Monitoring and Evaluating Quality of E-Learning in Basic Sciences Section and Introduction to Clinical Medicine Section in the School of Medicine During COVID-19 Pandemic

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Abstract- Many universities have turned to e-learning during the Corona Virus Disease 2019 (COVID-19) pandemic around the world. Ensuring the quality of higher education, especially in medicine, is considered one of the tasks of the education system, which is essential for both traditional methods and e-learning. This study aimed to monitor and evaluate the quality of e-learning conducted using the university LMS system for courses offered in the BS section and ICM section of medicine during the COVID-19 pandemic. The present study was an evaluation study using a goal-based approach that was conducted using the descriptive cross-sectional method. This study included 76 specialized courses offered in the first semester of the academic year of Bandar Abbas University of Medical Sciences, and participants were evaluated in terms of compliance with the course plan and the quality of the uploaded content. About 60% of e-learning courses presented in the course plan were in compliance with the curriculum. The uploaded educational content of 46.1% of the courses was good, 38.2% of the courses were relatively good, and 15.8% of the courses were not good. In the general review, e-learning courses offered were at a relatively desired level. Due to the new e-learning in medical schools, there is a need to monitor e-learning sessions during the course.

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Introduction

With the COVID-19 outbreak in December 2019 in the world, just as the way of life of the people in the world has changed, the face of education has changed a lot, especially in higher education (1). Given that the best way to control infectious diseases is appropriate social distance, in common interactions (2), shortly after the COVID-19 pandemic, many countries adopted a policy of shutting down face-to-face activities at all levels of education and educational institutions and turned to e-learning method (3). Although the change from face-to-face education to e-learning occurred unexpectedly and rapidly, due to the existence of some e-learning infrastructures in medical universities, administrators of the university tried to make the required standards for e-learning as soon as possible available to professors and students (4).

Although the emergence of this pandemic has caused higher education to face crises, this period can be a good opportunity to improve students' self-learning and compliance with online classes (5,6). In addition, due to no time and space limitations, the possibility of providing courses in a multimedia environment, the possibility of providing fast feedback (7), reducing wasted time, reducing costs, increasing productivity, and the possibility of creating teamwork in multimedia environments and electronic conferences (8) have attracted the attention and satisfaction of students, and perhaps the main challenge of online education in medical sciences is how to offer practical courses (6).

E-learning (technology-based distance learning) (9) is the opportunity to provide information and knowledge with better and higher quality. One of the most

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controversial challenges in the design of e-learning is the educational content provided (10). Providing content appropriate to the students' level and educational objectives, as well as appropriate visual and audio quality, is of particular importance. There are studies in this field that have investigated electronic content in terms of quality and concluded that factors such as the type of font and colors used in the background and some other features of the content had affected the level of student learning (11). Quality evaluation in any educational system, both in-person and virtual methods, should be monitored and evaluated. Although monitoring and evaluation of e-learning seem to be difficult, fortunately, the introduction of the NAVID system as a centralized educational system required all professors and students of medical schools to make use of this system (12). That made it possible to monitor and evaluate the quality of e-learning. Therefore, this study was conducted aimed to monitor and evaluate the quality of e-learning provided in the LMS system of the university (NAVID) for various courses offered in both the Basic Sciences (BS) section and the Introduction to Clinical Medicine (ICM) section of Bandar Abbas Medical School, based on educational design standards and in comparison, with the curriculum and the course plans of the academic year 2020-2021 (first semester) during the COVID-19 pandemic.

