Comparison of Virtual and Lecture-Based Methods of Education on Learning of Physiotherapy Students: A Post-Test Only Design Study

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Abstract

Background: The ever-increasing development of information and communication technologies has created new opportunities in the domains of curriculum planning and teaching. In this study, an exercise therapy course was held using both lecture-based and virtual teaching methods. Then, the students' opinions were investigated and their overall levels of satisfaction were measured.

Methods: This cross-sectional study was conducted among all physiotherapy students who had enrolled in the fourth semester of 2014 academic year and had selected the course of principles of exercise therapy. This study was conducted during one semester. We evaluated the effect of lecture-based and virtual (multimedia-based) methods of education according to the learning management system (LMS) among 20 students. A researcher-made questionnaire was designed regarding satisfaction with virtual versus lecture-based teaching methods; the questionnaire was scored based on a five-point Likert-type scale.

Results: Of 20 students, one individual was single and 19 were married. Moreover, the mean test score was 12.38 ± 3.23 for the virtual teaching method, while it was 14.21 ± 1.88 for the lecture-based one, showing a significant difference (P = 0.03). Generally, 50% of the students preferred the virtual teaching method over the lecture-based one. In total, 75% of the students were satisfied or totally satisfied with the virtual teaching method for the exercise therapy course.

Conclusions: In terms of scores, the lecture-based method was better than the virtual one. However, the level of student's satisfaction in the virtual method was higher than the lecture-based one.

Keywords: Virtual, Lecture-Based, Learning

1. Background

The ever-increasing development of information and communication technologies (ICTs) and the movement of societies towards knowledge-based approaches have created new opportunities for curriculum planning (1). Within modern educational systems, there have been attempts to fulfill the teaching-learning process more efficiently through benefiting from modern teaching methods and using diverse types of media (2). Currently, the course of exercise therapy is presented through lecture-based teaching methods. Teaching this course using such methods is highly teacher-centered and there is no particular attention to the pace at which students are learning. Normally, there are students in a classroom who are sharper and some who need more time to review and learn; however, both groups are suffering from a lecture-based educational system.

Moreover, lecture-based methods are based much more on the memorization of contents and less focus is placed on actual learning (3). Considering the increased growth rate of ICTs in the present age and the development of education and learning models, transition from behaviorism to constructivism has emerged in recent decades, and it is emphasized at a global level to improve the teaching-learning process (4). So far, numerous studies have been conducted on different teaching methods, but these investigations have produced diverse results due to differences in educational contents and study subjects. One of the lecture-based teaching methods is lecture-based instruction that is used in most universities across Iran, in the majority of classrooms, and for all courses and programs. In this method, teacher's oral expression is employed to explain and understand educational contents (5).

Studies have shown that in lecture-based teaching methods, memorized contents can last for a maximum of eight months and then will be forgotten; therefore, they

need to be repeated. Also, teaching a course based on lectures presented by a teacher is not equivalent to learning it by students. It should be noted that learning is, in fact, the acquisition of knowledge or a skill along with its application in practice, which should continue for a long time (6). Therefore, due to the failure of the current educational systems and lecture-based teaching methods in terms of professional development of physiotherapy students and due to the obvious need of this group for the current knowledge, which includes a very large collection of information, student-centered and self-directed teaching methods and practices should be further explored and used. Virtual or multimedia-based instruction, that is, using different types of media such as prints, audio files, images, video files, and animations, which has been recently known as e-learning, is considered as a response to the needs of today's societies, wherein it is almost impossible to teach everyone in a classroom using one method and achieve learning outcome in all of them.

