Using Blended Learning Model for Large Group Teaching in Medical Education

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ABSTRACT

Moving away from lecture-based classes and delegating some learning responsibilities to students is one of the new strategies proposed in teaching/learning process. The present study aiming to design, implement and evaluate the blended learning model for large group teaching is conducted through presenting a model based on combining face to face learning with distance learning (through creating virtual classrooms). The selected groupconsisted of medical students.This was a semi-empirical study in which the validity of blended learning model for large groupteaching was first designed and discussed by experts of educational sciences; this model was experimentally implemented and finally evaluated and modified from different aspects. In this study, six tools were used to assess the overall pattern. Generally, the results of qualitative evaluation of virtual and face to face learning indicated that this model succeeded in achieving active learning criteria in medical education large group teaching.

Key words: Blended Learning Model, Large Group Teaching, Active Learning.

INTRODUCTION

The quality of teaching in higher education is increasingly important and considered. However, in general teachingmethods, the level of teacher-student interaction is very low and causes some problems for teachers. It seems that active learning methods and modeling by master can changetraditionalroles of students from passive receivers to active learners, and teach them how to acquire knowledge and skills and to apply thesetaught meaningfully[1-3]. To achieve this purpose, the following objectives are considered as a part of education administrators' policy: 1) Creating effective and attractive education, 2) Reducingthe costs ofeducation, and 3) Designing the transition from education to a more flexible and responsive method[4].

Activating the students in the classrooms is very difficult due to numerous topics of theoretical units versus the hours dedicated to teaching. In addition, large numbers of students in the classroom makes the use of active learning methods difficult. According to definitions, a large class is one in which the teacher feels unable to appropriately implement his educational goals due to large number of learners. The number of learners in these classrooms is between 25-30 people in the UK[5] and more than 35 people in America[6].

Classrooms of most university courses are held by lecturingand in the best circumstances include question-answering methods. On the one hand, this method is completely teacher-centered and on the other hand, it is placed at low-level cognitive domain due to its minimum analytical and evaluative power[3]. In contrast, active learning includes approaches in which students are not only a simple listener, but also do activities such as discovering, processing and adding information[2]. Bonwell and Eison(1991) assert that some characteristics of active learning are as follows: Engaging students inanalysis and evaluating

more than listening to long explanations, increasing their skills, engaging them in higher levels of thinking and learning activities (e.g., writing, discussing and reading) and making them express their attitudes and values[4].

Extensive evidencessupport the finding that active learning leads to achieving better learning outcomes and higher understanding of concepts[7, 8]. To achieve the desired standards of active learning, academic groups are formed to solve exercises, improve thinking strategies, and analyze problems[9-11]. Learning some parts of theoretical lessons through distance learning and by instructor's guidance is one of the policies proposed for the necessity of changing teacher-centered procedures to student-centered and even learning-centered ones[12-13]. Therefore, in physical classes, more time remains to discuss the lessons requiring more teacher's justification and to discuss some important issuesin educational workshop[11]. Such models are called "blended learning models" and cover a wide range of educational needs[14]. In 2003, American Society for Training and Development introduced blended learning as one of ten major trends in the industry of knowledge transfer[15]. This educational model is designed to integrate data transfer methods and learning activities in a curriculum and generally includes a combination of e-learning, classroom exercises and private training which simply defined using technology-assisted teaching[16, 17].

Results of a study conducted by Melton et al.(2009) show that the use of educational courses in a blended form improves learning levels of students more effectively compared to general courses[18]. In addition, the results of a study conducted by Chen and Jones (2007) show that blended classes' students feel more empowered to understand concepts and their analytical skills improve during the course[19]. Findings of a study conducted by Greener (2008) indicate that the use of self-directed learning methods and self-relianceof student groups are key factors of their success in blended learning[20].

