SD=1.13462), Alternative methods 3.1221 (SD=1.216), Skills assessment 3.2056 (SD=1.14203) was detected.

Discussion

Given the importance of higher education management during the COVID-19 epidemic, the continuation of education is vital considering the limitations of Iranian medical universities. Based on the research results, the causes that are important during the COVID-19 pandemic in medical universities include the effective way of learning in a variety of ways and using the latest educational technologies, holding educational courses for professors of the university on the effective use of technology in various educational methods according to the latest online test methods in the university by using the experiences of other countries and considering the methods of empowering students in learning at the levels of knowledge, comprehension, analysis and review, combination, evaluation. In line with the mentioned results, the research conducted by Buheji & Ahmed stated that "combining foresight with problem-solving efforts" will create future-oriented generations for us, as they engage in participatory action in complex human challenges with preparedness and access (3).

Also, the scientific development of educational content and the availability of study resources and comprehensive and specialized information to increase the quality of students' learning with new, up-to-date and technological resources for professors and students and expanding

research and establishing international scientific-research relationships, strengthening scientific exchanges, and increasing international research and educational cooperation for professors and students online and the use of knowledge-based technologies and paying attention to the design of educational programs and online courses and providing educational strategies for professors and students with an approach of increasing learning quality by planning for a real internship environment for students during COVID-19 were identified important within the framework of the social impact. These results were in with the study conducted by Olaniyi, in an article entitled "Socio-economic impacts of novel coronavirus: The policy solutions". In this article, he examined the consequences of the new coronavirus and stated that the virus has not only had direct impacts, but also indirect impacts and costs. He suggested policy solutions, including management approaches, policy frameworks related to education and health literacy, and national and international changes in public and private participation regarding the coronavirus (7).

It is also necessary to explain the goals, philosophy and system of theoretical, practical and virtual education, and virtual tests and follow the instructions regarding their optimal implementation, monitor the teaching process and quality of online education courses by professors and continuous evaluation and provide feedback to students and professors. To improve the strengths and reduce the weaknesses in the virtual and integrated education system, scientific and practical skills learned by students during the education process during the corona and afterwards need to be evaluated. They are in line with the results of a research conducted by Butler, in a critique of the prevalence of Coronavirus in the United States and the reaction of the education system to it in societies and the emphasis on the way of access public education services

knowing that we nowadays facing a virus that quickly crosses borders and makes us forget the idea of national land. Butler, also discusses the post-coronavirus order, and considers teachings and believes that in this order, retrospective views should be set aside and issues such as equality of educational services, equal allocation in the area of educational and health facilities should be considered (8).

Also, a study entitled Ruth deals with different aspects of teaching and learning in higher education, such as student learning and individual differences, teaching and learning methods in higher education, such as learning of students and individual differences, teaching methods and new teaching techniques. In the mentioned study, four general goals in higher education and their relationship with assessment techniques and teaching methods were investigated. Researchers state that some recent changes in curriculum and teaching methods stem from some consideration of university education goals, but this effort suggests that a more accurate analysis of goals and objectives in higher education can be useful and it will soon become a necessity (9).

Due to the importance of developing new technologies in higher education during COVID-19, in the present study, Pollock & Cornford, carried out a study that showed that UK universities are trying to develop new technologies in higher education during COVID-19. The mentioned research attempted to develop and implement this system in a focused way in "space, location and virtual universities". Reviewing the results revealed that the great impact of virtual universities in promoting higher education has been pointed out (10). Several international studies have investigated the effectiveness of integrated learning, such as a study conducted by Evans, in the UK at the University of Pennsylvania, which reported that at the level of 99%, better learner learning was obtained using integrated learning (11).

Finally, according to the study results, it is concluded that the need to change this curriculum is being felt and there is the possibility of this change in the curriculum and moving toward integration. In general, based on the results of the study, the quality of educational services in the country virtual education is desirable.In a research carried out by Ardalan et al., entitled "A Study of the Effects of Mobile Technology Solutions on Effective Deployment of Mobile Learning in Medical Education Based on the Technology Acceptance Model", results showed that educational, administrative-structural, management and motivational-recreational strategies, respectively, have the most significant effect on the mental perception of the professors of the usefulness of mobile learning and also their mental perception of the ease of using mobile learning (6).

In a research carried out by Salehi, entitled "Theoretical perspectives on the development of higher education", the results showed that holding educational courses, educational planning, information and granting financial facilities are the most important development strategies for mobile learning at Isfahan University of Medical Sciences. In research entitled "Theoretical views on the development of higher Education, Salehi concluded that in terms of human capital, participation in higher education leads to economic growth by improving the quality of human resources, both in the developed world and in the developing world, it should be considered as a key and fundamental point in examining the expansion of higher education (12). In a research conducted by Kardan & Fahimi Fara, they examined the development of higher education with an approach to virtual education: meeting the needs, increasing access, and the challenges ahead. The results revealed that to develop virtual education in the universities of the country, it is necessary to know the motivating factors and barriers and use the gained experiences, and select appropriate solutions to accelerate the process of

developing virtual education (13). In the research of Mohamed Mortagy et al., the shift to online education has significantly impacted medical students in Egypt. Medical students reported various limitations and challenges of online medical education, which must be addressed considering the potential benefits of online platforms over traditional face to face learning. The results of this nationwide study provide a framework for potential areas to implement change to improve the accessibility and structure of online medical education in Egypt (14). Egyptian medical students indicated no trend in any direction regarding the perceived impact of online education. Approximately equal numbers indicated their grades were the same, lower, or higher as compared to if they had been in face-to-face education. The literature is inconclusive on this issue. One cross-sectional study observed that student performance increased with the online method (15).To produce electronic content for virtual courses, due to the need for a large investment, it is necessary to adopt an appropriate policy to accelerate their production through self-sufficiency of the course production process.

Research recommendations

Conducting research in the area of examining technology capacities and facilities in universities
Conducting research in the area of examining opportunities and strengths and threats and barriers in the area of virtual education

Conclusion

To develop virtual education at the level of the country's universities, it is necessary to identify the motivating factors and barriers and use the gained experiences to select appropriate solutions to accelerate the process of developing virtual education. To produce electronic content for virtual courses, due to the need for a large investment, it is necessary to adopt an appropriate policy to accelerate their

production through self-sufficiency of the course production process.

Author's contribution

Saeed Lak and Nadergholi Ghourchian developed the study concept and design. Akhtar Jamali acquired the data. Saeed Lak and Nadergholi Ghourchian analyzed and interpreted the data, and wrote the first draft of the manuscript. All authors contributed to the intellectual content, and manuscript editing and read and approved the final manuscript.

Informed consent

Questionnaires were filled with the participants' satisfaction and written consent was obtained from the participants in this study.

Conflict of interest

The authors declare that they have no conflict of interest.

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