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JOURNAL INFORMATION

AIM AND SCOPE

The aim of publishing Strides in Development of Medical Education is to promote the quality of the medical education and inform via publishing the conducted researches in all topics related to medical education. Such topics may include modern teaching methods, designing educational courses, evaluating the success rate of these courses, planning in medical sciences education based on the society's needs, and planning, management, and assessment of education. However, the Journal of Strides in Development of Medical Education welcomes any subjects causing a communication between the faculties and professors of the medical sciences and medical experts.

The Journal of Strides in Development of Medical Education is of the publications of the Kerman Medical Sciences Education Development Center and is financially sponsored by the aforementioned center. Now, the publishing of this journal is updated Continuous. Moreover, it is an online publication.

CONTENT COVERAGE

This journal publishes original, review, editorial, letter to the editor, short communication articles, all related to the journal goals.

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- **Acknowledgments:** All contributors who do not meet the criteria for authorship should be covered in the acknowledgment section. Persons who provided technical help and writing assistance should also be acknowledged.
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Ford MJ, Munro JF. Introduction to Clinical Examination. 7th ed. Edinburgh: Churchill Livingstone; 2000.

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Meltzer PS, Kallioniemi A, Trent JM. Chromosome Alterations in Human Solid Tumors. In: Vogelstein B, Kinzler KW, editors. The Genetic Basis of Human Cancer. New York: McGraw-Hill; 2002. p. 93-113.

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Meydani SN, Leka LS, Fine BC, Dallal GE, Keusch GT, Singh MF, et al. Vitamin E and Respiratory Tract Iinfections in Elderly Nursing Home Residents: a Randomized Controlled Trial. JAMA. 2004 Aug 18;292(7):828-36.

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Reports should contain 1000 - 2000 words and should contain a structured abstract of 200 words maximum. Short reports should comprise sections of Introduction, Materials/Patients and Methods, Results, and Discussion with not more than 2 tables or figures and up to 20 references.

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Letters to the editor will be considered if they give significant comments on recent articles published in this journal or they contain relevant preliminary data providing new insights. Letters need no abstract and must cite the previous article in this journal that is being discussed, and should have no more than 10 references.

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Strides in Development of Medical Education

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Editorial

Student: A Neglected Element in Facing the Challenges of Medical Education during the COVID-19 Era

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Keywords:
COVID-19, Educational Communication, Medical Education, Medical Students, Online Educations

The COVID-19 pandemic, which has startled all of us, caused rapid and major changes in the higher education system of Iran, especially in the field of medical education. Although since 2001 the education system is trying to use virtual /distance education (1), until the start of the pandemic, e-learning had a low share in the educational programs of most medical universities and was considered as a less important secondary educational method. Since controlling the pandemic requires avoiding face-to-face training, e-learning is the most important way to provide educational content and holding courses in almost all medical universities of Iran.

According to the literature, e-learning is faced with five challenges related to the university, professors, students, e-learning systems, and e-classroom environment (2). However, there are studies which mentioned to four categories of challenges, including technical and technological (weakness in telecommunications infrastructure), teachers and learners (unfamiliarity with the structure and technology used for e-learning), ethical challenges (weakness of existing technologies for fraud detection), and problems related to psychological issues (technology-related anxieties such as power and internet outages and system crashes) (3).

Since the onset of the pandemic in Iran was simultaneous with the start of the new educational semester, there was no opportunity for proper planning. Therefore, most of the medical universities focused their planning, policies, and activities on finding proper educational platforms (while having eyes on costs, convenience, etc.) to provide educational content (either online or offline), creating or modifying the infrastructure of distance/electronic/online education, and providing intensive training courses for familiarizing university teachers with these methods of education and Learning Management Systems (LMS).

It seems that less attention is paid to students, who are the other side of e-learning systems. We, unfortunately, ignored that a sudden shift from an almost complete face-to-face education to complete e-learning creates challenges for students. It was assumed that, if correct educational content (according to educational objectives) be provided correctly by the professors and through a proper communication path, students would receive the content correctly.

Although nowadays students are Millennials or from the Z generation and we name them as digital citizens or the Internet generation, however, their ability to use e-learning systems is different. For face-to-face instruction, it was emphasized that students' differences should be taken into account to increase the effectiveness of the education, but this has been overlooked in our current e-learning systems, which may be due to the rapid and forced transformation from face-to-face to the electronic methods.

Given that likely, the coronavirus will be with us for at least the next two years, so students' challenges in e-learning and related factors should be addressed. If the current situation is properly understood, it would be possible to take timely and effective steps to provide evidence-based interventions for effective electronic training and evaluations.

Conflict of Interests: Non

Ethical Approvals: Not applicable

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2. Zamani BE, Parhizi R, Kaviani H. Identify challenges and performance assessment of students' e-courses. Journal of Technology of Education. 2015; 9(3):199-206. [In Persian]

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Policy Analysis

Leading Higher Education in Iran during COVID- 19 Pandemic: Reporting the Policies and Progresses

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Abstract

Background: After the COVID-19 pandemic and the consequent restrictions assigned by the National Committee on Combating Coronavirus (NCCC), the Ministry of Science, Research, and Technology (MSRT) set up committees to trace and analyze the outcomes of the pandemic.

Objectives: This paper aimed to explain the policies, programs, and activities executed by MSRT and analyze the points of strength and weakness.

Methods: In this report, the MSRT experience during the first wave of the COVID-19 pandemic in the Iran higher education (HE) system is briefly reported by referring to pieces of evidence documented by MSRT and analyzing strengths and, predicting the outcomes toward the future. The evidence was analyzed descriptively.

Results: The policies, plans, and actions were based on three key policies including participation, adaptation, and tolerance.

Conclusion: Iranian HE system has changed in many aspects during the recent months due to the COVID-19 pandemic. MSRT instantly reorganized its activities to coordinate its decisions with NCCC.

Keywords: Higher Education, Coronavirus Pandemic, Iran.

Background

Higher education (HE) in Iran is governed by the Ministry of Science, Research and Technology (MSRT) and Ministry of Health and Medical Education (MHME). MSRT covers around 85% of the total enrolled students at non-state and state-dependent universities, in all disciplines excluding medical studies. (1) After the coronavirus pandemic and the consequent restrictions assigned by the National Committee on Combating Coronavirus (NCCC) for all state ministries and organizations, MSRT set up committees to trace and analyze the outcomes of the pandemic outbreak signified by NCCC and reliable global sources such as World Health Organization (WHO). More than 2000 HE institutes are active in different parts of Iran. The quarantine condition raised limitations and serious concerns over the next step policies of the HE system. The MSRT required pertinent policies to direct the universities in their decision makings about their contingencies. The pressing conditions of vague information and unpredicted factors affected an effective and operational decision-making process. Hence, MSRT built its decision-making process on the wide participation of the universities and HE institutes, where all the beneficiary parties were encouraged to be engaged in the process and this wide participation could be led to more accurate decisions.

The other key MSRT policy was to shift to distance learning substituting the in-person classes and in particular emphasizing the e-learning options. However, there were meaningful differences regarding the capabilities and experiences of different distance learning methodologies within the HE institutes under MSRT. The final and main option for distance learning was e-learning for the HE system. The main concern was that only a handful of universities and HE institutes were previously engaged in presenting modules and courses based on the e-learning techniques which dated back to 2003. These were among the well-rooted universities which were highly equipped with required software and hardware to support the e-learning substitutes. These universities immediately shifted to the e-learning process with minor educational regulatory modifications. Other universities and HE institutes needed support to shift their status towards the e-learning paradigm.

To facilitate a fast and reliable transition from the traditional learning systems to the new e-learning methodologies required a review of the regulations and mandates of the HE institutes. This led to reviewing the decision-making process in the MSRT and raised the second major policy shift of a decentralized and adaptable decision-making process. In this framework, MSRT recognized the institute-driven characteristics and moved towards decentralizing the decisions. By the adaptable decision policy, the institutes were able to alter decisions and certain regulations to handle the many unpredicted individual consequences of the pandemic in different parts of the country.

The third and last policy under the restrictions of coronavirus pandemic was toleration and consideration. It was revealed to MSRT that the pandemic has effected many students and their families in multiple ways, affecting daily actions, and everyday activities of thousands across the nation. This implied that the institutes should show more flexibly into various students' requests for various exemptions. This covered a wide range of possibilities such as students in the deprived sector of the society that could not easily access the internet or students that declared they were not satisfied by the newly adopted e-learning modules and prefer to apply for omitting one or more existing modules or opted for omitting the whole semester. The policy could respond to the needs and requests of students unions and different student sectors in the face of the coronavirus pandemic crisis.

These three policies could reduce the impact of coronavirus pandemic as a calamity on the national HE system and lead to the plans and activities to assist in preserving the HE system on a safe and assured operational path.

Emerging crisis and the initial activities

The coronavirus pandemic might have derived the national HE system towards canceling the semester and gradually halting all academic events and activities across the nation. To prevent this, upon receiving the news from the international and initial nation impacts of the coronavirus pandemic crisis, MSRT planned to take an active role in handling the crisis as early as just 24 hours after NCCC first coronavirus pandemic notifications and regulated social restrictions as quarantine at February 24, 2020. The key policies and actions adopted by MSRT are as follows:

1. Rearranging regulations. MSRT formally sets academic rules in general and delivers them to the universities and HE institutes where they are customized and adapted to the particular needs and requirements of the institutes. Due to the coronavirus pandemic crisis, the regulations were rearranged under the adaptability policy to make it applicable for the fluent continuation of the semester. Rearranging covers a wide range of rules from the minimum allowed study units to tuition fee reductions and e-learning regulatory facilities.

2. Reorganizing managerial essentials. Committee of Electronic HE (CEHE), was reorganized to accomplish assigned missions to study and assess the technical challenges of e-learning in nation-wide universities and HE institutes; directing universities and HE institutes towards activating electronically teaching frameworks; providing counsel to universities and HE institutes for re-arranging the curricula based on e-learning contingencies; presenting technical workshops and short courses for academic and non-academic staff in universities and HE institutes to prepare them to engage in e-education programs; data gathering and monitoring the e-education activities of the universities and HE institutes and sending progress reports for MSRT, and finally providing policy and decision making support and advise to MSRT in the dynamic and fast-changing environment following the coronavirus pandemic. Moreover, CEHE supervised the operations to keep the expected ratio of the coverage rate of students under the e-learning program. CEHE supported the universities and HE institutes permanently solving their technical problems and finding the best way to manage the program effectively.

3. Continuing education amid the crisis. Concerning the negative impact of halting the universities and HE institutes activities, MSRT tried to actively handle the emerging crisis by calling the national proficiencies of related expertise and experiences. All universities and HE institutes which already had powerful e-learning programs and infrastructures shared their knowledge and abilities with other small or newly established universities and HE institutes. At least twenty universities were called in and planned to assist others which applied for technical support.

4. Coordinating with authorities. To keep and enhance coordination, MSRT made the decisions with absolute harmony to the NCCC and MHME, as the focal managerial units of the Covid-19 crisis. Rationally, MSRT insisted on the objectives to prevent increasing tension among students and their families.

5. Publicizing decisions. With a deep understanding of the anxiety, stress, and impatience following the coronavirus crisis in the society and among the students, MSRT directed all the new notifications and information flow from a single validated official source.

6. Promotion of public information on e-learning. A majority of universities and HE institutes attendees and audiences had no sufficient and background knowledge about electronic and distance learning. This was a hardly-known area in higher education. It is believed that the academic staff is the first respondents while most of them are not qualified for e-learning. Before the coronavirus pandemic, a few Iranian universities and HE institutes run on-line courses where some of them implemented the courses entirely based on the e-learning methods mainly in postgraduate programs. Given that at least until the COVID-19 vaccine is found, much of the training will continue electronically, it is necessary that Iranian universities and HE institutes need to be familiar with e-learning. (2)

7. Facing the challenges. The main challenges faced by the HE system in pursuing the e-learning programs are the lack of knowledge and experience in the majority of universities and HE institutes; resistance to change, and

circulating dissatisfaction among students and employees. To manage these challenges, MSRT produced and distributed informative documents in the different forms of pamphlets and brochures on e-learning features and requirements, focusing on teaching in the virtual environment. Also, a specialized webpage on different aspects of e-learning news, courses, workshops and seminars, and other related issues were designed and activated on the MSRT Website.

The achievements

MSRT monitored the results of the policies implemented in the universities and HE institutes to evaluate their performance confronting coronavirus pandemic crisis. The initial reports were notable because of the excellent coverage of students under the e-learning program. The following table shows the data up to May 1, 2020.

Table 1. Number and students' coverage ratio of e-learning in various universities and HE institutes in Iran (February-April 2020)

The Universities and HE institutes		Number of students	Number of certain e-classrooms	The number of students under e-learning	The percentage of covered students
State universities		542500	52422	454130	83.7
Decentralized universities	"Payam Noor"	430000	4000	400000	93
	Technical & Vocational	136000	12600	90000	66.1
	Applied Science and Technology	250000	21000	125000	50
	Farhangian	85000	100	85000	100
	Al-Mostafa Society	44000	6980	44000	100
Non-profit universities		148000	27400	110000	74.4
Shahed university		5500	1300	3500	63.7
Islamic Azad University		1056000	97458	950000	89.9
Sum		2680000	223260	2372300	86.2

The other distance learning activities of universities and HE institutes not reported in the above table include learning material distribution as hardcopy packages for students who lived in areas with no internet access; off-line primitive digital courses offered to students. MSRT considered these as achievements to preserve the education quality when simultaneously keep the education ongoing.

Adaptability and sustainability of the MSRT crisis policies

Converting the coronavirus pandemic threat to an opportunity for HE promotion is the main achievement of the MSRT. This promotion includes the break from the traditional classroom-based on teaching to the new e-learning programs and regulations that would be costly and time - consuming under normal conditions. By this approach, the coronavirus crisis inspired MSRT for being sustainable on the initiative plans and achievements, especially on the e-learning methodologies. During the period of quarantine, the capacity of Iran HE for adaptability was assessed considerably. The short-time results showed the potential of Iranian HE for adaptability when confronted with forced and inevitable changes. MSRT could shift the teaching-learning process to a feasible process during the COVID-19 pandemic. Despite the inherently centralized system, MSRT showed the power of its flexibility regarding rules and modifying regulations. Moreover, MSRT introduced a new face of experience and knowledge sharing among universities and HE institutes.