Multimedia-based instruction is a response to different learning styles. It is worth noting that the multimedia-based system does not create this response by itself, rather, it is its correct design that helps in this respect. There are even multimedia-based teaching methods developed according to lecture-based ones that have not been completely successful (7). In the virtual learning method, pupils are deprived of face-to-face interaction. In other words, they cannot experience real communication. Moreover, there is a lack of flexibility and variety in this teaching method. Among the advantages of the lecture-based method is active participation of students in the teaching-learning process, which has even changed teaching from teacher-centered and pamphlet-based methods to student-centered instruction. Other benefits include spending more time on teaching each student and allowing them to review the educational contents. Along with these advantages, this method also helps individuals use an interactive atmosphere without any restrictions. Moreover, it is cost-effective since it provides teachers with much more time to do research and teach more students (8). Furthermore, the lecture-based method enables students to take part in problem-solving, reinforce their communicational skills, and strengthen their social bonds. Consequently, all the aforementioned points help students to improve their memory, and in turn, learning. There are several instructional design models, each of which encompasses a micro- or macro-level educational design with its own specific strengths and weaknesses, all of which can be placed in two categories. The first category is a system-based design that includes steps for accurately analyzing educational needs or objectives, selecting the right contents for each objective or requirement,

determining order and sequence of instructional components, analyzing knowledge and skills in students, determining types of learning required for each part of instructional contents, designating specific teaching methods to each part of instructional contents, identifying evaluation methods tailored to the types of contents and learning, and then implementing and evaluating educational curriculum. The second category is related to instructional design via a constructive approach that involves principles instead of steps, including teaching relevant and realistic contents, teaching social experiences, encouraging ownership of opinions towards the learning process, presenting experiences of the knowledge process, encouraging self-awareness of knowledge process, offering experiences, appreciating different perspectives, and encouraging the use of a variety of teaching methods (9). The model used in this study was one developed at the scientific hub of Virtual School, Comprehensive Center of Excellence for E-Learning in Medical Sciences designed in response to the weaknesses of the systematic model and considering constructive principles that are currently used in the design of multimedia-based instruction. This model includes the following steps: Planning and analysis, formulation, instructional text design, media production and provision, development of narratives, metadata generation and storage, and final evaluation and presentation (10).

2. Objectives

Given the importance of the exercise therapy course in physiotherapy, the aim of this study was to investigate the effect of virtual versus lecture-based teaching methods and to compare their impacts on knowledge and attitudes of physiotherapy students concerning the exercise therapy course design implemented in 2017. In this study, we attempted to address the following research questions:

• What are the differences between the levels of learning in the exercise therapy course among physiotherapy students after implementing lecture-based and virtual teaching methods?

• What are the differences between the levels of satisfaction in exercise therapy course among physiotherapy students after implementing lecture-based and virtual teaching methods?

The purpose of this study was to measure the students' level of satisfaction with the contents of exercise therapy course presented via the virtual teaching method to examine their opinions about the superiority of this teaching method over lecture-based ones with respect to the dimensions of concentration, learning, motivation, and optimal use of time. Finally, we sought to compare the scores ob-

tained from both teaching methods as objective indicators of the rate of learning.

3. Methods

This study was a cross-sectional research. A target group of all physiotherapy students enrolling the course "principles of theoretical exercise therapy" in 2014 were included in this study, and any student who omitted this course during the mentioned semester was excluded. Using lecture-based and virtual teaching methods, the effect of the variables related to knowledge and attitudes among 20 physiotherapy students was assessed during one semester. Besides, informed consent was obtained from the study participants.

The topics of the course (8 topics) were randomly divided into two groups of lecture-based and virtual teaching methods based on random data table. Half of the topics were taught based on the lecture-based method through attending classrooms run with lectures and the other half were presented via multimedia teaching using the learning management system (LMS). After taking the test, the scores obtained from both teaching methods were calculated and analyzed to check for significant differences.

Since all the students who had selected this course were participated in the present study, the census method was used. The four topics presented through lectures included plyometric exercises, balance sensory system, mindfulness exercises, and muscle relaxation techniques accompanied by topics presented through new methods including active movements, open kinetic chain exercises, closed kinetic chain exercises, and principles of walking in exercise therapy. During the lecture-based teaching method, the teacher attended the classes and explained the objectives of the session; after that, s/he presented the contents using slides and then wrapped up the instructional contents. In the classrooms, several questions were also raised on the text presented in three rounds and students were asked to respond. It should be noted that their responses were discussed at the end of the classrooms. Moreover, one more question was posed and the students were required to answer it as their assignment and present in the next session. After attending the scientific hub for advanced electronic learning, the teacher implemented the virtual (multimedia-based) teaching method in an acoustic room at the center where the Articulate Studio was also used for audio recording and storage. During this teaching method, the teacher firstly explained the objectives of the session, and then audio-recording was performed for each slide. It should be noted that at least three slides were set as tests during the presentation of the

course for students. These three tests were in the form of two true-false items and 1 multiple-choice question. The students could also get feedback for their responses at the end of the session. During the presentation, a question was raised and the students were required to personally respond and send it to the e-mail provided by the teacher.