Materials and Methods

This study was evaluation research using a goal-based approach that was conducted by the descriptive cross-sectional method. The evaluated program was an e-learning program of general medical education in the BS section and ICM section, which, based on the medical curriculum approved by the Supreme Planning Council of the Ministry of Health in 2017, includes 76 specific course codes. The duration of the program was one semester in the academic year 2020-2021. For this purpose, after obtaining permission from the Research Ethics Committee of Hormozgan University of Medical Sciences (HUMS) with the code (IR.HUMS.REC.1400.216), at the beginning of the new semester, the program was evaluated. Given that almost all courses were offered through the NAVID system (special LMS for medical sciences universities), so the experts were defined as evaluators, the user code and password to enter the NAVID system were provided to them, initial briefings were held, and required evaluation files were provided to them (General Medicine Curriculum, PowerPoint Standards) and courses were divided among them. The task of the evaluators was to match the content uploaded to the NAVID system with the standards. The components of the standards were provided to them in the form of a checklist of quality control, which consisted of two parts. The first part consisted of investigating various parts of the NAVID system of each professor/course. In order to complete this part, the evaluators were asked to answer yes and no to the variables of having a course plan, matching the course plan with the approved curriculum, observing the course headings, student participation in the teaching and learning process, and the existence or absence of class assignment. The second part consisted of evaluating the quality of uploaded content, which included audio quality, text format, image format and slides, and teaching management. If there was a delay of at least three days in uploading the content according to the schedule of the course plan, discrepancies with the educational curriculum, and the problem with uploaded files, the Educational Development Office (EDO) director would be informed of the problems will be reported to the professors and department director and necessary follow-up will be done to solve problems in the shortest time during the semester. At the end of the semester, a checklist was given to each evaluator to evaluate the last uploaded content (three sessions) of each professor/course and enter it into the checklist. A six-point Likert scale (0 to 5) was used for scoring: zero (none), 1 (very low), 2 (low), 3 (moderate), 4 (high), and 5 (very high). These scores were considered in the three ranges described below, which are obtained by dividing 5 by 3: 5> desired> 3.33> relatively desired > 1.66> undesired >0. The completed checklists were collected within a week. The professors presenting each course were evaluated separately and given feedback. Then, the mean scores obtained from the professors (a course) were considered as the result of the evaluation of the relevant course. In this study, each course code was considered as an item, and except for the practical pathology course, which had a separate course code, other courses were considered as practical & theory. Presentation of courses in the form of PowerPoint teaching videos in mp4 format was considered the top educational criterion (13). The data have entered the software (SPSS 21) and analyzed by descriptive and analytical statistics. For descriptive statistics, statistical index, frequency table, percentage, average, and standard deviation were used for the variables of sound quality, video format, text format, introduction slide, and teaching management. For

analytical statistics, Chi-square and independent t-tests were used to compare the mean scores between group variables. A significance level equal to or less than 0.05 was considered.

Results

The study results showed that among 76 specific courses, 50 courses were for the BS section (semesters 1 to 5), and 26 courses were for the ICM section (semesters 6 and 7).

For having a course plan (60.5%), 46 courses course plans were uploaded to the NAVID system. Among them (70%), 35 courses were for the BS section, and 11 courses (42.3%) were for the ICM section. Among the courses uploaded in the NAVID system, 69 courses (90.8%) of the educational content corresponded to the approved educational curriculum. 5 courses (6.6%) did not correspond to the curriculum, of which 2 courses (2.6%) were optional that had no approved educational code. 32 courses (42.10%) introduced no reference. In general, 35 courses (46.1%) were good, 29 courses (38.2%) were relatively good, and 12 courses (15.8%) were not desired. In the plan of loaded courses (60.5%), 46 courses had a schedule. Fourteen courses (18.4%) were uploaded for further study. In 16 courses (21.1%), assignments were uploaded.

Among the uploaded courses, all courses of physiology, anatomy, biochemistry, and pathobiology were of good or relatively good quality, but some courses in community medicine, pathology, and pharmacology were of poor quality.

As shown in figure 1, the utility in terms of sound quality and video and text format, respectively, has been more than teaching management and course introduction.