Results

Iranian HE system has changed in many aspects during the past 3 months due to the coronavirus pandemic. MSRT instantly reorganized its activities to coordinate its decisions with NCCC. The outcomes could be summarized as follow:

1. Sustaining teaching-learning process by e-learning;
2. Adjusting different HE sub-systems to changeable conditions;
3. Preparing HE system toward the paradigm of learning-teaching;
4. Preventing a forced pause in the education stream.

Conclusion

The coronavirus pandemic has affected the educational systems worldwide. MSRT polices led to a uninterrupted continuation of the teaching-learning process in HE institutes and universities. Iran was encountered with the virus at the very early stages around 20th Feb 2020. This implied that were no reliable reported experiences of tackling the crisis from the global HE systems. In this paper, the MSRT experience during the first wave of coronavirus pandemic in the Iran HE system is briefly reported. The policies, plans, and actions were based on three key policies including 1) participation; 2) adaptation; and 3) Tolerance. Finally, the HE system achievements in handling the coronavirus pandemic are briefly presented.

Acknowledgment: We are sincerely thankful to education deputies in Iranian universities for providing the required data.

Conflict of Interests: Non

Ethical Approvals: Data and information were gathered from authentic origins to present the right and credible analysis.

Funding/Support: No F/S

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1. Ministry of Science Research and Technology. [Cited 2020 June 21]. Available from: https://www.msrt.ir/en/page/20/statistics-2019.

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Research Article

Comparison of Analytic Indices of In-Person vs. Online Exams in an Iranian Medical University in the Academic Year 2020

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Abstract

Background: Currently, many medical universities in Iran use e-learning programs to educate and evaluate students. This teaching and assessment method is highly significant during the coronavirus epidemic.

Objectives: The present study was conducted to compare the analytic indices of in-person vs. online exams at the Kerman University of Medical Sciences, (KMUS) Iran.

Methods: This descriptive-analytical cross-sectional study was conducted in 2020. The study samples included all exams given at the KMUS and midterm exam scores obtained from in-person and online courses in the first and second semesters in the academic year 2019-2020. The exams were selected based on courses, and the same courses were offered both in-person and online; thus, only one group was studied. Course exam indicators, including difficulty and discriminative index, were examined. Data analyzed using SPSS software version 22.

Results: The mean of the difficulty index related to in-person and online exams were (0.62 ± 0.1) and (0.68 ± 0.1), respectively. (P=0.01). The mean of the discriminative index related to in-person (0.30± 0.07) and online (0.33± 0.08) exams had no statistically significant difference (P>0.05). The frequency of easy questions in online exams was significantly higher, (55% vs. 43%) (p = 0.008). The frequency of questions with an appropriate discriminative index was significantly higher for in-person exams compared to online exams (58% vs. 54%) (p = 0.01).

Conclusion: The difficulty index was acceptable and appropriate for both in-person and online exams. Both exams had appropriate quality according to the discriminative index Therefore, it seems that e-learning programs and assessments can be a good alternative to in-person teaching in emergencies.

Keywords: Online Education, Student Evaluation, Coronavirus, Online Exam, Difficulty Index, Discriminative Index

Background

The advent of information and communication technology and the growing expansion of new communication platforms such as the World Wide Web

in universities have changed many educational activities. The emergence of "e-learning" is one of the outcomes of these developments in the field of education, which refers to various forms of learning and education based on new technologies. One of the basic features of e-learning is the use of information, knowledge, and educational technologies to establish communication among people with educational resources in the form of formal or informal education (1).

In recent years, many efforts have been made to grow and expand the efficiency of e-learning. E-learning refers to a form of learning, in which teachers and learners are separated by physical distance so that students unable to attend the class for any reason to receive in-person instruction can learn the lesson online via the Internet (2). Therefore, it is necessary to evaluate the quality of e-learning. Numerous models and frameworks have been introduced to assess the validity of e-learning programs (5-3), most of which agree on the fact that basic quality principles are the same in e-learning programs and traditional educational programs offered in-person. If educational activities are well-designed, desirable outcomes will be obtained regardless of the context, in which the activities are presented. E-learning is not only a novel method to implement traditional (class-based) teaching methods, and is a new approach to education. Thus, e-learning quality assessment indicators should be considered accordingly (6).

E-learning can have different advantages. For instance, it can create diverse educational media and provide a wider range of visual learning tools. Students have better access to educational content and individual learning. Moreover, it facilitates learner feedback and makes abstract concepts more understandable using multimedia educational tools. However, e-learning is not considered a real training and an effective type of learning due to its cold and mechanical learning environment and lack of vital and spontaneous interaction between teachers and learners. Therefore, desirable teaching goals in e-learning programs cannot easily be turned into accurate and measurable goals (7). The results of a study entitled "Assessing the impact of e-learning on the academic achievement of students of Isfahan University of Medical Sciences" showed that empowering students with an average of 3.55, education with an average of 3.60, equipment and facilities with an average of 3.65, education content with an average of 3.55, and students' awareness with an average of 3.53 was effective in the students' academic achievement (8).

Although teaching in the classroom has to date been a predominant method of teaching and learning, today, especially in the current situation, the teaching-learning process must be offered online and outside the classroom. Scientific evidence shows that classroom-based methods are no longer accepted for medical education and new methods are required (9-11). With the global spread of COVID-19 in the world and severe restrictions on physical distance in high-risk populations such as students, many universities and educational institutions are using e-learning programs and teaching courses. In this regard, 150 countries have closed educational institutions and universities, which account for about 80% of the world's student population (12), and e-learning has replaced in-person teaching (13,14). Due to the significance of the major factors, all basic sciences, paramedical, and health courses) at the Kerman University of Medical Sciences were held through online education. Given that this is the first time that online courses are being extensively used in Iranian medical universities, there is not much evidence about the experiences of universities regarding the quality of educational programs and the challenges of implementing e-learning programs. Therefore, providing initial evidence about the quality of e-learning programs can pave the way for decision-makers in the field of education in the country to continue and promote e-learning programs more seriously. In this regard, the present study aimed to evaluate e-learning education programs at the Kerman University of Medical Sciences in the second semester of the academic year 2019-2020 by comparing students' scores in online midterm exams with their scores from exams of similar content in the previous semester in terms of difficulty index, discriminative index, mean scores, frequency of questions with different difficulty level, and discriminative index. This difference was not statistically significant Difficulty and discrimination index are major indicators examined in the analysis of questions of an exam. An appropriate difficulty index indicates the difference between subjects, while an appropriate discriminative index can distinguish between strong and weak students. Since exams as the main assessment tool indicate student's degree of learning and their achievement of educational goals, it is necessary to check the quality of questions in any exam and ensure standardization of exams.

Objectives: The present study was conducted to compare the analytic indices of in-person vs. online exams at the Kerman University of Medical Sciences, (KUMS), in the first and second semesters in the academic year 2019-2020.

Methods

In this analytical cross-sectional study, students' scores from online midterm exams in different fields of medical science were extracted through the online examination system of the university (Faradid) and compared with their scores from in-person exams of similar content in the previous semester. The study samples included all online exams held electronically at the university in the second semester of the academic year 2019-2020. Until the end of the study, 102 exams were conducted, of which 30 were selected with simple random sampling using a random number table. The inclusion criteria were exams on courses offered in both semesters of the academic year 2019-2020. Courses not offered in the first semester of the same academic year or those with different or distorted target groups were excluded from the final analysis. Finally, a total of 30 exams met the inclusion criteria. Data on exam indicators such as mean scores, difficulty index, discriminative index, frequency of easy, appropriate, and difficult questions, and frequency of questions with low, appropriate, and inappropriate discriminative index entered SPSS software version 22 after extraction from the system

and quality control of the data. Central statistical indicators and frequency tables, frequency percentages, and graphs were used to describe the data. Further, means were used to compare the distribution of scores in the online and in-person exams. Given that the data distribution was not normal in the studied samples, the Mann-Whitney U test was used to compare the means. The significance level was considered less than 0.05.

Results

In this study, from a total of 102 exams, 30 exams were selected. Table one provides the comparison of exam indicators related to in-person and online courses in the academic year 2019-2020.

According to the table one, the mean of the difficulty index had a statistically significant difference between in-person and online exams given in the first and second semesters of the academic year 2019-2020.

Comparing the mean of the discriminative index of exams given in the first and second semesters in the academic year 2019-2020 showed no statistically significant difference in this regard.

In addition, examining the frequency of easy questions in the exams in both semesters showed a significantly higher frequency of easy questions in the online exams (55%) compared to that in the in-person exams (43%). The frequency of questions with an appropriate difficulty index was measured in the exams given in both semesters and showed a statistically significant difference. A statistically significant difference was also observed in terms of the frequency of difficult questions in the exams given in the first and second semesters of the academic year 2019-2020 (10.8% vs. 9.3%, respectively).

Table 1. Comparison of Exam Indicators Related to In-Person and Online Courses at the Kerman University of Medical Sciences in the Academic Year 2019-2020

Exam indicator	In-person exams, 2019 Mean (SD)	Online exams, 2020 Mean (SD)	P
Difficulty index	0.62(0.1)	0.68(0.1)	0.01
Discriminative index	0.30(0.07)	0.33(0.08)	0.9
Cronbach's alpha coefficients	0.65(0.17)	0.68(0.15)	0.7
Easy questions (N)	43.6(22.3)	55.4(24.3)	0.01
Appropriate questions (N)	45.5(19)	35.1(21.3)	0.02
Difficult questions (N)	10.8(8.1)	9.30(8.9)	0.2
Questions with an appropriate discriminative index (N)	57.7(17.4)	53.8(15.5)	0.2
Questions with a low discriminative index (N)	36.5(14.7)	40.9(15.3)	0.2
Questions with an inappropriate discriminative index (N)	2.30(2.5)	4.20(4.9)	0.1

Moreover, the frequency of questions with a low discriminative index was not significantly different in the exams given in the first and second semesters (37% vs. 41%, respectively). Comparing the frequency of questions with an appropriate discriminative index showed no statistically significant difference between the exams given in both semesters. However, the frequency of questions with an appropriate discriminative index between 0.3 and 0.7 was slightly higher in the in-person exams (58%) compared to that in the online exams (54%). No statistically significant difference was also observed in terms of the frequency of questions with an inappropriate discriminative index between the exams given in-person (2.3%) and those given online (4.2%).

Finally, Cronbach's alpha coefficient showed almost similar mean coefficients between the in-person (0.65) and online (0.68) exams given in the first and second semesters, respectively.

Discussion

This study compared several exam indicators related to in-person and online exams on courses offered at the Kerman University of Medical Sciences, Iran, in the first and second semesters of the academic year 2019-2020, including difficulty index, discriminative index, frequency of questions with different difficulty levels, and discriminative index.

A comparison of the mean of difficulty index showed a statistically significant difference between the in-person and online exams in the first and second semesters of the academic year 2019-2020, respectively. This indicated that both types of exams had an appropriate difficulty index of 0.60 (15). These results are consistent with the findings of Baharvand et al. (16), Imam Juma, and Zahedifar (17) who reported the difficulty index of exams between 0.60 and 0.76. Considering that the best difficulty index is in the range between 30%-70% (18), it can be mentioned that the difficulty index of the exams given at the Kerman University of Medical Sciences was suitable.

The mean of discriminative index was not significantly different between the exams given in-person and online in the academic year 2019-2020. This indicates that different types of exams act similarly in terms of differentiating between strong and weak students in emergencies. Online exams can be a proper alternative to in-person exams.

Moreover, the mean of discriminative index of all exams given in both semesters was at a high level of 0.3. Therefore, online electronic exams can be used with more confidence instead of in-person exams.

Based on the mean of discriminative index of both exams, it is necessary to take more measures for both in-person and online exams to help distinguish between weak and strong students. A larger discriminative index indicates the discrimination power of the question, and a closer percentage of this index to 100 demonstrates that it is more appropriate (19).

Scientific evidence shows that the exam is the main tool of evaluation in the process of teaching and learning and if it is continuously designed based on scientific principles and standards, it will indicate the extent to which teachers and students achieve predetermined goals. The ultimate educational goal is learning achievement. Therefore, if a test does not have the desired format in terms of the taxonomy of questions, compliance with structural rules, content validity, difficulty index, discriminative index, and other test standardization measures, not only is the main role of the exam achieved but it also motivates the learners. Such tests will have negative effects on the learning process and will waste the efforts of teachers and the education system. Therefore, it is necessary to check the quality of questions and ensure the standardization of exams (20). On the other hand, one of the most significant issues in non-invigilated online exams is the issue of cheating, and medical universities must follow necessary measures to manage this issue. In this regard, it is recommended that in online electronic exams to assess the affective or psychomotor domain, which is in the form of multiple-choice questions, the following items should be considered by exam designers. Taxonomy 3, which evaluates the decision-making, application, and problem-solving power of students, should be used in testing so that students cannot easily answer questions. Therefore, Taxonomy 3 contains a higher percentage of questions (50%) than Taxonomy 1 (20%) and 2 (30%). Other factors include having a time limit, having random questions, and eliminating the possibility of switching between questions. The mean scores of all the 30 exams in the first and second semesters were compared and no significant difference was observed. This indicates that both types of exams had a similar effect on the students' academic achievement. Scientific evidence shows that 94% of learners who completed distance learning courses believe that they learned more in online classes than in traditional face-to-face classes (22). This finding suggests that e-learning can effectively increase students' learning capacity and outcomes. On the other hand, other scientific findings show that online teaching cannot be solely used as the primary approach at universities.