Using Delphi Method, So and So and Bonk (2010) conducted a study entitled "Examining the Roles of Blended Learning Approaches in Computer-SupportedCollaborative Learning (CSCL) Environments" and concluded that blended learning approaches are a key part of learning and teaching in the present and their role will become more highlightedin the future. According to findings, teachers perceiving the advantagesof blended learning can improvethe degree and the effect of cooperation between students of their classes, as well as other similar classes. Developments within computer-supportedcollaborative learning (CSCL) environmentsare indeed based on better understanding and use of blended learning approaches[9, 20].

Griffit and Graham (2009) conducted a study entitled "Using Asynchronous Video in Online Classes". Asynchronous means that learners can willingly watch training videos at any time and it is not required to synchronize learning time with other learners (e.g. teleconferences). This pilot study showed that asynchronous video communications have attracted the attention of students and aspects of success in the classroom have been very surprising and exciting. In addition, results of this pilot study led many teachers to use asynchronous video at different schools in various degrees(21).In the present study, blended learning model for large group teachingwas designed based on combining physical learning in classroom with distance education through creating virtual classrooms and after experts' confirmation was experimentally implemented in theoretical class of "Care forPatients with Cardiovascular Diseases". The present study aims to implement and evaluate the proposed model of blended learning for large group teaching in medical education as well as investigating the level of access to active learning criteria in this education group.

MATERIALS AND METHODS

This is a semi-empirical study in which the validity of blended learning model is approved by experts of educational sciences. This study was conducted on 4th semester of nursing students passing the unit of "care forcardiovascular diseases". Sampling method was census.Therefore, all qualified students (37 girls and boys) were included.

Data Collection Tools

Data were collected using the six following tools

1   Student Portfolio review form, to measure self-directed activities of students - Determining content validity: content validity index. Determining its reliability: Cranach's alpha = 0.854.

2   Student self-evaluation form regarding active learning outside the physical classes, including 7 questions with scoring from 10% to 100%. Determining content validity: content validity index (Relevance = 100%, Clarity = 92% and Simplicity = 95%).

3   Virtual classroom survey form including 4 questions about 14 virtual classes movies - Determining content validity: content validity index (Relevance = 95%, Clarity = 89% and Simplicity = 92%).

4   Observation record form of student's active learning behaviors in small group discussion including three areas: Students' attention to teamwork, student's participation in group discussions and cooperation with others, and the student's individual effort to find the answer. Determining content validity: content validity index, and determining tools reliability: One-way analysis of variance (ANOVA) of three researchers' observations (Scoring the student's attention to teamwork: $p=0.985$; scoring the student's participation in group discussion: $p=0.976$; scoring the student's individual effort to find the answer: $p=0.971$).

5   Observation record form of student's active learning behaviors in large group discussion included a5-point Likert scale, based on which, the student was given scores over time. Determining content validity: content validity index, and determining tools reliability: One-way analysis of variance (ANOVA).The group having participated in the small group discussion was asked to participate in a discussion with the instructor's leadership using the inquiry method for 20 minutes. Results of one-way ANOVAof three researchers' observations: $(p-1/000)$

6   Final exam form, to measure learninglevels of students including 13 questions on the "Care for Patients with Cardiovascular Diseases". This form was designed at the level of analysis and synthesis.Determining content validity of this tool: content validity index, and determining tools reliability: Retest method

(Tools reliability was approved with correlation coefficient of 0/999).

Stages of Research

Lesson plan was codified based on 16 hours of training considering Regulation of the Supreme Council of the Ministry of Health and Medical Education Planning and included learning-teaching activities in two areas of distance learning through virtual classes (based on provided training videos) and face to face workshops (Fig. 1).Before starting each four-hour session of a physical class, students should participate in one session of a virtual classroom and watch a series of training videos on the master's lecture and do their assignments. Fig. 1

Training video of the class was totally 273 minutes including 14 videos on two DVDs and standardspeeches (lectures)based on one of the lesson references and approved by the related professions. When completed, the videos were evaluated andapproved by three expert professions in nursing courses in the field of cardiovascular diseases.