The data were collected through obtaining information including age, gender, date of enrollment, and marital status as well as registration of the test scores obtained from both teaching methods. Comparisons were also provided in three sections as follows:

- Demographic information
- Evaluation of educational outcomes
- Assessment of students' performance based on the scores obtained from both teaching methods.

A researcher-made questionnaire was used which consisted of nine questions regarding satisfaction with the virtual versus lecture-based teaching method, and the responses were scored using a five-point Likert-type scale. The validity of the questionnaire was confirmed by four experts, and its test-retest reliability was established (Cronbach's alpha: 0.7).

The purpose of the questions was to facilitate comparative evaluation of understanding of the concepts, learning motivation, optimal use of time, concentration on instructional concepts, and overall satisfaction. Descriptive statistics and t-test were used for data analysis in SPSS version 23.

4. Results

The findings revealed that of the 20 students (6 males and 14 females) enrolled in 2014, one individual was married and 19 were single. It was also reported that the mean test score in the virtual teaching group was 12.38 ± 3.23, while in the lecture-based group it was 14.21 ± 1.88. The mean age of the students was 21.15 ± 0.81 years (range: 20 to 23 years old). The results of the study are depicted in Table 1.

According to the results, 95% of the students believed in the possibility to review the contents in the virtual teaching method and 95% of these individuals asserted that the virtual teaching method provided them with more time compared to the lecture-based teaching method. In addition, 90% of the respondents believed that concentration in the virtual teaching method was at higher levels than the lecture-based method; also, 95% of the students held that the time of virtual courses was more flexible than the lecture-based ones. Furthermore, 50% of the students generally preferred the virtual teaching method over the lecture-based one. In total, 75% of the students were generally satisfied or very satisfied with virtual teaching in the exercise therapy course.

Table 1. Satisfaction with the Virtual Teaching and Lecture-Based Teaching Methods Based on Nine Questions Using a Likert-Type Scale

No.	Questions	Totally Agree	Agree	Neutral	Disagree	Totally Disagree
1	Being easier	10	45	20	25	0
2	Better teaching method for the subject lesson of exercise therapy	5	50	25	20	0
3	Motivating	10	20	40	25	0
4	Possibility of review	50	45	5	0	5
5	Optimal use of time	25	65	5	5	0
6	Focus on the subject of the lesson	30	65	0	5	0
7	Freedom in choosing the lesson time	30	65	0	5	0
8	General preference for teaching	15	35	35	15	0
9	Satisfaction	10	65	15	10	0

5. Discussion

Our analyses revealed a significant difference (P = 0.03) between the scores obtained from the virtual and lecture-based teaching methods, that is, the scores obtained from the lecture-based teaching method were higher than those attained from the virtual one. This result is consistent with the findings of Lee (2004), indicating that multimedia-based teaching methods using lecture-based designs may not be able to succeed in this domain. Moreover, our findings were in line with the findings of Ataei et al. (2012), who acknowledged that memorizing the course contents using the lecture-based teaching method can last up to eight months. Since the evaluation of the contents in this study in both methods was performed approximately during four months, the scores obtained in the two teaching methods did not show any significant differences. Regarding some variables, such as the possibility of reviewing and lesson time flexibility, the majority of the students gave much priority to the virtual teaching method; however, the scores obtained in the lecture-based teaching method were higher. Therefore, it seems that in the design for virtualization compared to lecture-based teaching method, teacher's role in the general results of the teaching process is fulfilled through taking exams is greater than the virtual teaching method.

5.1. Conclusions

Despite the fact that in most variables, satisfaction in particular, the majority of the students gave more priority to the virtual teaching method, the scores obtained from the lecture-based teaching method were higher.

Footnotes

Conflict of Interests: The authors declare that they have no conflict of interests regarding the publication of this article.

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