The mean of the frequency of easy questions was examined in the exams in the first and second semesters, showing that the frequency of easy questions was significantly higher in the online exams (55%) than in the in-person exams, (43%). This indicates that exam designers are more inclined to ask simpler questions in online exams since it is believed that students take their online tests under special conditions which encourages professors to ask simpler questions. Comparing the mean frequency of questions with the appropriate difficulty index showed no statistically significant difference between the two types of exams in the first and second semesters, and thus, the quality of exam questions was observed to be highly similar (45% vs. 35%). Moreover, no statistically significant difference was observed between the two types of exams in the first and second semesters in terms of the mean frequency of difficult questions (10.8% vs. 9.3% for online and usual electronic exams, respectively). Despite the degree of importance, few comprehensive studies have examined theoretical exam questions in terms of various qualitative indicators. In a study conducted by Baharvand et al. at the Shahid Beheshti School of Dentistry, 30 qualitative indicators of structural validity along with the content of theoretical exams were examined. The results showed that written exams on theoretical courses performed at the Shahid Beheshti School of Dentistry were at an appropriate level in terms of communication and content coverage, compliance with structural rules, and difficulty index, but needed to be reconsidered in terms of taxonomy, discriminative index, and value for each deviant option (16). No statistically significant difference was also observed between the online and in-person exams after examining the mean frequency of questions with a low differentiation coefficient. Therefore, the theory is reinforced that in online exams, the same standard question design criteria (Millman criteria) are observed by professors, as in-person exams (37% vs. 41%, respectively). Comparing the mean frequency of questions with an appropriate discriminative index showed a statistically significant difference between the exams of both semesters in this regard. Accordingly, the mean frequency of questions with an appropriate discriminative index between 0.3 to 0.7 was slightly higher in the in-person exams (58%) compared to the online exams (54%). This shows that the number of questions with an appropriate discriminative index was the same in both types of exams, confirming that online exams have the same required standards as real face-to-face exams. However, the mean frequency of questions with an inappropriate discriminative index was almost similar in both types of exams (2.3% in the in-person exams and 4.2% in the online exams). This shows that online exam questions have the same ability to differentiate between a strong student and a weak student.

An evaluation of Cronbach's alpha coefficient showed no statistically significant difference between the exams of the first and second semesters (0.65 vs. 0.68, respectively). This indicates that the reliability coefficient of both types of exams is in an acceptable range (above 0.6). In other words, online exams have acceptable reliability and validity, and in-person exams can be used to evaluate students' academic level.

According to the results of this study, it appears that e-learning educational programs can be used as part of routine educational programs at universities, especially during the coronavirus epidemic, for evaluation of medical

sciences. Research shows that online academic education is a successful and efficient system if the educational content is properly structured and evaluated (24). One of the limitations of this study was inaccessibility to all information on the exam indicators.

Conclusion

Evaluation is one of the most significant parts of the educational process. Proper evaluation can identify the strengths and weaknesses of education (27). Exam analysis associated with testing is a major step in educational evaluation, in which the degree of accuracy and inadequacy are examined in each question to finally determine the strengths, weaknesses, and quality of an exam. The results of this study showed that at the Kerman University of Medical Sciences, the difficulty and discriminative index were acceptable and appropriate for both in-person and online exams. The experience of the Kerman University of Medical Sciences in the academic year 2010-2011 confirms the fact that if educational processes are implemented with quality and necessary technical standards are observed, e-learning programs and online exams can be of the same quality as traditional education and in-person classes. However, the continuation of this path requires preparation of all components of the educational system such as professors and students, and proper use of existing technological capacities to improve the quality of existing educational programs. It is suggested to conduct further research on the subject in other medical universities of the country. It is also suggested to examine other exam indicators such as structural validity, relevance and content coverage, and taxonomy.

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Research Article

Policy-Making in Determining the Mission of Medical Sciences Universities during the COVID-19 Pandemic using Competitive Advantage and Scientific Strength

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Abstract
Background: The outbreak of 2019 novel coronavirus (2019-nCoV) caused a pandemic in most countries, and how to face the pandemic is a major issue that needs to be addressed worldwide.
Objectives: The current study aimed at determining the competitive advantage and scientific strength of medical sciences universities to face this pandemic
Methods: A mixed-methods was employed to conduct the current study from May to April 2020 in three steps: a) identifying the academic departments with the most exposure to this pandemic; b) designing the protocol to calculate the scientific strength and competitive advantage, c) allocating the mission to academic departments.
Result: The scientific strength and competitive advantage were calculated for clinical and non-clinical departments in all medical sciences universities. The obtained results indicated that some universities, for instance, Tehran, Shahid Beheshti, Iran, Isfahan, Mazandaran, Shiraz, Kerman, and Mashhad, had the most competitive advantage that would increase their responsibility to face this pandemic.
Conclusion: Policy-makers that clearly identify the mission and objectives of their institutions and define the relevant tasks may have better performance based on the capacities and abilities of the medical sciences universities.
Keywords: Coronavirus, COVID-19, Academic Departments, Scientific Strength, Competitive Advantage, Mission Differentiation

Background

In December 2019, a novel coronavirus was detected in patients with pneumonia, which was later named 2019-nCoV. Since the first human coronavirus was detected in the 1960s, 2019-nCoV is the 7th one known to infect humans (1). The new coronavirus, from a family that historically was not viewed as a global health concern, is the world's daily headline news. The 21st century marked its arrival with the emergence of three previously unknown coronaviruses: SARS-CoV (severe acute respiratory syndrome coronavirus) recognized in November 2002 (2, 3), MERS-CoV (Middle-East respiratory syndrome coronavirus) in June 2012 (4, 5), and 2019-nCoV in December 2019 (6).

Now the outbreak of the virus is a pandemic in more than 19,000,000 confirmed cases worldwide until August 2020(7). Until now, little is known about the infectiousness of 2019-nCoV. How to fight pandemics is always a major issue that needs to be addressed worldwide. In 2003, the SARS epidemic caused global economic losses of US$ 30 billion (8), which exceeded the military expenditures of any one of 221 countries in 2018 (9). At present, predicted funds required to fight a future global pandemic is not clear (10, 11). Making advanced preparations for a pandemic may bring significant short-term benefits, such as providing basic health services, encouraging research and development, strengthening interregional cooperation and emergency response systems and biosafety management, and promoting the balanced development of health and security of the world in general(12).

The outbreak of the coronavirus pandemic and the sudden development of the COVID-19 disease shocked all countries, and one of the essentials under such circumstances is to adopt rational, professional, and evidence-based strategic policies based on the structure of the own and other countries experiences. By learning from the effective measures employed and problems encountered in the prevention and control of this pandemic, the government is likely to set up an emergency decision-making organization when responding to future public health emergencies. Externally, the government needs to guide medical and scientific research and allocate medical care materials, and at the same time, comprehensive epidemic prevention should be implemented rapidly and efficiently. Scientific achievements, such as the development of vaccines, anti-bodies, and antiviral drugs, play a pivotal role in fighting epidemics and reducing mortality. Integrating scientific research resources, increasing research investment, strengthening direct cooperation between the international and domestic scientists, and accelerating clinical applications of scientific research results enhance the ability to prevent the spread of the epidemic or accelerate the elimination of the virus. The rapid response of the government to the epidemic benefits, in part, from the substantial improvement of the national scientific research ability and research equipment, as well as the efficient communication of research results(12).

In Iran, universities and higher education institutions (HEIs) play critical roles in achieving the goals of the health system. A diverse range of HEIs, with different missions, allows the system to increase HEI effectiveness and offer opportunities for experimenting with innovation. However, despite its prominence within the policy lexicon, pursuit of diversity (it is argued) is continually undermined by countervailing tendencies. (13-16).

In Iran, on the first day of the coronavirus outbreak, all 66 schools and universities of medical sciences, as well as the Ministry of Health and Medical Education (MOHME), began to tackle the spread of the virus. The activities included educating the community, providing measures to prevent further outbreaks, taking care of the patients, etc. Some universities and scientific associations, such as Tehran(17), Baqiyatallah(18), Shahid Beheshti(19), Iran(20), Kerman (21),etc., began researching for treatment and control of 2019-nCoV. The activities, such as treatment and informing the public taking place in medical sciences universities, were often performed in parallel at all institutions, some of which resulted in a high cost and waste of time. Due to the necessity and importance of time to control 2019-nCoV and treat the patients, it seems that the universities should approach this disease based on their capabilities, which saves time and cost and improves the quality of providing services. Therefore, the academic departments involved in the control and treatment of 2019-nCoV and their scientific and competitiveness strength should be determined to allocate them appropriate missions to treat the patients and control the virus. The national division of labor plays a critical role in pandemics. Studies are conducted so far on practical researches in different countries for the better management of diseases, but no one is conducted on the advantages of medical sciences universities to determine and prioritize the universities and departments that should act as a core to fight the pandemics, such as the experience of China and other countries by using applied research in the control of the coronavirus, the SARS (22-24). The findings can help the policy-makers of MOHME to plan appropriately for the allocation of missions in the field of research and to get a top rank at national and international levels.

Objectives: Therefore, the current study aimed at seeking answers to the following questions:

–Which departments in the medical sciences universities should contribute to the centers of research for the control and treatment of Coronavirus disease?

–How much are the scientific strength and competitive advantage of the departments of medical sciences universities?

–What mission should each department of medical sciences universities be assigned?

Method

A mixed-method design (25), incorporating both qualitative (focus group discussion) and quantitative (scientometric) techniques, was employed in the current study (26). In this regard, the study was conducted in three steps: a) identifying the clinical and non-clinical academic departments that face the pandemic; b) designing the protocol to calculate the scientific and competitive strength of the departments, c) allocating the mission to universities of medical sciences to deal with 2019-nCoV.

These three steps were performed as follows:

a) Identifying the most important academic departments that should be involved in dealing with 2019-nCoV.

In order to choose the departments, five expert participants in clinical and basic sciences were interviewed to determine the groups involved in fighting with the outbreak of 2019-nCoV; after collection, the data were analyzed through the Braun and Clarke content analysis(27). Therefore, the list of departments that should be involved in the COVID-19 control and management was identified and finalized. The results obtained from the interviews were divided into two clinical and non-clinical clusters (Table 1).

It should be noted that clinical academic departments are the disciplines that their faculty members work in hospitals and medical centers and deal with patients, and non-clinical departments are the ones that their faculty members work in non-hospital centers, such as schools or research ones. The departments were categorized into five groups of management & control, social education & prevention, diagnosis, treatment, and information management.

b) Designing the protocol to calculate the scientific and competitive strength of departments; this part of the study

was done in two stages:

b-1) Determining the formula for the calculation of scientific strength and competitive advantage of departments.

This stage was conducted in Iran within the context of postgraduate training programs of the academic clinical and non-clinical departments trained by the faculty members in 66 schools and universities of medical sciences. In this regard, the explored and identified viewpoints of the participants were utilized in a focus group discussion (FGD) by the faculty members of medical sciences universities, and research data of the faculty members were analyzed using a scientometric system of MOHME.

FGD was conducted to develop a protocol in order to determine the scientific strength and competitive advantage of departments. The literature review showed that the focus group method is used as an explanatory or exploratory data collection technique.. In this study, the participants were selected using purposive sampling. In this technique, participants are selected on the premise of a purpose in the mind of the researcher and the sample is then selected to encompass the interested participants as well as excluding those who do not suit the purpose (25, 28).

At the beginning of the meeting, the research objectives and general information about the research and the meeting time were explained. In addition, it was fully described the meeting audio recording and that everyone had to contribute, and it was assured that the information remained confidential and anonymous. During the meeting, one of the researchers conducted discussions maintaining neutrality, without judging.

After the focus group meeting, the recorded audio was transcribed by one of the researchers. A qualitative content analysis was performed according to the study by Braun and Clarke, and the results were obtained (29, 30). Validity, transferability, reliability, and verifiability criteria were considered in the study. For validity, Each member of the research team reviewed and refined their themes to ensure they were coherent and representative of the whole data set. in all the stages of the study. In addition, the data collection and analysis processes were performed shortly after the FGD. Regarding the transferability criterion, it was attempted to provide a comprehensive description of the study. Regarding reliability, data analysis was performed by two researchers, and the results were reviewed by the third party, as an external observer in order to ensure the criterion of verification. Each statement was classified in a matrix, and the themes summarizing various statements were searched. The consistency of the matrix was checked by the researchers by coding the transcripts again while looking for blanks or inconsistencies that did not fit in the themes and establishing whether the themes were exclusive. Contradictory statements were also explicitly searched, and the consensus was reached through discussion. No theoretical framework was used during the coding procedure(29).

b-2) Implementation of the protocol proposed in the first stage

In this regard, the research data related to faculty members of clinical and non-clinical departments from the scientometric system of MOHME, including demographic characteristics, school and university names, H index, the total number of citations, ranking at the national level in the fields, and specialized field names, were extracted (31). At this stage, the accuracy of the data was examined. Each member of the research team worked independently to research data, They then discussed their individual findings online and at face-to-face meetings to agree upondata obtained from scientometric system . After analyzing the scientometric data of all schools and universities, the results were extracted based on the scientific strength and the competitive advantage indices. The scientometric data were analyzed using Microsoft Excel 2019 and Tableau software version 2018.3. Descriptive statistics (frequencies and percentages) were analyzed.

c) Proposing the mission to medical sciences universities to deal with 2019-nCoV.

The findings of the two previous stages, including the competitive advantage of clinical and non-clinical departments, as well as missions, were suggested to the medical sciences universities in the form of management and control, community-based education and prevention, diagnosis, treatment, and management information(4).

Results

The current study aimed at determining the scientific strength and competitive advantage of departments of medical sciences universities to deal with the 2019-nCOV pandemic.

The current study, using the focus group method, was conducted by five faculty members of Shahid Beheshti and Kerman universities of medical sciences and MOHME. Participants in the study were two professors, two associate professors, and one assistant professor with the mean age of 53.1 years; data were collected from May to April 2020.