Considering the student's self-directed activities, a portfolio including 12 challenging questions regarding the virtual classrooms'training videos, and 4 questions regarding the face to face classes was provided. In addition to the questions, a review form of care for the patient with cardiovascular diseases, abbreviated lesson plans for students, a portfolio guide sheet, a scheduled worksheet fordelivery of students' assignments, a training CD containing three e-books about the curriculum, two softwareregarding the cardiovascular examination and electrocardiogram reading method were given to the students.

Considering physical classes, the programs of three workshops were provided and codified. It should be noted that due to the content nature of related lessons, the first session of face to face classes was not held in the workshop, but was held through lecture and presentation of pre-organizers of the related lesson along with practice.

Each clinical status included some questions, the answersof which required thought,

research and discussion among students. Required resources were given to the groups before the class started.

Using problem-solving method, six 6-7-person groups were formed for early discussion in small groups (30 minutes) and inquiry-based discussion in large group (120 min, six 20-minute time).

After each class, a session called reflection was held in which the student expressed his doubts and questions and recorded the findings in his portfolio.After the curriculum was finished, students were tested for the last time.The test questions were descriptive and designed at the level of analysis and synthesis. This test wastaken only at the end of the course to examine the learning level of the student after teaching.

Methods of Data Analysis

The following statistical tests were used to analyze data

*   Student Portfolio review
*   Review of student self-evaluation form regarding active learning outside the classroom
*   Review of Virtual classroom survey form
*   Review of observation record form of student's active learning behaviors in small group discussion
*   Review ofobservation record form of student's active learning behaviors in large group discussion
*   Review of Final exam form to measure learninglevels of students

RESULTS

Table 1 shows the frequency of student's opinions about the content of training videos ofvirtual classrooms. According to the results of above table, most students (54%) have asserted thatthe contents of the four training videos are "highly" clear and comprehensible, and most students (71%) have expressed that the need for the repetition of the contents of the four training videos in physical classes is "somewhat" and "low".

The results of the student self-evaluation about virtual class-based learning activities (Table 2) showed that the study trend of the majority of students is changed from individual to teamworkup to the fourth week. However, they were slightly dependent on other students' answers to respond the questions. Although the questions highly motivated them to study, they slightly searched other resources related to the subject matter. Most students said that answering the questions has affected their learning, but generally, their satisfaction level with their performance was low and very low.

Considering the follow up of the student regarding the assignments of virtual classrooms, the results showed that the majority of students (62/16%) delivered the assignments of the first week with delay (over one week)and no one delivered them on time. The majority of students (43/24%) delivered the assignments of the second week with delay and only 18/92% delivered their assignments on time. In the third week, the majority of students (51/35%) delivered their assignments with delay. Finally, in the fourth week, no one deliveredhis assignments on time and 89/19% delivered them too late. In addition,

Table 1: Frequency of students' opinions on the content of training videos of virtual classrooms

Frequency (percent)Student's opinion	Very high	high	somewhat	low	Very low	Total
Clarity and comprehensibility of subjects presented in virtual classrooms	32.5%	54.0%	21.0%	1.5%	0.0%	100%
Usefulness of subjects presented in virtual classrooms	19.0%	53.0%	27.0%	1.0%	0.0%	100%
Need for the repetition of subjects presented in virtual classrooms	2.0%	12.0%	40.0%	31.0%	15.0%	100%

Table 2: Results of student's self-evaluation regarding virtual class-based learning activities

No.	Frequency – person (percent)Self-evaluation	Second week	Third week	Fourth week
1	How much activity and individual effort did you have to find the answers of questions discussed in the portfolio?	Very high (35.14%) 13	Very high (29.73%) 11	Low and very low (24.32%) 9 (24.32%) 9
2	How much activity and group study did you have to find the answers of questions discussed in the portfolio?	very low (27.03%) 10	Low and very low (27.03%) 10	Very high (27.03%) 10 (29.73%) 11
3	How much dependent were you on your friends to find the answers of questions discussed in the portfolio?	very low (43.24%) 16	very low (43.24%) 16	very low (43.24%) 16
4	How much did you search other related resources to find the answers of questions discussed in the portfolio?	very low (37.84%) 14	very low (27.03%) 10	very low (32.43%) 12
5.	How much did the questions discussed in the portfolio motivate you study and learn?	Very high (32.43%) 12	low (35.14%) 13	Very high (32.43%) 12
6.	How satisfied were you with your performance in answering the questions discussed in the portfolio?	low (32.43%) 12	low (27.03%) 10	very low (32.43%) 12
7.	How much did answering the questions discussed in the portfolio affect your learning?	High (37.84%) 14	High (32.43%) 12	Very high (32.43%) 12