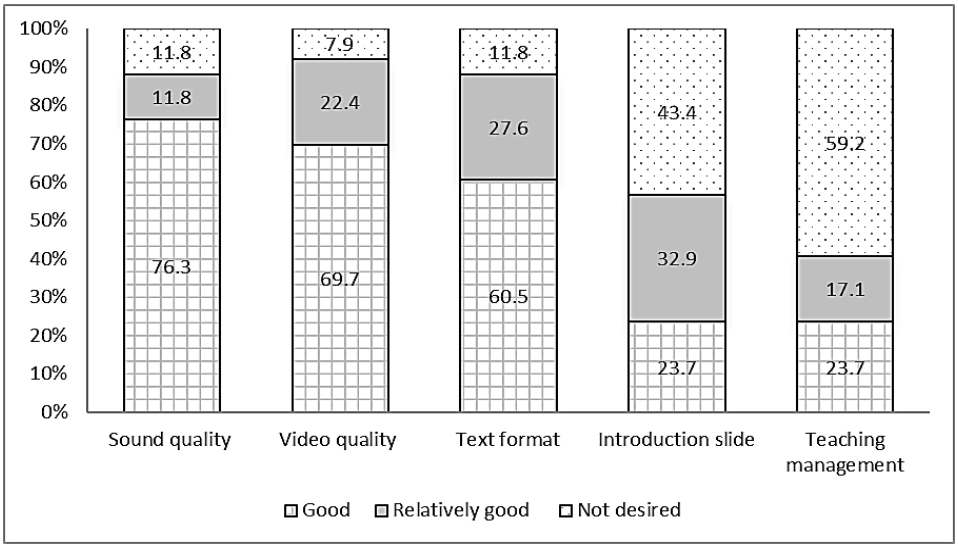

Figure 1. Investigation of teaching quality evaluation parameters in the loaded courses in the first semester during 2020-2021

Image format: Use the provided slide format, appropriate background color, and font, and use the university logo in the slides.

Writing format: using short sentences, short paragraphs, observance of Rule 7-7, list of contents, and showing important points

Introduction slide: introduction of the professor and the course, presentation of the references, welcome slide, course or session ID, learning objectives, and list of course headings.

Teaching management: additional explanations in addition to PowerPoint writing, questioning during teaching, and review of the contents of previous sessions

The mean of the teaching quality variable (2.95±1.1) and range (0.004-0.50) has been calculated, showing the results of a single sample t-test (P=0.054 and t=-1.95). Since the significance level is more than 0.05 therefore, it can be concluded that t-statistics are not significant at a 95% confidence level, and since no significant difference was between the mean of the variable and the theoretical mean of 3.32, it can be concluded that the quality of teaching is moderate and relatively desired.

The results of t-statistics are shown in table 1, indicating a significant difference in sound quality,

introduction slides, and teaching management with a theoretical mean. According to the undesired mean of introduction slides and teaching management, the text and image format is relatively good, and the sound quality is good.

Table 1. Comparison of the mean score of evaluation variables with the mean of theory course

Evaluation variables	Average ± SD	95% confidence interval of the difference Upper-Lower	Sig	t
Teaching quality	2.95 ±1.1	0.50_0.004	0.054	-1.95
Sound quality	4.01±1.65	0.304_1.059	0.001	3.59
Video quality	3.44±1.15	0.304_1.059	0.401	0.845
Text format	3.47±1.36	-0.166_0.456	0.357	-0.928
Introduction slide	2.07±1.54	-1.60_-0.901	0.000	-7.060
Teaching management	1.75±1.72	-1.97_ -1.18	0.000	-7.96

The content was uploaded in different formats, and based on the most uploaded sessions of each course, 47 courses (61.8%) were in mp4 format, 16 courses (21.1%) were in PowerPoint format with voice, 4 courses (5.3%) were in PowerPoint format, 7 courses (9.2%) were in PDF format, and 2 courses (2.6%) were uploaded only during the professor's lecture voice.

For evaluating the quality of teaching, no significantly significant difference was observed between the BS section and ICM section courses. So that 32 BS section courses (64%) were good, and 3 ICM section courses (11.5%) were reported well (P=0.00, df=2). The results of t-statistics are shown in table 1.

Discussion

With the COVID-19 outbreak, university education centers' unwittingly and without prior preparation were forced to hold e-learning classes. Given the experience gained from one and a half semesters of e-learning, e-learning as a new academic approach requires careful consideration in all aspects (14).

In the general review of educational content, the quality of the content was relatively satisfactory, which was almost consistent with the studies result of Hakimzadeh *et al*., Nobakht, and Saad-Mohammadi, who in separate studies investigated the status of virtual education in universities. Sometimes, due to the need for a quick response from applicants, the quality of courses reduces (14-16). In the present study, due to lack of sufficient preparation of professors and universities for holding e-learning courses and the time limit for completing the semester affected the quality of e-learning to some extent, and of course, considering these conditions, it is almost acceptable. In the present study, more than 60% of the courses had a course plan; the results were close to the study results of Nikbakhsh *et al*., (17). In this evaluation, the teaching quality of BS section courses was more desired than that of ICM section courses which seem to be due to the appropriateness of the nature of BS section e-learning courses held so that in leading medical education universities such as Harvard, Columbia, Boston, and Michigan most BS section courses are held online (18).