The results of focus group analysis were presented as four indicators, two computational formulas and two executive strategies, to determine the competitive advantage and scientific potential of clinical and non-clinical departments of medical schools and universities. Indicators included H_2, T10C, T10C/N, and T10CU/N, and the scientific strength calculation formula called scientific strength and competitiveness advantage indices are explained below. Finally, executive solutions were obtained to follow the path of calculations.

Indicators of the department authority in knowledge production:

H Index: One of the recent strong indices

[2]Hirsch suggested the index-h as a simple useful method to describe the scientific output of researches (32). Research assessment of academic institutions (universities, departments, and independent research institutes) is one

of the most important points in scientometric studies. The number of articles published and the number of citations received usually constitute the starting point of this assessment. Brown et al., Propose a Hirsch-type index for Journals, equivalent to h, if the journal h published the paper, each having at least a citation of h. Two cases that arise out of mind are the first-order index, h1, and the second-order index is h2. In h2, the indicator is the largest number of individuals (N), which all have an H index larger or equal to N(33).

$T_{10}C$: Total university team citations

In order to calculate this index, the individuals in the group are sorted by H index from large to small. The index is calculated by the sum of the top 10 citations of the group.

$T_{10}C/N$: Ratio of citations of university team to national team To calculate this index, the sum of citations of the top 10 academic staff in the university is divided by the sum of citations of the top 10 academic staff in the national level.

$T_{10}CU/N$: University contribution from the national team citations

$$Scientific\ Strength\ Index = \frac{\mathrm{T10C}}{\mathrm{T10N}} \times h2$$

$$Competitiveness\ Advantage\ Index = \frac{\mathrm{SSI}\ UMS}{\mathrm{SSI}Rival}$$

To calculate this index, the total number of citations of the academic staff of the top 10 universities at the national level is divided by the sum of the top 10 citations of the academic staff at the national level.

UMS: university of medical sciences

SSI Rival: the highest SSI (first rank) in each field divided by others and the second rank divided by the first rank.

The results obtained from the calculations performed in the four categories are segmented in the current study; only the exclusive advantage and competitive advantage are reported:

- Competitive power over 5 is considered as an exclusive advantage of the medical sciences university.
- Competitive power from >0.3 to 5 is defined as a competitive advantage of the medical sciences university.
- Competitiveness 0.1-0.3 is considered as the mild competitive advantage of the medical sciences university.
- Competitiveness less than 0.1 is considered as a lack of competitive advantage of the medical sciences university.

After the calculations, using the indices and formulas obtained in the form of the protocol, the competitive advantage of the clinical specialty was obtained for

Table 1. List of Clinical and Non-clinical Departments Obtained From the Panel of Experts

Department Name	Clinical	Non- clinical
Clinical pharmacy	*	
Community health		*
Community medicine	*	
Emergency medicine	*	
Environmental health engineering		*
Epidemiology		*
Health education and promotion		*
Health in disaster and emergencies		*
Health information management		*
Infectious diseases	*	
Internal medicine	*	
Laboratory sciences		*
Medical genetics		*
Medical immunology		*
Medical informatics		*
Medical intensive care	*	
Medical microbiology		*
Medical virology		*
Nutrition science		*
Obstetrics and gynecology	*	
Pathology	*	
Pediatric infectious diseases	*	
Pediatric pulmonology	*	
Pediatrics	*	
Public health		*
Pulmonology	*	
Radiology	*	

Table 2. Competitive Advantage and Scientific Strength of Non-clinical Departments in Medical Sciences Universities

Department Name	University Name	T10C	T10C/N	UH_2	SSI	CAI	Type of CAI
Epidemiology	Tehran	65589	0.67	14	9.48	5.47	Exclusive advantage
Community medicine	Iran	25760	0.76	5	3.80	2.95	Competitive advantage
	Tehran	6236	0.18	7	1.29	0.33	Competitive advantage
Medical informatics	Mashhad	1692	0.42	3	1.26	1.78	Competitive advantage
	Urmia	947	0.23	3	0.70	0.55	Competitive advantage
	Kerman	758	0.18	3	0.56	0.44	Competitive advantage
Medical immunology	Tehran	26850	0.77	12	9.27	4.18	Competitive advantage
Pathology	Shiraz	9390	0.57	10	0.03	1.19	Competitive advantage
	Tehran	7851	0.47	10	0.04	0.83	Competitive advantage
	Isfahan	5275	0.32	8	0.04	0.70	Competitive advantage
	Iran	4102	0.24	7	0.03	0.62	Competitive advantage
	Shahid Beheshti	3939	0.23	7	0.03	0.59	Competitive advantage
	Mashhad	2249	0.13	6	0.02	0.39	Competitive advantage
	Kerman	1492	0.09	4	0.02	0.39	Competitive advantage
	Shahed	978	0.05	3	0.01	0.34	Competitive advantage
	Blood transfusion	914	0.05	3	0.01	0.32	Competitive advantag
	Yasuj	285	0.017	1	0.01	0.30	Competitive advantage
Health education and promotion	Shahid Beheshti	1514	0.26	5	1.33	0.39	Competitive advantage
	Kerman, Shah	1351	0.23	5	1.19	0.35	Competitive advantage
Medical genetics	Tehran	14436	0.77	12	9.30	3.93	Competitive advantage
Nutrition science	Tabriz	91	0.72	1	0.72	4.13	Competitive advantage
	Tehran	21106	0.60	12	7.29	1.96	Competitive advantage
	Shahid Beheshti	12882	0.37	10	3.70	0.50	Competitive advantage
Environmental health engineering	Tehran	19685	0.91	9	8.27	5.06	Exclusive advantage
Medical microbiology	Tehran	13165	0.78	11	8.62	3.12	Competitive advantage
	Shahid Beheshti	5800	0.34	8	2.76	0.32	Competitive advantage
	Pastor Institute	5762	0.34	8	2.74	0.31	Competitive advantage
Medical virology	Tehran	2966	0.41	7	2.89	1.37	Competitive advantage
	Pastor Institute	2152	0.29	7	2.09	0.72	Competitive advantage
	Shiraz	2034	0.28	6	1.70	0.58	Competitive advantage
	Iran	2304	0.32	4	1.28	0.44	Competitive advantage
	Shahid Beheshti	1506	0.20	5	1.04	0.36	Competitive advantage
Community health	Ilam	118	0.39	1	0.39	1.22	Competitive advantage
	Mashhad	96	0.31	1	0.31	0.81	Competitive advantage
	Shahr-e-Kord	56	0.18	1	0.18	0.47	Competitive advantage
Public health	Tehran	1765	0.55	3	1.67	6.84	Exclusive advantage
Laboratory sciences	Tabriz	539	0.45	1	0.45	1.97	Competitive advantage
	Mazandaran	273	0.23	1	0.23	0.50	Competitive advantage
	Golestan	166	0.13	1	0.13	0.30	Competitive advantage
Health information management	Iran	938	0.49	4	1.99	1.88	Competitive advantage
	Tehran	497	0.26	4	1.05	0.52	Competitive advantage
Health in disaster and emergencies	Shahid Beheshti	312	0.55		1.11	4.87	Competitive advantage

departments with a competitive advantage and scientific strength in medical sciences universities. It should be noted that clinical academic departments are the disciplines that their faculty members operate in hospitals and clinical centers and deal with patients, and departments of basic sciences are the disciplines that their faculty members operate in non-clinical departments (Basic Sciences). (Table 2, 3).

Discussion

The current study results showed that some of the medical sciences universities had the scientific strength and competitive advantage in clinical and non-clinical settings based on the disciplines selected to deal with COVID-19. However, this set of departments may be different in other countries and diseases (34). In Iran, all of the departments are of importance in dealing with the outbreak of coronavirus, but in the current study, the priority was with those determined by the panel of experts and scientific associations. In this regard, the experience of using the radiology department to fight with the outbreak of COVID-19 in USA, set of policies and procedures directly applicable to imaging departments designed *(a)* to achieve sufficient capacity for continued operation during a health care emergency of unprecedented proportions, *(b)* to support the care of patients with COVID- 19, and *(c)* to maintain radiologic diagnostic and interventional support for the entirety of the hospital and health system. Because of varying infection control policies (both nationally and regionally), steps for radiology preparedness for COVID-19 will vary between institutions and clinics. The Radiology Editorial Board assembled a team of radiologists active in coordination, development, and implementation of radiology preparedness policies for COVID-19 (35).

Some major universities, such as Tehran (in 19 disciplines), Shahid Beheshti(in 16 disciplines), Iran (in nine disciplines), Isfahan (in four disciplines), Mazandaran (in four disciplines), Shiraz (in three disciplines), Mashhad (in three disciplines) and Kerman (in two disciplines), had the most competitive advantage that would increase their responsibility to deal with this pandemic. Some

Table 3. Competitive Advantage and Scientific Strength of Clinical Academic Departments in Medical Sciences Universities

Department Name	University Name	T10C	T10C/N	UH_2	SSI	CAI	Type of CAI
Infectious diseases	Shahid Beheshti	8071	0.59	7	4.18	2.13	Competitive advantage
	Iran	5288	0.39	5	1.95	0.46	Competitive advantage
	Tehran	2875	0.21	6	1.27	0.30	Competitive advantage
Pediatric infectious diseases	Shahid Beheshti	4254	0.65	5	3.27	8.98	Exclusive advantage
Internal medicine	Tehran	4650	0.73	6	4.43	5.54	Exclusive advantage
Pulmonology	Shahid Beheshti	6516	0.48	5	2.44	3.44	Competitive advantage
Clinical pharmacy	Tehran	7781	0.71	9	6.45	3.12	Competitive advantage
	Shahid Beheshti	3200	0.29	7	2.06	0.31	Competitive advantage
Pediatric pulmonology	Shahid Beheshti	258	0.42	3	1.27	5.77	Exclusive advantage
Obstetrics and gynecology	Tehran	4650	0.60	9	5.40	1.73	Competitive advantage
	Shahid Beheshti	3453	0.44	7	3.12	0.57	Competitive advantage
	Iran	2999	0.38	6	2.32	0.42	Competitive advantage
Emergency medicine	Shahid Beheshti	1752	0.76	5	3.80	1.44	Competitive advantage
	Iran	1011	0.43	6	2.63	0.69	Competitive advantage
	Tehran	995	0.43	4	1.72	0.45	Competitive advantage
Pediatrics	Tehran	11811	0.39	5	1.96	2.46	Competitive advantage
	Isfahan	12000	0.39	2	0.79	0.40	Competitive advantage
Medical intensive care	Mazandaran	181	0.20	2	0.40	2.39	Competitive advantage
	Shahid Beheshti	151	0.16	1	0.16	0.41	Competitive advantage
	Isfahan	75	0.08	2	0.16	0.41	Competitive advantage
	Shiraz	149	0.16	1	0.16	0.41	Competitive advantage
	Guilan	133	0.14	1	0.14	0.36	Competitive advantage
	Tehran	28	0.62	1	0.62	2.80	Competitive advantage
	Isfahan	10	0.22	1	0.22	0.35	Competitive advantage
Radiology	Tehran	3177	0.76	7	5.33	3.39	Competitive advantage

Table 4. Proposed Mission of Fighting With the Coronavirus for the Departments

Mission Category	Department Name	University Name	Type of CA
Management & control	Epidemiology	Tehran	Exclusive advantage
	Community medicine	Iran	Competitive advantage
		Tehran	Competitive advantage
	Health in disaster and emergencies	Shahid Beheshti	Competitive advantage
Social education & prevention	Health education and promotion	Shahid Beheshti	Competitive advantage
		Kerman, Shah	Competitive advantage
	Environmental health engineering	Tehran	Exclusive advantage
	Community health	Ilam	Competitive advantage
		Mashhad	Competitive advantage
		Shahr-e-Kord	Competitive advantage
	Public health	Tehran	Exclusive advantage
Diagnosis	Medical immunology	Tehran	Competitive advantage
	Medical genetics	Tehran	Competitive advantage
	Medical microbiology	Tehran	Competitive advantage
		Shahid Beheshti	Competitive advantage
		Pastor institute	Competitive advantage
	Medical virology	Tehran	Competitive advantage
		Pastor Institute	Competitive advantage
		Shiraz	Competitive advantage
		Iran	Competitive advantage
		Shahid Beheshti	Competitive advantage
	Radiology	Tehran	Competitive advantage
	Laboratory sciences	Tabriz	Competitive advantage
		Mazandaran	Competitive advantage
		Golestan	Competitive advantage
	Pathology	Shiraz	Competitive advantage
		Tehran	Competitive advantage
		Isfahan	Competitive advantage
		Iran	Competitive advantage
		Shahid Beheshti	Competitive advantage
		Mashhad	Competitive advantage
		Kerman	Competitive advantage
		Shahed	Competitive advantage
		Blood transfusion	Competitive advantage
Treatment	Infectious diseases	Shahid Beheshti	Competitive advantage
		Iran	Competitive advantage
		Tehran	Competitive advantage
	Pediatric infectious diseases	Shahid Beheshti	Exclusive advantage
	Internal medicine pulmonology	Tehran	Exclusive advantage
		Shahid Beheshti	Competitive advantage
	Clinical pharmacy	Tehran	Competitive advantage
		Shahid Beheshti	Competitive advantage
	Pediatric pulmonology	Shahid Beheshti	Exclusive advantage
	Obstetrics and gynecology	Tehran	Competitive advantage
		Shahid Beheshti	Competitive advantage
		Iran	Competitive advantage
	Emergency medicine	Shahid Beheshti	Competitive advantage
		Iran	Competitive advantage
		Tehran	Competitive advantage
	Pediatrics	Tehran	Competitive advantage
		Isfahan	Competitive advantage
	Medical intensive care	Mazandaran	Competitive advantage
		Shahid Beheshti	Competitive advantage
		Isfahan	Competitive advantage
		Shiraz	Competitive advantage
		Guilan	Competitive advantage
		Tehran	Competitive advantage
		Isfahan	Competitive advantage
	Infectious diseases	Shahid Beheshti	Competitive advantage
		Iran	Competitive advantage
	Nutrition science	Tabriz	Competitive advantage
		Tehran	Competitive advantage
		Shahid Beheshti	Competitive advantage
Information management	Health information management	Iran	Competitive advantage
		Tehran	Competitive advantage
	Medical informatics	Mashhad	Competitive advantage
		Urmia	Competitive advantage
		Kerman	Competitive advantage

universities were not involved at all since they were not on any lists. They can work under the supervision of the departments of major universities. Of course, with the formation of a committee in the departments of the major universities, other universities and schools interested in conducting research or executive activities can be invited.