in the fourth week, a large majority of students had no questions and follow-ups about the material presented in virtual classrooms and the questions included in the portfolio.

The results of students' learning behaviors in small group discussion are shown in Diagram 1. The results indicate that the time of students' attention to small group discussion, cooperation with others and individual effort to answer the questions was more than 23 minutes from 30 minutesin all three workshops. Diagram 2 also indicates the scores resulting from the students' participation in large group discussion based on Likert scale.The results show that the scores gained by studentsin each of the three days were more than 17/90 points from 20 points.
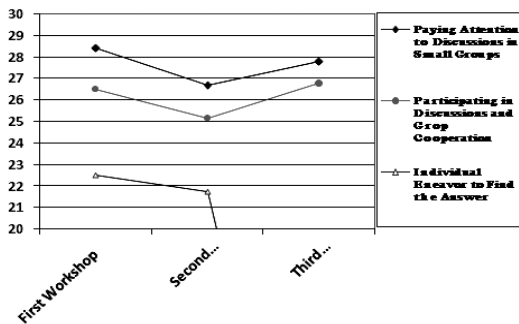

Fig. 1: Average learning behavior observed among the students in educational workshops (face to face classrooms)
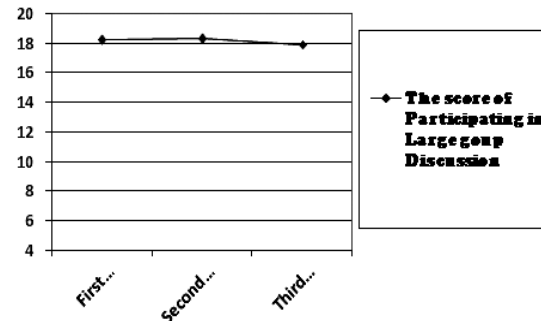

Fig. 2: Average learning behavior observed among the students in educational workshops (face to face classrooms)

DISCUSSION

In order to examine the active learning criteria regarding virtual classes, we first investigated the students' welcome towards observing training videos, in other words, their participation in virtual classrooms. Generally, students' opinions indicated that the majority of students have asserted thatthe subjects discussed invirtual classrooms are "highly" clear and comprehensible (54%) and useful (53%). Therefore, the implementation of virtual classes under the conditions governing the above-mentioned classes can be an appropriate method for blended learning model. A study conducted by Griffit and Graham (2009) showed that asynchronous video communication can be changed to a technological approach being a bridge to remove the gap between online world and physical learning[21].

Considering the need for the repetition of subjects presented in virtual classes, most students (71%) have expressed their need as "somewhat" and "low". In fact, in the students' opinions, the contents of some classes were heavier than that of other classes
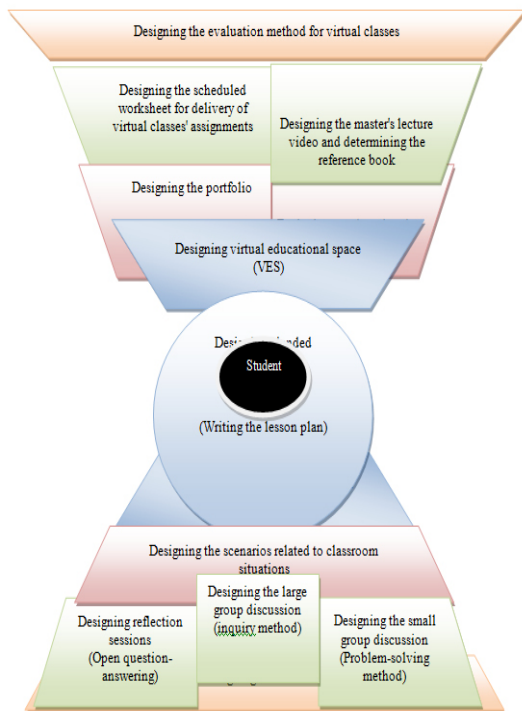