For other activities in the NAVID system; although a small percentage of professors have uploaded assignments, by reviewing educational videos and other parts of the system, it was found that, in fact, most of the assignments requested by professors are in discussions part or during courses and students are asked to send the assignments or question to the professor through other electronic communication methods such as social apps or email.

The component of references citation was good, and most of the courses introduced by the educational resources were related to the BS section, and for ICM, only introductions to psychiatric diseases and introductions of hematology diseases were introduced as educational references. In a similar study conducted by Hakimzadeh, citing the reference from the point of view of professors and students was reported desired (15).

In the present study, according to the headings of the educational content uploaded in the system, the educational content is more than 90% in accordance with the approved curriculum. While in a study by Habibzadeh *et al*., which investigated compliance of emergency medicine curricula across the country with curriculum content, less than 30% of the curricula offered in emergency medicine departments matched the official curriculum content (19). The nature of the principle, history, and type of content can make the difference.

According to e-learning standards, the professor

should express his/her educational objectives based on scientific principles, curriculum planning, and educational targeting (10). In the present study, more than half of the courses have been started by the professor, but due to the importance of the subject, more emphasis is on standard observance.

In spite of the briefing sessions and the presence of help files on the university website, nearly 40% of the professors uploaded educational content in a format other than mp4, the main reason for which could be the unpredictability of e-learning classes and lack of computer skills of some professors.

According to the observers' reports in general, the most problems were reported for the three-day loading interval, the course plan loading, and the sound quality, respectively. However, in the final review of the checklist, it was found that the sound quality and the compliance of the course plan were more desired than the other components. This result shows that continuous monitoring can be useful and improve the performance of professors in e-learning. Basically, due to new e-learning in medical schools, there is a need for more monitoring during e-learning (20).

We observed inconsistency of the existing programs in the faculty education with the files and the course plans of the uploaded courses, which are based on e-learning, due to not changing all educational programs. While in an e-learning system, all its components must be in accordance with e-learning conditions and facilities. Also, during the pandemic and the involvement of professors with the COVID-19 patients, especially in the ICM section, more shifts were observed in the program.

The two variables of image and text format, which mostly evaluate the teaching of teachers in PowerPoint format, have been evaluated relatively well, while the two variables of introduction slide and teaching management have been evaluated undesired, confirming that professors have less difficulty in presenting teaching content, but have more shortcomings in complying with the rules for preparing slides for e-learning and need training programs.

Studies have shown that in most courses with multiple professors, the quality of teaching reduces by increasing the number of professors and a large difference exists between the acquired scores of professors in a group. This result is similar to a study by Tirgar *et al*., in which medical students found that the presentation of a course by multiple professors reduced the mastery of class management (21).

In this study, practical courses have not been evaluated separately, but an investigation of laboratory courses showed that the title of laboratory theory courses, courses that have a special technique or work with a laboratory device and equipment are taught only as observation, and the emphasis of the professors' explanations is on teaching laboratory theory topics. The difficulties of teaching practical courses were mentioned in a study by Muhammad in Egypt, which investigated e-learning of veterinary medicine during the COVID-19 pandemic (6). Due to the greater effectiveness of the combined method (in-person and e-learning) than the traditional method and e-learning (11), investigation of practical courses in a separate study after the feasibility of in-person learning in addition to e-learning can be the subject of another study.

The main point of the SCORM (Sharable Content Object Reference Model) e-learning standard is the ability to share and reuse previously prepared content. Due to this capability in the NAVID system and the possibility of transferring content from one course to another, in addition to transferring it from the professors to the students, this system can be considered appropriate for e-learning (10).

Due to the relatively successful experience of professors, it is suggested to have extensive and systematic planning for using blended learning and strengthen the necessary infrastructure during the post-pandemic period. One of the methods to strengthen the infrastructure is human resource empowerment, which seems to be necessary for professors to be familiar with new, up-to-date, and useful methods and software in this field and use simulators in this field.

Limitations

In this study, online sessions were not evaluated due to the lack of access to the content of those sessions at that time. Given that the content of online sessions has recently become available, they can also be evaluated in future studies.

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