In successful industrialized countries, research is one of the key elements for development and self-sufficiency. According to the missions and functions of universities in this context, they have deep and fundamental roles in the matter; therefore, considering research activities of major universities to identify the universities and researchers with the highest scientific productivity is one of the most important policies required in this area (36). Research assessment from different aspects can provide useful information in terms of quantity and quality, as well as a view to stakeholders in this dimension and a basis for decision-making to allocate resources to universities(37). Therefore, the study of the research status of universities, quantitatively and qualitatively, is important for the university itself, and the university can plan its distance from other universities with an understanding of its strengths and weaknesses, and design an appropriate pattern to achieve the desired position. In addition, it assists Health policy-makers in understanding the capabilities of universities, preferred allocation of resources, and optimal scientific management(36).

It is an important strategy to offer the institutions the programs in which they have a competitive advantage to succeed in a highly competitive globalized market in higher education since higher education institutions always have a competitive ecosystem in achieving high academic standards and excellence and gain international reputation (37). Focusing on delivering niche programs that institutions have a competitive advantage in is a critical strategy for succeeding in the competitive higher education systems. Therefore, to achieve a sustainable competitive advantage, resources and capabilities should be integrated into higher education institutions (38). Different types of competitive advantages cause differentiation (38, 39). Higher education institutes have challenges for achieving competitive advantages at both national and international levels. For example, changing government policy, continuous student growth, stakeholder demand for quality, change in leadership, new organizational strategy, and financial sustainability are some of the intrinsic factors in challenging universities (38).

The current study suggested any intervention policy necessary to redress the power balance and make administrators accountable to all stakeholders. Hence, consideration of the following items is suggested:

1. Decentralizing the administrative power: Tenure-track should have a voice in university governance. Decision-making should be transferred from the MOHME to the universities of medical sciences with a competitive advantage, a distributed and democratic process. Departments should be expected to participate in MOHME governance and be given the time and resources for this purpose.
2. Balancing the decision-making bodies: Departments should be composed of individuals from diverse universities. Ensuring decision-making bodies would reduce the chance that the decisions are made to the benefit of a small but potential group to the detriment of the university community. Inclusive representation would promote equity within the university community and ensure that the decisions are made to the benefit of the community as a whole.
3. Establishing accountability mechanisms: There should be a more transparent feedback mechanism for stakeholder's satisfaction to be incorporated into the evaluation of academic administrators' performance.
4. Adopting management systems that logically and fairly support each mission of dealing with coronavirus. A transparent mechanism should be created for supporting research and service in a way that allows each area to flourish for the benefit of all stakeholders.

Of course, this process of mission allocation may have some advantages and disadvantages. Among the advantages are the sharing of the national division of labor and more power of MOHME in fighting with the outbreaks of 2019-nCOV, using the potential and capacity of different academic departments to advance the objectives, preventing parallel activities, and speeding up prevention, diagnosis, and treatment. Among its disadvantages, the lack of coordination among university departments is noteworthy. Some of the reasons for that include the geographic distance between universities, the lack of willingness to work with some faculty members, and the lack of infrastructures required in some universities for better participation.

Conclusion

Policy-makers that clearly identify the missions and objectives of their institutions and define the more relevant tasks may have better performance based on the capacities and abilities of the medical sciences universities. Finally, at the national level, there is a need for obtaining better data on medical sciences education to identify effective practices and programs. These data collection efforts are vital to informing policy-makers and higher education leaders about the cumulative impact of mission differentiation on the stratification of students and academic programs.

Limitations

The current study had some limitations. First, due to the widespread outbreak of 2019-nCOV worldwide, the need for authentic research was one of the main limitations of the current study. The research team overcame this problem through continuous collaboration. Second, the MOHME scientometric system was the only valid reference in Iran to provide data related to the research activities of the medical university faculty members. The extraction of data from this system was accompanied by problems solved by holding regular meetings of the research team members and cross-checking the data several times for a series of problems.

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Research Article

Online Education Strategies Used in Imam Hossein Hospital in Tehran during the COVID-19 Outbreak

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Abstract

Background: The COVID-19 pandemic has caused many changes in the educational structure of hospitals, so much so that the educational systems tend to use online education. In this regard, the Deputy of Education of Imam Hossein Hospital designed an application to expand this form of education in the hospital.

Objectives: The purpose of this study was to review various software used in online education in Imam Hossein Hospital, to obtain the strengths and weaknesses.

Methods: The present investigation was a scholarly approach study performed in Imam Hossein Hospital in Tehran in several stages during the COVID- 19 outbreak (beginning of March 2020). First, the necessary infrastructure was examined through meetings held in the educational deputy of the hospital. Then, a system was created by the deputy by which teachers could upload educational files in different formats. Finally, the files uploaded by the faculty members were evaluated by the observers.

Results: In this study, professors uploaded 234 files in various formats to the hospital website. PowerPoint was the most frequent format in these files, of which 105 (44.8%) were uploaded. 42 (17.9%) files were sent as images. 27 (11.5%) were multimedia files in different formats. And 17 files (7.2%) were about the evaluation of the residents, which was conducted via Google form. Other files in total 43 (18.3%) included other formats. The average score of the educational files uploaded by the faculty members was 17.79 ± 3.26.

Conclusion: Since medical education is mostly based on students' clinical practice, the lack of an exclusive platform in this area is quite noticeable. The present study showed that professors at first do not necessarily choose the best platform for providing online education, but the most familiar software available. This trend, however, may change with experience. Therefore, it is better to suggest the best platform for professors from the very beginning of online education.

Keywords: Distance Education, COVID-19, Teaching hospital

Background

Although online education is not new, it has recently received more attention due to the outbreak of the COVID-19 crisis. The first cases of COVID-19 were identified in China in December 2019. (1) When the Chinese city of Wuhan was quarantined, perhaps few people in the world thought COVID-19 would spread around the world. In Iran, the first reported case of COVID-19 was on February 19, 2020, which was diagnosed in two patients living in Qom, and after that, the disease spread to other cities such as Tehran and Isfahan (2). The epidemic in Iran caused widespread changes and restrictions on personal relationships, shut down many places, and canceled all the classes in universities. As a result, the use of online education has expanded in Iran as well as in many other countries. Different countries use various platforms depending on

their conditions, such as Adobe Connect, Skype, Google Class Room, Google Drive, Power Points, Zoom, Model, Microsoft Class Note, WhatsApp, Webinar, Microsoft team (3). There are also more advanced technologies for medical education, such as the use of Microsoft HoloLens to teach anatomy and other medical disciplines. Using this technology, the doctor can view a 3D image of any organ in humans in the online world from any angles. It means that different parts of the body, such as blood vessels, nerves, muscles, and internal organs of the human body without any limitations, can be seen in the context of Augmented Reality (4-6). The type of software and technology used is highly dependent on the familiarity of the people, the available Internet bandwidth, the educational capabilities of the software, cost, and the availability of the necessary technology and the place of teaching. Although all of the above-mentioned cases can be applied in online education in hospitals, the main problem is the educational facilities of hospitals. On the one hand, in most cases, the hospital classrooms are scattered, or some classes may not be ready for educational services via the Internet. On the other hand, teaching the students and clinical residents in hospitals can cause more serious problems because the professors and medical students are among the high-risk groups. Also, the classrooms are mostly located in inpatient wards, which also increases the risk for medical professors and students. More importantly, these classes are often small, so there is high-density for students and professors in these environments. To solve this problem, the Deputy Minister of Education of Imam Hussein Hospital decided to expand online education like many universities and educational centers, so the professors were required to provide part of their teaching online. To achieve this goal, two important things were unknown to the deputy of education. The first one was the physical and human infrastructure of online education, and the second one was monitoring the quality of teaching and achieving the desired result. The following questions were asked about the first part:

Is there the necessary infrastructure in the hospital? Is there enough internet speed and bandwidth? What is the appropriate software or software for holding online classes? What are the features of each software, and do these features have the ability to meet the teaching needs? Is using web-based software and space rental a priority or buying dedicated servers? What are the financial costs of using the software, and is there a specific budget for these cases? To what extent are hospital physicians taught to have online classes and work with the software? Is there enough reception from doctors and students for this type of education? Do these types of software have the necessary standard in terms of information security? Do students and residents have the necessary equipment to make the best use of this type of education?

Also, the following questions are often asked about the second part:

How to monitor the holding of classes? How should the information about the classes be sent to the deputy of education? What should be considered in online education? What person or group should do the evaluation? On what are the evaluation and scoring criteria based?

Objectives

The purpose of this study was to review various software used in online education in Imam Hossein Hospital, to obtain the strengths and weaknesses of these educational platforms according to the needs of the hospital, and to provide appropriate solutions to improve online education. This study can also help identify weaknesses in monitoring the quality of online education and its appropriate contexts so that the quality of online education in the hospital could finally be improved.

Methods

The present study was conducted via a scholarly approach study during the COVID outbreak (beginning of March 2020) in several stages in Imam Hossein Hospital in Tehran. In the first stage, several sessions were held with the members of the hospital's educational deputy. Given the conditions of this pandemic, the deputy prioritized online education. After conducting preliminary studies, several sessions of discussion and review and consultation were held with the professors and computer engineers who were familiar with online education. In these sessions, the strengths and weaknesses of the available software, as well as hospital facilities, were evaluated. Finally, due to the present status, the lack of experience, and limited opportunity, it was decided that the educational groups provide and use the best software following the country's constitutions, and be relevant to the educational materials of the group. This subject was officially announced to all groups in a meeting with the educational deputies of the groups. The study population included all faculty members of the hospital and physicians who were the medical staff. The faculty members who could not participate in online education due to illness or long leave were excluded from the study. Six people were selected to monitor the online education performance of the clinical groups. Each invigilator was responsible for 2 to 3 teaching groups. Also, regarding the evaluation and monitoring of the quality of online education in the first stage, we decided to launch a new section on the website of the Deputy Minister of Education. The address of this system is http://edu.ehmc.ir. The design and production of the online education system module were based on the ASP.net technology of Microsoft Company by the software engineer of the hospital's educational deputy. Google Drive storage space was used due to the need for file storage. Google Drive storage is created by Google to store files, providing up to 15 GB of free space (7). Faculty members can access this group's dedicated panel by entering this system and going to the online education system sub-section. Finally, a special panel was created for 19 departments in the hospital. These groups included orthopedics, obstetrics, ophthalmology, sports medicine, internal medicine, pediatrics, anesthesia, pathology, general surgery, radiology, radiotherapy, psychiatry, emergency medicine, neurology, neurosurgery,

cardiovascular department, clinical pharmacy, infectious diseases department and ICU. To enter the group panel, there is a unique username and password for each group. In this section, it is possible to register the group, the title of the class, the organizer, the target group, and the date and time of the class. Faculty members can upload files up to 100 MB in Word, PowerPoint, Excel, PDF, MP3, ZIP, Gif, JPG formats. It is possible to report the uploaded files separately by the educational deputy of the center to analyze and evaluate the results in the designed website. After completing the website, the professors of the groups were asked to upload the content on this website, separately. For monthly uploading, each group was given a specific time, so activity reports could be uploaded until the fifteenth of the following month. After uploading the files, all the documents were extracted by the computer engineer of the educational deputy, and the information was delivered to six supervising professors in Excel format. The Excel file contained all the uploaded information, and by clicking on the file address, the desired file was displayed to the observer. The observing professors reviewed all the uploaded files and assigned the necessary quality scores according to the quality of the file, the type of file, and the method of teaching provided to minimize mistakes and also prevent the observers from applying personal opinion. A similar evaluation form was designed for all observers. These observers had to look at this in four sections: the type of uploaded file, the presence of questions and answers in the files, the quality of the summary of educational materials at the end of the session, and the conformity of the presented materials with the curriculum of the educational field. A score of 1 to 5 was considered for each section.) and the selected professors, based on the designed form, assigned their desired score to these items, and then the grade point average for each person was considered as the final grade of the teaching. According to the evaluation form, the minimum assigned score was 4, and the maximum was 20. At the end of the study, the professors were asked to give their opinions regarding the strengths and weaknesses of the platforms. These comments were summarized, and the advantages and disadvantages of the software were measured to reach a single result and promote online education in the hospital.

Results

All educational groups of the hospital were included in the study. The psychiatry department, with 14 faculty members, had the most members. Sports medicine, and clinical pharmacy departments had the least members with one faculty member. All professors participated in this process. 234 files with different formats from PowerPoint audio to videos and images of online classes were uploaded on this website by educational groups in two months. PowerPoint was the most frequent t format with 105 uploaded files (44.8%), and the lowest type of file was related to multimedia files, of which only 27 cases and files related to online evaluation through Google included 17 forms. (The most used platforms, according to the received images, were WhatsApp, Skype, Skyroom, and Adobe Connect, respectively. Of the 17 online assessments of residents and students performed as standard (with the help of Google Form), almost all were related to the obstetrics and gynecology group. The other groups did not take the exam online or through other types of software and did not have a standard form. Another point was that all the uploaded multimedia files were in audio format, and the educational videos were not seen. After uploading the contents, the results were provided to the supervisory faculty members for review and evaluation. These were the original formats in the Excel file without any changes. The observers' feedback was received on the quality of faculty members, from which important points were obtained. The first case was the lack of a standard because in the same groups, several faculty members had used Skyroom, and other professors had conducted classes only via WhatsApp. The same form was provided to observers, and they could score between 4 as the lowest score up to 20 as the highest score.

Some observers gave high evaluation scores. The lowest evaluation score of the professors who participated in online education was 10, and the highest was 20. The average score was 17.79±3.26. The highest scores were obtained by obstetrics, ICU, general surgery, neurology and psychiatry groups, obstetrics, general surgery, and ICU groups with an average of 20 and a standard deviation of 0, the psychiatric group with an average of 19.74 and a standard deviation of 0.44, and the neurology group. With an average of 19.62 and a standard deviation of 0.31, they were in the next ranks. The scores in the two groups was the lowest. One group had a mean of 12 and a standard deviation of 4.47, and the other group had a mean of 11.33 and a standard deviation of 2.3. When uploading PowerPoint files, nothing was mentioned about the presentation of these files. Whether the presentation was conducted via Adobe Connect or Skyroom, or by sending PowerPoint (voiced and silent) was not clear for the observers. The results showed to the Deputy of education for Research that the most important change in this process should first be in the field of standardization so that all departments can use the standard context to provide online teaching and evaluate it under the same conditions more accurately.

Discussion

With the outbreak of the coronavirus, the teaching method changed in many parts of the world. Many world congresses were either canceled or scheduled to be held online (8). During this outbreak, the potential of cyberspace was expanded, and various types of software were used for teaching purposes. New technologies such as the fifth generation of communication with the ability to quickly transfer information had a high potential for these cases (9). Various universities and professors around the world became interested in online education for online education, several congresses were held online, and various solutions were explored. There are several methods of online education. One is the use of educational videos, which is quite effective in promoting the ability of medical students and residents (10). The field of online education includes online teaching

through virtual patient, theoretical knowledge, and surgical skills (11). However, the implementation of online education programs can have some problems, including the lack of bandwidth required for the Internet in several places, low upload speed on ADSL Internet, lack of 4G Internet antenna in some places, especially the lower floors of buildings, lack of familiarity with the appropriate software and work with them, lack of necessary facilities in the software, Problem communicating with computer server, and uploading restrictions in terms of file size.

In this study, we allocated the choice of e-learning methods to the professors and departments due to the second phase of the COVID-19 outbreak, existing stress, the priority of combating COVID-19, and insufficient knowledge of professors and students regarding the features of all types of available software. Although this method can lead to the prevalence of online education, the rapid operation of the subject, and the reduction of the stress for the professors, it created some problems.

For instance, there was no evaluation standard for all professors. More importantly, the software was not defined for online education, or at least they were not expansively used for this purpose. WhatsApp or Zoom are not fully educational applications. Also, due to the existing situation, it was not possible to train all of the teachers in the field of online education, so they were not completely familiar with online evaluations. In this study, only one group used a standard format such as Google Form. The next problem exists in evaluating the quality of professors' work because when they use a different type of software to provide online content, a similar standard does not practically make any sense, so this can lead to a decrease in the quality of evaluations. The gynecology, general surgery, and ICU groups received the highest scores. After these two groups, the psychiatry and neurology groups had the highest scores. The average score in April was lower than in May in most groups. The reason may either be the Norouz holidays or the lack of experience in providing online education in the first month of this study. Those who scored the lowest reported that they did not cancel classrooms even despite the coronavirus, so they had lower online classroom teaching statistics and lower e-learning scores. One of the reasons for not canceling or increasing in-person teaching in several groups was the possibility of social distancing when teaching.

The most commonly used file format was PowerPoint because the professors and residents were Familiar with Office software and that almost all professors have this software in their computers and mobile phones, so it is available to view the PowerPoint presentations easily. In this study, the most used platform was the WhatsApp software because it was convenience, popularity, acceptable security, free or low-cost connectivity, and usability on all three operating systems Android, iOS, and Windows. WhatsApp is social network software that has been used by doctors for educational purposes before the outbreak of coronavirus (12, 13).

Skype was the second most useful platform due to the low cost, proper video communication facilities, and the ability to share files. Skype software is used for educational affairs and conferences, telemedicine, and telecommunications (14-16).

Skyroom, an Iranian software platform, was the third most popular platform among the professors. Easily accessible in https://www.skyroom.online, this platform incorporates desktop sharing, audio-visual communication, slide show, whiteboard, audio, and video files. This software is affordable and provides users with excellent speed and stability. The designed environment is also quite suitable and user friendly. It can also be used in both mobile and computers, and there is no need to install plugins. One of the important advantages of this software is the Persian language support.

Another platform used by the professors was Adobe Connect software. This software had many features, including the ability to share the desktop and the ability to view the platform itself in this mode in a reduced and floating window, the ability to share files. It supports mobile and desktop and can record classes (17). The drawbacks of Adobe Connect include the difficulty of setting up a dedicated server, lack of proper support for the Persian language, and the need to install Flash Player in the browser or install Adobe Connect client software.

Although the high variety of software is very good and useful, they also have some drawbacks. For instance, working with multiple software can be demanding. Also, some types of software are not designed for specific educational purposes, or they are expensive. In the Deputy of education for Education, considering the opinion of professors and additional studies, we concluded that the use of Skyroom due to being Iranian, easy to use, acceptable facilities, no need for a dedicated server, high speed, and the possibility of creating numerous educational classes have a significant advantage over other similar platforms, although they do not seem to have the necessary ability to conduct online exams now.

Conclusion

With the outbreak of COVID-19, online education has become quite essential. There are various types of software and platforms for online classes. Each of these platforms has exclusive features and advantages.

Medical education is mostly based on clinical education, and unfortunately, there is insufficient experience in online education in this field. Most of the professors are more willing to use PowerPoint software because of its proper and convenient features and that they were more familiar with it in advance. According to the present study, the professors selected the most familiar platform, not the best one, although this trend changed with more experience. Therefore, the Deputy of Education should provide professors with the best platform from the outset for online teaching. We also felt the lack of having a suitable native platform to hold online exams for students. Certainly, in the future, the existing types of software will have significant improvements. With the development of the fifth generation of mobile Internet (5G)

and the prevalence of fiber optics (FTTH), online education will likely be a powerful means of education even in normal situations.

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Research Article

Managerial Analysis and Explaining the Viewpoints of the Students on Virtual Education During the COVID-19 Pandemic at the Virtual School of Medical Education and Management of Shahid Beheshti University of Medical Sciences in 2020

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Abstract

Background: In the current COVID-19 crisis, the necessity for respecting social distancing and making the new decisions by officials, and the closure of universities moved the classrooms to entire online home learning. Strategic planning allows the university to adapt its activities to meet the changing needs of the environment.

Objectives: The present study aimed at explaining the viewpoints of students and evaluating the phenomenon of virtual education of students during the COVID-19 pandemic in the Virtual School of Medical Education and Management of Shahid Beheshti University of Medical Sciences in the academic year 2020. Internal and external factors affecting this system were identified and analyzed.

Methods: The present descriptive-survey described the conditions and characteristics of virtual education and surveyed students' viewpoints on factors affecting this system of education. Using the TOWS (Threats, Opportunities, Weaknesses, Strength) matrix, the internal and external factor evaluation matrices were plotted, and the final score of each factor was achieved by determining its coefficient and rank, and proper strategy was formulated after analysis.

Results: The TOWS matrix analyses showed the overtake of threats by opportunities and the exceed of strengths over weaknesses in factors affecting the virtual education, indicating the strategic status of the virtual education of the virtual school in the ST (strengths-threats) cell.

Conclusion: Coronavirus outbreak is not the end of a pandemic, and there is still the risk of the emergence of other diseases and crises. The valuable experience learned from the Coronavirus era can be used in the development of virtual education in the studied and other faculties. Fortifying strengths, benefitting from opportunities, reducing weaknesses, and fixing threats can provide a suitable strategic basis for planning virtual education in Iran.

Keywords: TOWS Analysis; Distance Education: Virtual Education; Student; COVID-19

Background

In the 21st century, the academic community increasingly moves from the industry-oriented world towards the information-oriented, and transition from the physical world to the virtual one. By accepting to learn through computers, CDs, the internet, and similar technologies of the current century, traditional university education shifts onto virtual learning. If Peter Drucker's (2004) statement as: "We will not have a university in the future as what we have today" (1) comes true, it is essential to think of a solution and look into the future. The growing demand for virtual education opportunities significantly increases the number of courses offered by higher education institutions. Students unable to attend university due to work, family refusal, and far distance try to find ways to access education despite their limitations (2). Universities turn their attention to virtual education; through this simultaneous and asynchronous communication, teaching and learning are formed well (3). Many universities and higher education institutions are rapidly preparing various virtual education programs (4), and an institutional commitment to virtual education and virtual students form in them accordingly (5). All the activities and programs of virtual courses are to develop professors professionally and grow students scientifically (6). In the second half of the previous century, Iran experienced eight years of Imposed War that led to the closure of schools and universities for several months, when distance learning was not possible and extracurricular classes were held after reopening. On the way to move toward the information-oriented world, COVID-19, was suddenly introduced in Iran in February 2019. Despite its small size, the creature caused severe complications, greatly affected human life, and significantly changed the routine life. It also entered the education system and easily affected the second semester of the 2019-2020 academic year. Because of the possibility of irreparable consequences in educational spaces due to people gathering, there was no way to deal with the Coronavirus except the closure of academic institutions, which caused the students to stay home and learn remotely. Using the capacity of cyberspace was essential under such circumstances. Although this educational system is useful, the unavailability of all the educational options in cyberspace, the lack of appropriate infrastructures, and economic and cultural poverty prevented its successful implementation.

It is gratifying that this virus emerged when the internet, smartphones, and modern equipment are available to most of the world's population. Technology came to the aid of people in this global crisis and even compensated for some disturbances in education. COVID-19 caused the dominance of special conditions over the country, especially universities, and led them to strive to maintain their academic connections with students through virtual and distance education (7).

Beat believes that "electronic (e-learning) or virtual learning is a way allowing learners to work and study in the desired place, and communicate with the instructor without face-to-face contact at the desired time. Most institutions are rapidly offering virtual education programs and strive to reduce challenges and problems faced by this education system (7). Despite the excitement, facilities, and attractiveness of a virtual course, its application without analyzing the effectiveness may lead to failure in achieving the objectives (8). Holding virtual classes requires extensive financial, material, and human resources, and organizers and participants expect the courses to be useful (9). Management is always a stressful process (10). Planning is the management pillar, which links the present to the future (11). Strategic planning is an organized effort to make fundamental decisions and take measures shaping the direction of the organization activities within the legal framework. Strategic planning- an umbrella for the whole organization- determines goals, outlines, and the mission of the organization in a long time; it is comprehensive, long-term, at the highest level of the organization, and a framework for tactical and operational planning. The strategy of each organization is affected by its interaction with the external environment; therefore, predicting the future situation plays a pivotal role in the organizational success (11).

In the current COVID-19 crisis, the necessity of respecting social distancing and making the new decisions by officials, along with the current situation of education in Iran, the strategic planning allows the organization to adapt its activities and services to meet the changing needs of the environment. This planning codifies a framework for improving the program and provides a platform for restructuring programs and organizational communications and collaborations, and evaluating organizational progress in these areas. One of the methods used in strategic planning and the main instrument for strategic analysis in today's organizations is the SWOT (strengths, weaknesses, opportunities, and threats) analysis model or TOWS matrix. The uncertainty caused by environmental changes, as well as the acquisition of more profit, has made the TOWS matrix an undeniable necessity for organizations. The TOWS analysis is a tool to identify the threats and opportunities existing in the external environment of a system and recognize its internal weaknesses and strengths to assess the situation and formulate a strategy to guide and control the system (10, 11).

In internal factors, strengths include the distinctive competencies through which the organization can gain a competitive advantage over competitors. The organization should pay special attention to its internal and external strengths (15). Weaknesses include defects and negative points, limited or lack of resources, skills, facilities, and abilities that significantly hinder the performance of the organization (15). In external factors, the opportunity is a major desired success in the external environment of the organization-e g, recognizing a part of the market that was forgotten until then, and is an environmental element that the organization can take advantage of it. Accurate analysis of the external environment may lead to the identification of new opportunities involving in organizational development (15). The threat is an unfavorable situation in the external

environment of the organization that can be troublesome and dangerous. It occurs when the conditions of external environment endanger the reliability and profitability of the organization (15).

The TOWS analysis was first introduced in 1950 by George Albert Smith and Roland Christensen, Harvard Business School graduates, and Jack Welch employed it to examine the GE (General Electric) matrix of strategic planning and increase his organization's productivity. Bonnie Taylor considers the ultimate purpose of TOWS analysis as helping organizations to be fully aware of all the factors influencing decision making. The TOWS analysis helps organizations become fully aware of all the factors that influence decision making. TOWS analysis helps to have a complete and comprehensive view of the right decision (11). This model then is a strategy that sometimes maximizes strengths and opportunities and minimizes weaknesses and threats. For this purpose, strengths, weaknesses, opportunities, and threats are linked in the general framework of SO.WO.ST.WT, and the strategy is chosen among them (12). Strategic planning is an investment in performance improvement. However, managers who want to use strategic planning to achieve success face obstacles to its implementation (13). Approaches to organizational management are different, each of which has strengths and weaknesses, and their introducers according to their knowledge, experience, and skills, focused on particular aspects. These models, considering multiple indicators, provided appropriate tools for evaluating the performance of modern organizations, which, over time and to meet environmental needs, became more comprehensive and considered more criteria and evolved (14).

Given the global importance of virtual education and a new perspective on this issue in the Coronavirus era, the internal and external factors affecting this system of education should be identified, using the TOWS matrix, to take appropriate and correct measures by determining its technological status; otherwise, they might be ineffective and lead to waste of resources.

Considering the general structure of the TOWS matrix and its influencing factors, the effectiveness of strengths, weaknesses, opportunities, and threats existing in virtual education was considered as the research hypothesis.

Objectives: The current study aimed at utilizing the management method of TOWS matrix to explain students' viewpoints, and evaluate the phenomenon of virtual education during the Coronavirus era in the Virtual School of Medical Education and Management of Shahid Beheshti University of Medical Sciences to identify internal (strengths and weaknesses) and external (opportunities and threats) factors to develop virtual education at this school and other universities, and use it as the basis of proper planning for virtual education in Iran.

Methods

The present descriptive-survey research described the conditions and characteristics of virtual education and surveyed students' viewpoints on internal and external factors affecting this system of education. Given the closure of universities, the statistical population available for the study included the students of the Virtual School of Medical Education and Management of Shahid Beheshti University of Medical Sciences that received the research questionnaire via email and returned it after completion. The questionnaire had two parts; the first included demographic information. In the second part, the students were asked to mention the strengths, weaknesses, opportunities, and threats of virtual education they received during the COVID-19 pandemic in the TOWS table, according to the provided definitions; then, the data were analyzed.

To use the TOWS model, first, the internal factor evaluation matrix (IFE), used to assess the strengths and weaknesses of the organization, is completed. Then the strengths and weaknesses are listed in order of relative importance or priority, and the coefficient of each factor is determined. The highest coefficient is assigned to the factor that has the greatest impact on the organization. The total weaknesses and strengths of the organization are a maximum of 100. The zero coefficient is trivial, and 100 coefficient means very important. Then the rank of each factor, ranging from 1 to 4, is determined; 4 means a very high strength; 3 strength; 2 low weakness; and 1 fundamental weakness. The final score is calculated by multiplication of the obtained sore in the rank number, which, regardless of the number of factors in the matrix, ranges from 1 to 4. If it is less than 2.5, it means that the organization is weak in terms of internal factors, and if it is more than 2.5, it indicates the strength of the organization in internal factors.

The second step in using the TOWS model is to plot the external factor evaluation (EFE) matrix, which is similar to that of IFE. After the plotting and identifying external factors, first, 10-20 factors causing opportunities are listed. Then the threat factors are put in the matrix, and a coefficient or weight is given to each of them, which indicates their relative importance in terms of influencing the opportunity or threat of the organization. These factors are ranked again from 1 to 4; it indicates the effectiveness of the current strategies in showing the reaction to the factor. Rank 4 means the excellent; 3 above average; 2 the average; and 1 the weak reaction by the organization. Finally, the coefficient is obtained by multiplying the coefficient in the rank. In this matrix, regardless of the number of opportunities and threats to the organization, the final score ranges from 4 to 1. The mean of this sum is also 2.5. If it is close to 4, it means that the organization can react well to opportunities and threats. If it is 1, it means that the organization could not exploit opportunities and avoid threats in formulating the strategies (11).

In the next step, the TOWS matrix, a suitable tool used by managers to select one of the four general strategies of SO, WO, ST, or WT, is formed. It combines the EFE (the vertical column) and IFE (the horizontal column) matrices and determines the final score of the matrix, and depicts the most appropriate strategy (11).

Table 1. The Evaluation Matrix of Internal Factors Influencing Virtual Education From the Viewpoint of Students

Internal Factors	Coefficient	Rank, 1-4	Final Score
Strengths			
1. Creating a suitable situation for students to access e-learning and prevent the loss of educational communication	4	3	12
2. Student-centered e-learning and the guide role of the teacher	3	2	6
3. The access of most students to the e-learning system	2	2	4
4. Announcing the readiness and willingness of student committees and students to produce educational materials	3	2	6
5. Proper cooperation and interaction between teacher and student	4	1	4
6. Experience of higher education students in using the LMS and learning during the relevant courses	5	3	15
7. The active presence of most students in NAVID system	3	2	6
8. students welcome to online problem-solving and the possibility of communicating with students outside of class time	1	2	2
9. Dividing the final exam to get a better grade	3	4	12
10. Benefiting from specialized, technical, and compassionate professors and educational experts in e-learning and their appropriate and timely responsiveness	3	4	12
11. Protecting students against Coronavirus, staying home with virtual education, observing home quarantine, and following the recommendations of the National Headquarters of the Fight Against Coronavirus Outbreak	8	4	32
12. Benefiting from virtual learning without attending classes, saving time, especially for traffic, owing to traffic jam problems, and the Coronavirus outbreak	4	4	16
13. Access to the content of sessions, files, and booklets uploaded any time	3	3	9
14. Gaining experience in virtual education and e-learning, and moving away from the atmosphere of traditional teaching and lecturing	3	2	6
15. The student's desire to search on the internet and learn more about the subject of the course after class	2	1	2
Weaknesses			
1. Lack of access to educational experts due to the school closure	5	2	10
2. Lack of full readiness of some professors in providing educational materials or their fatigue to hold consecutive online classes	5	4	20
3. Lack of paying attention to students' viewpoints in the evaluation of professors who hold online classes, until the end of the course, and the lack of an appropriate incentive mechanism to promote studens pationpartici	6	4	24
4. Students adaptation to traditional and in-person learning methods and resisting this system of education due to the lack of face-to-face communication	6	4	24
5. Lack of the mastery of some professors on e-learning standards and criteria (accumulation of the content, non-compliance with the time, etc.)	4	3	12
6. The high cost of the internet to access the system and imposing cost of the necessary equipment and hardware	7	3	21
7. Low quality of the audio, video, and even PowerPoint files provided by professors	2	2	4
8. Lack of familiarity of some students with the system environment (particularly undergraduate and older students in higher education)	3	2	6
9. A large number of training files, and the stress of students and confusion over the way of holding practical courses	6	3	18
10. Lack of easy access to the internet for some students who cannot attend and interact with the class, and worry about getting low grades	5	1	5
	100	-	288

Table 2. The Evaluation Matrix of External Factors Influencing Virtual Education From the Viewpoint of Students

External Factors	Coefficient	Rank, 1-4	Final score
Opportunities			
1. Creating an opportunity for students' empowerment using social networks and informal learning methods	4	4	16
2. Deployment of electronic infrastructures to produce and present educational materials by professors in the school and university	4	3	12
3. Configuration of Adobe Connect dedicated server	5	2	12
4. Proper access to acoustic rooms, video and audio recording facilities, and production of educational materials	3	1	3
5. Ability to upgrade the system and benefit from professors and students comments	4	2	8
6. Benefiting from capable professors and education officials in solving educational problems following the closure of the university	6	4	24
7. Accelerating the compilation of clear and practical instructions for the virtual education of students and public informing			
8. Proper interaction of educational officials with the National Headquarters of the Fight Against Coronavirus Outbreak, and informing the public through media	4	2	8
9. The feeling of responsibility, and pursuit of officials in solving the educational challenges following the closure of the university	5	3	15
Threats			
1. Unexpected lockdown of the university following the Coronavirus outbreak	5	2	10
2. The disbelief of some officials in the necessity of virtual education	4	2	8
3. Lack of a proper evaluation program	4	1	4
4. Delay in students' access to instructions for holding and participating in virtual learning courses	4	2	8
5. Lack of surveys of students in compiling e-learning guidelines	3	3	9
6. Lack of student representative in the e-learning committee at the university level	3	1	3
7. Problems in accessing high-speed internet with appropriate bandwidth to hold and attend online courses	5	2	10
8. Students difficulties in getting a report from NAVID system	4	2	8
9. Applying limits to the size of files uploaded by professors to avoid students' confusion	3	2	6
10. The newness of the system that needs dynamism and upgrading	3	1	3
11. Failure to fully access the NAVID system through some smartphones	2	1	2
12. Impossibility of the evaluation of professors by students in the system	2	2	4
13. Lack of a specific protocol or appropriate tool to evaluate the quality of e-learning	2	2	4
14. Lack of rules for the evaluation of students, which makes them unmotivated	3	2	6
15. Lack of getting e-learning feedback from students	3	1	3
16. Inability to hold online practical, internship, and apprenticeship courses	4	2	8
17. Lack of synchronization and unification of the rules to hold online programs in all the country universities	4	2	8
18. Insufficiency of the NAVID system infrastructures and limitation of servers in accepting a high volume of educational content	5	2	10
Total	100	-	218

Results

The Virtual School of Medical Education and Management of Shahid Beheshti University of Medical Sciences has four departments and disciplines: medical education, community-based education in the health system, e-learning, and health policy management and economics in-person and online in master's and Ph.D. degrees; this school had 594 students and 17 faculty members. According to the study results, the students were within the age range of 36 to 41 years, 86% in master's degrees, and 14% in Ph.D. courses. The majority of the students studied in medical education (72%) and minority (8%) in health policy management and economics; 68% were employed with an average work experience of 6 to 10 years. All of the students

had e-learning experiences. Due to the virtual nature of some courses, the provision of infrastructures and software facilities for many years, and with the authorities' decision to hold online courses to prevent a health crisis in the COVID-19 pandemic, the courses offered online. However, any change in the working environment first faces resist and is associated with problems, so changing the education system from in-person to online created many problems for both the school and students and was not welcomed at first. Although some students did not attend virtual classes in the early days due to unfamiliarity with the method of teaching and the low speed of the internet, the number of students in online courses increased with the improvement of conditions and increase of the internet bandwidth. The results of the present study can be considered in terms of factors influencing this education system to strive to improve virtual education, along with fortifying and benefiting from the strengths, reducing weaknesses and turning them into strengths, optimally using opportunities, and turning threats into opportunities.

The results of the evaluation of students' viewpoints as two internal (strengths and weaknesses) and two external (opportunities and threats) factors in virtual education are shown in tables 1 and 2 by determining the coefficient, rank, and score of each factor.

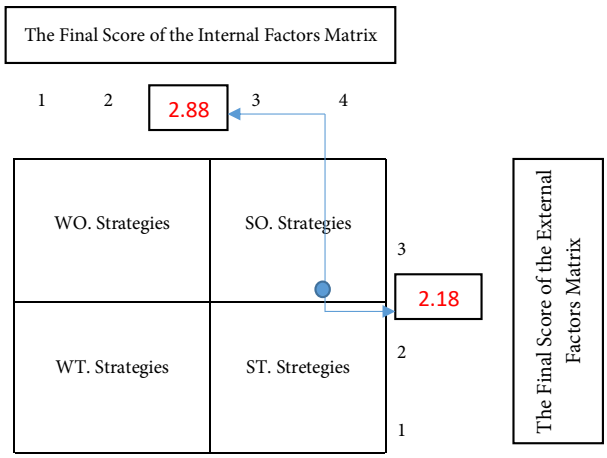
The score of strength and weakness factors in the present study was obtained by dividing the sum of the final score into the sum of coefficients (100) that was 2.88, greater than 2.5, indicating the strength of the school in internal factors or, in other words, the school strengths were more than its weaknesses.

The score of factors listed in the table of opportunities and threats in the present study was calculated by dividing the sum of the final scores into the sum of the coefficients (100), which was 2.18, smaller than 2.5, which, compared to the reference number of 4, indicated that the organization reacted moderately to the opportunity and threat factors, and tried to use opportunities and limit the threats.

Strategy Formulation: The set of variables in the TOWS matrix is not new, but the novelty of this technique is its ability to coordinate and find a systematic relationship among the variables. Although many authors of strategic planning believe that organizations need using their strengths to take advantage of opportunities, other important equations, such as a reduction of weaknesses, should not be neglected in this way. However, weakness means a lack of strength, and strive to reduce it can lead to a distinct strategy for the organization. The TOWS analysis is also a technique to persuade decision-makers to find more effective tactics. The TOWS analysis systematically analyzes the strengths, weaknesses, opportunities, and threats after listing each factor, and by writing them down in cells by weighted scores from the intersection point of each, the desired strategies are obtained, and those fit the situation are reflected. Therefore, according to Figure 1, the TOWS analysis always leads to four categories of ST, WT, WO, and SO strategies (16), and the selected strategy is placed in the ST strategies cell by drawing the line intersects the point 2.88 from the horizontal axis- i e, the final score of the internal factor matrix, to the point 2.18 from the vertical axis-i e, the final score of the external factor.

The results of the present analysis indicated the overtake of threats by opportunities, and the exceed of strengths over weaknesses in factors affecting virtual education, indicating the strategic status of the Virtual School of Medical Education and Management of Shahid Beheshti University of Medical Sciences in the cell of contingency planning (maximum-minimum or ST). It is formulated based on taking advantage of system strengths to deal with threats, and aimed to maximize strengths and minimize threats. However,

Figure 1. TOWS Matrix Analysis



since according to evidence the misuse of power can have unintended consequences, no organization should misuse it to fix threats. This strategy is competitive, interactive, diverse, and convergent; it optimizes production, reduces costs in providing educational services, and increases the number of customers and training orders, even in content production, with coordination at technical, tactical, and operational levels. The development of production capacity (education) is an effective and goal-oriented strategy, seeking to do the right thing. The management model in this strategy is rational, aims to act efficiently and effectively, and has a mechanical structure using planning tools.

Discussion

It can be concluded, based on the obtained results, that the today's globally reputable educational institutions, which serve as the model for other institutions and official organizations to transform talented humans into healthy, creative, growing, balanced, and developed ones, and provide human resources required at different cultural, social, and economic levels, are expected that while examining the internal and external factors affecting them, to overcome weaknesses and fortify strengths, and take advantage of opportunities and avoid threats. University, as an educational organization with extensive and rich resources, plays a pivotal role in human life, since a significant part of modeling responsibility lies with higher education. Higher education has always been an issue for governments and a master topic for the progress and success of nations. Due to the extensive changes in the higher education system, as well as the high social demand for higher education, and considering the new obstacles, limitations, and challenges faced by the education system, it is necessary to formulate a strategic plan in this area. Undoubtedly, considering the particular circumstances of Iran, today's organizations, particularly universities and higher education institutions, are affected by political, social, economic, cultural, and technological evolutions, and their internal environment always changes with these influencing external factors. In strategic planning, the university is a dynamic system that accepts external influences and also influences the external environment. Also, the university is a complex organization that affects culture. One of the features considered in the Vision Document of the Islamic Republic of Iran in 2025 for the Iranian society is to have advanced and dynamic knowledge of the production of science and technology, relying on the superiority of human resources and social capital in the national production (17). Similar results were reported in studies by Little John (1997), Hitch (2000), Mani (2007), Perry (2004), and Niwang (2001), investigating factors affecting virtual schools, and determining the future status (18, 19, 20, 21, 22). The only distinguished point in the present study was the TOWS matrix analysis, which considering the factors remarked by the students on virtual education, the ST strategy was presented.

Virtual education for emergencies, including the current Coronavirus crisis, is the best environment and tool for maintaining the academic connection among the university, professor, and student, which completes in-person training under normal conditions. The implementation of virtual education was a good thing that brought qualitative planning and coherence to virtual education. The closure of universities is a sudden event in a country that, due to the lack of prior planning, in addition to surprising the authorities, requires time-consuming planning and is one of the weaknesses of e-learning. In the current days of Coronavirus lockdown, the professors should be appreciated for spending their resources, trying to compensate for the shortcomings with redoubled efforts, providing virtual training in a short period according to the students' weekly schedule, and achieving their relative satisfaction. In online education, before students, professors should be trained in this regard. Also, Iran's Ministry of Communications and Information Technology should provide facilities to enable the use of cyberspace for everyone. In addition, facilities should be provided so that professors and students can access smart facilities and equipment; hence, the Coronavirus could enhance educational capacities. Constraints have always led to human progress, and the Coronavirus, which poses a challenge to the education system, led humans to concentrate on education in extensive dimensions. Therefore, the authorities should strive to use all educational capacities. Based on the experiences gained during this period, virtual training can be a complementary and integrative method in many courses, even at some points of the time that capacity building is a priority in the development of such programs. Based on the results of the study and the selection of ST strategy for the studied school, considering the mentioned status through plotting the TOWS matrix, 16 strategies were identified, and by determining the attractiveness and importance of each using a quantitative matrix of strategic planning, five strategies with the following priorities were selected and introduced for the codification of operational programs so that while taking advantage of the school strengths, the existing threats can also be addressed: 1. Development of virtual education infrastructure, 2. Possibility of investment in virtual education, 3. The purposefulness of education and virtual learning evaluations, 4. Increased purposeful extra-organizational interaction, and 5. Improved participation of experts inside and outside the organization.

Conclusion

Undoubtedly, the Coronavirus outbreak is not the end of a pandemic, and the risk of the emergence of other diseases and crises still exists. It is worth making the lessons learned during recent months a valuable experience by fortifying strengths and taking advantage of opportunities, and reducing weaknesses and fixing threats in order to be used as a guideline in future crises by the officials, professors, and students.

Recommendations: According to the results, it is recommended that the educational officials identify the obstacles to the implementation of the strategic plan and try to fix them. Concerning the dynamic nature of management processes, it is recommended to hold training courses based

on needs and priorities derived from research, so that schools and affiliated organizations can promote the effectiveness of virtual education. It is also recommended that similar studies be conducted in universities starting virtual education, and the appropriate strategy be determined.

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Letter to Editor

COVID-19 Pandemic: Educational Disruption in Africa

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Dear Editor,

The coronavirus diseases pandemic (COVID-19) has affected educational systems across the globe. This pandemic problem leads to closures of most of the learning centers including; colleges and universities. As of 18 April 2020, it was estimated that about 1.7 billion learners have been affected globally (1). In response to that the United Nations Educational, Scientific and Cultural Organization (UNESCO) suggested the use of distance learning programs and open educational applications and platforms where teachers can use to reach learners and limit the disruption of educational system worldwide (2).

Africa has taken the coronavirus pandemic seriously, following the confirmation of its first cases. Initial responses included the closure of schools, colleges and universities. The most important issues that hold serious implications in confronting the COVID-19 pandemic are online teaching, which is now being introduced as an alternative method to provide the educational content, and the economic consequences of the pandemic on African higher education. The UNESCO reports millions of African learners are experiencing disruption in their studies due to the closure of their learning institutions (3). The pandemic issue has triggered institutions to move their courses online. However, online learning is not that simple in Africa where only 24.0% of the population has access to the internet, and poor connectivity. To an increasing extent, the universities and higher education institutions are collaborating with internet providers and governments to conquer this challenge by negotiating zero-rated access to specific educational and websites. The effects of the pandemic on Africa's education system cannot be overemphasized. If the COVID-19 pandemic continues, it may seriously impact the commitment of governments toward the higher education development (3).

In present time a lot of efforts have been made to transform higher education in Africa, however the COVID-19 pandemic is expected to destabilize the educational situation in this continent. The pathology and health consequences associated with COVID-19 must be studied, nevertheless the impact of the novel coronavirus pandemic (COVID-19) on medical education is yet to be known.

As a result of COVID-19 pandemic many medical students have missed a lot of opportunities; because they have been sent home as part of infection control. Medical students are the future healthcare providers, they are supposed to be engaged in learning through direct patient care.

Medical students are also learning during this time through distance education, however this is a huge challenge for them to be adapted. Medical education deals with training in the hospital wards as well as some clinical rotations, this has proved that it's not designed to be fully online.

Education providers across the globe - including in Africa, are racing to launch remote learning options. Some countries across the world have prepared as much as they could to provide 'learning at a distance' during this pandemic, however in Africa most of the people are living in rural areas and will struggle to access distance learning. Due to the current response of the

COVID-19 outbreak, the future of millions of learners in Africa is at stake. Though the disease may disappear over time (sooner or later).

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Letter to Editor

Teaching in Clinical Rounds When Driven by the COVID-19 Pandemic

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Clinical Rounds, COVID-19, Teaching, Learning

Dear Editor,

The spread of the Corona virus (Covid-19) has already taken on pandemic proportions, affecting many educational systems and the medical community at large around the world (1). In this respect, a global response to prepare educational systems worldwide is necessary.

Medical schools are at the forefront of the fight against the Covid-19 in terms of providing the care needed for the patients afflicted by the virus as well as preparing medical students for their professional roles as medical doctors in the future. But the Covid-19 pandemic has engulfed all the educational institutes and universities by the extent not to be able to run their classes and being unable to keep abreast of any developments for remote learning options as far as possible. In addition, many students have been sidelined due to Covid-19 pandemic and this situation is exacerbated for the educational systems which cannot keep in line with the new methods of teaching and learning.

The current situation is critically important for medical students as gaining competence with reference to knowledge, attitudes and psychomotor skills necessitates radical changes during the pandemic. Medical students as the cornerstone of the health care team need education on clinical rounds when it comes to patient care and mastery over psychomotor skills (2,3). In this regard, medical teachers should provide education to medical students by holding clinical rounds using an approach which is not only innovative and fascinating but also to be safe both for students and patients not to endanger their wellbeing.

According to the literature concerning the importance of teaching medical students on rounding practices as many skills such as history taking, physical examination, communication, professionalism, etc. are learned through the interaction between the medical teacher and the students at the bedside (4), there is a need to shift away from the traditional method of teaching and learning to more robust and flexible methods in this period of time. But the question is: "what is a practical method for teaching on rounds when students cannot be present at the bedside during the Covid-19 pandemic?" "Is it really feasible to provide education especially related to bedside rounds remotely?"

When thought carefully, methods of instruction which are technology-based and distant in which they simulate the real life can become the mainstream in medical education. The use of technology in support of medical education needs creativity and adaptability. As many educational systems are grappling with the Covid-19 pandemic, here, we introduce and navigate a little about the three methods which can be utilized to help medical students gain the knowledge and skills as the pandemic retains an aura of despondency.

One of the methods of teaching in clinical rounds during the Covid-19 pandemic can be the use of virtual rounds.

This technology-enhanced platform can be operationalized by a medical teacher equipped with a webcam on his/her protective hood and a cellphone underneath the hood holding the clinical round while students are at a place far away from the ward to have the live clinical round. This novel means of interaction has been used by the Johns Hopkins educators during the Covid-19 pandemic (5). This platform assists medical teachers unfold medical processes and provide the opportunity for all students to see the patient, ask their questions and be invited by the medical teacher to elaborate on the patient's problems and debate diagnoses as well.

If most of learning is expected to happen concerning students' knowledge and skills at the bedside during the Covid-19 pandemic, there is a need for more cooperation on part of the medical teacher. With regards to this issue, the medical teacher should provide the necessary data concerning patients in the ward for students to help them write up a patient's history and physical exam similar to how they would tackle the task back at the hospital. Therefore, the use of social networks can facilitate the interaction required between the medical team, namely the teacher and the medical students. Through such interactions and under the supervision of the medical teacher, the case will be unfolded and students add progress notes and real-time feedback and reflection can be provided during this short "virtual round". Although there is no patient interaction, students learn more regarding analytical and communication skills.

The last but not lease, another method to overtake the Covid-19 pandemic is the use of online meetings by using social networks to help medical students practice presenting cases. Collaborative learning through Case-based Scenarios (CbS) is an excellent way to gain the required knowledge and develop decision-making skills based on patient cases. The case presented must be valuable and aligned with learning outcomes (6). For instance, "Students get a case like, "Mr. X is a 60-year-old man with chronic, recurrent headaches and a fever of 90". In this regard, students have discussions for the potential causes and alternative solutions. This facilitates group dynamics as students type messages or exchange ideas by sending their voice to share their thoughts.

In summary, COVID-19 is going to be with us for a long period of time as it seems, therefore, we must adapt ourselves to this situation and cling to innovative and riveting methods of teaching, online gathering of students and teachers, even when it comes to teaching students at the bedside. Virtual rounds with the medical teacher as the focal point transmitting the knowledge and skills needed for students by setting the scene of the bedside in virtual terms, and the involvement of medical students in virtual learning by elaborating on the progress note as well as the use of case-based scenarios are three methods which can help us in the fight against Covid-19 in terms of educating medical students. We should bear in mind that the learning experiences concerning a patient's medical history or learning hands-on procedures are not fully addressed and taken into account on the premise of the virtual rounding practices. Therefore, these skills can be only mastered through clinical encounters in real world. It is important to declare that the above-mentioned methods might have ethical or legal limitations that should be taken into account in the virtual clinical round accordingly.

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Letter to Editor

The Shadow of COVID-19 on Medical Education at Tehran University of Medical Sciences in 2020

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Keywords:
Medical Education, COVID-19, Crisis

Letter to editor,

The outbreak of Coronavirus disease 2019 (COVID-19) has had a major effect on medical education at Tehran University of Medical Sciences. Although we are confronted with the disease challenges including university recess, cancellation of all face to face sessions, and postponement of the exams, we observe a paradigm shift towards 'institutional culture' transition in medical education. However, we know not everything is rosy and glassy; we are going to present the opportunities created in this situation in both classroom and clinical settings at our university.

In classroom settings, two considerable changes have taken place following the outbreak of the Coronavirus taken from face to face to virtual learning and from round tables to networking. While we felt we had failed to incorporate e-learning in the undergraduate medical curriculum (1), after the outbreak of Coronavirus we faced a huge number of requests for using LMS (Learning Management System) and other virtual learning platforms. Besides the replacement of Face to face learning with virtual learning, interactive learning and collaboration are taking place in a variety of virtual communities and social media platforms, including Skype, Tritapp, and Mendeley by networking instead of round tables.

In clinical settings, three main trends and approaches are highlighted; from being a medical student to a physician in training, from individualized practice to collaborative practice, from disease based education to community-oriented education. However, much attention has been paid to creating a conscious perspective of being a physician in training on medical students using various educational interventions from the initial weeks of our curriculum; Coronavirus incidence caused large facilitation towards the unconscious developmental process of feeling like a physician. Furthermore, before the emergence of the Coronavirus, most teachers were endeavoring to focus on teaching individualized practice to medical students, in a way that their students' competencies were valued based on the use of specialized knowledge and skills in providing services to patients, disregarding improving communication and collaboration skills. Nevertheless, after Coronavirus, the learning approach has changed from being an individual to being a team member, focusing on strengthening teamwork skills. Finally, in the recent situation, competent medical students are required to continue the great pace of involvement in disease prevention (such as joining the campaigns, engagement, and partnerships in health-oriented projects, etc.) and translate evidence-based medicine to community health education (like developing training protocols and guidelines, etc.). This is led our curriculum to move toward community-oriented medical education instead of hospital-based education.

These moves encouraged us to embrace the idea that change is happening – a new situation specifically created to facilitate the new approaches to teaching and learning medicine in our university.

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Letter to Editor

The Need to Set up an Online Archive System to Store Educational Materials and Information Related to COVID 19 Pandemic

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Keywords:
COVID-19, Education, Information, Online Archive

Dear Editor,

Covid19 is a viral disease (Coronavirus 2019) that was created in December 2019 in Wuhan (China) and quickly spread worldwide (1). It is a serious challenge for public sanitation and the health of societies. Like other pandemic diseases, people want to know what can be done to prevent and treat the disease. Considering that no specific control or method is developed to prevent and treat this disease yet, early diagnosis and prompt treatment are of crucial importance because not only does the patient become involved in the disease, but it also significantly increases the risk of transmitting the infection and its subsequent expansion (2). So self-care and self-control are vital to prevent the spread of COVID-19. The people of communities that are infected with COVID-19 should be trained about how to protect themselves against risks and harms of this new unknown virus. Considering that the universities of medical sciences are responsible for promoting the health of the people in their catchment area, one of the main tasks of these organizations during this crisis is to train the people about how to prevent and treat this new virus.

In this way, in addition to conducting research and publishing the results as scientific articles, medical universities have developed content in various multimedia formats to inform people as well as to train them about how to prevent the spread of the disease. Developed contents on the internet, such as websites of medical universities and social networks, are available to the community. Of course, since appropriate information is not available on the internet, most of the developed contents are published on weblogs and channels of social media and instant messaging such as Soroush, Eta, and Telegram. Because these contents cannot be searched through search engines such as Google (3), they are not widely available to the public and are only accessible in a limited number of networks and channels. Even these contents may be removed from social media or webpages before being publicly available. Therefore, developing and disseminating information and knowledge is one of the main tasks of universities (4), and the storage and preservation of this knowledge are of great importance for universities and scientific centers. Besides, public access to these contents and their storage are so important so that medical universities in each province or city can collect and keep these contents by creating Internet websites or institution repository (5). Therefore, universities can make available content on the web by managing this information and the resources generated in the university.

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