Fig. 1: Final blended learning model for large group teachingin Medical Education

and required to be repeated in the face to face class. Therefore, in the researcher's opinion, important and essential parts which need repetition should be expressed in the form of question in situations provided for face to face classes to let the students review them in group discussion and if necessary, an explanation be given by the teacheron parts that are not fully understood.

The results of the student self-evaluation form showed that students studied and had individual activity in the second week of education more than before to find the answers of the questions discussed in portfolio. While the level of their teamwork increased in the third and fourth week. This shows that students had understood the importance of teamwork to find the answer of questions. In the results of the qualitative part of this study, students interviewed said that the group follow-up of answers discussed in the portfolio is pleasant and helps their learning very much. In this regard, Mc Alpine et al. (2008) conducted a study entitled"Steps towards using an inquiry-based blended learning design for curriculum change in Health Sciences" in Melbourne. The results showed that both students and teachers were involved in the learning process much more than those of usual classes[22].

Considering the question of how much the questions discussed in the portfolio motivated you to study and learn, the responses of all three weeks were "very high" and "high". In addition, the results of interviewing students in the qualitative part of the research show that the questions discussed in the portfolio have motivated them to follow up and search to find the answers. Oliveira et al. (2006) conducted a study on teaching methods to improve active learning in higher education. The results showed that all students have asserted that taking assignments has helped their learning progress, and 80% have expressed that review was a great tutorial. However, one of the teachers said that "only 50% of students did their assignments, but he added that those doing their assignmentsobtained better final results"[3].

Considering the sixth question of self-evaluation, most students'satisfaction level with their performance was "low" in the second and third weeks, and "very low" in the fourth week. In their interview in the qualitative part of the study, students

expressed that they should have acted better, but they lost their time due to laziness and negligence. They asserted that despite the willingness for doing related activities, they flinched from studying and watching videos with various excuses. In the researcher's opinion, students' not managing the educational activities is the most important factor causing negligence and students should be trained in this field. However, most students (64/87%) said that answering the questions discussed in the portfolio has affected their learning "highly" and "very highly". Blended learning manifesto (2007) explains that students' natural tendency to Procrastinate or failure to complete their assignments is one of the risks of blended learning models associated with asynchronouse-learning. Since e-learning can be used at any time, this may delay the students' practices.

The results of *directobservational* assessment of *students' behavior*using observation record formwere used to examine active learning behaviors in physical classesObservation record form(Table 2). Investigation of the average time of student's attention to small group discussion (per minute) in all three days shows the progressive increase instudents' attention to small group discussion. The results of investigating the duration of student's participation in teamwork and cooperation with others (per minute) show that students greatlyparticipated in the small groupwork (consistent with the study results of Pundak, 2010). 80% of students believed that conceptual questions were a stimulant factor to attract the attentions to lectures. In addition, they all said thatclass discussion helped their learning process.

The results of investigating the duration of student's individual effort to find the answer (per minute) indicate that students had a very good individual effortto find the answer in the small groups.

After investigating the students' learning behaviors in small group discussion, the second observation record form was used to examine their behaviorsin large group discussion (whole class discussion). The average score of students' participation in discussion in each 20-minute positionin all three days (based on a Likert scale) indicates that inquiry method highly affects the activation of large group of students to participate in class discussion.

Considering the fact that the face to face classroomsaim to lead students to achieve higher levels of learning in the cognitive domainusing problem-solving and inquiry methods, a descriptive test was designed at the end of the curriculum, the questions of which wereat the level of analysis and synthesis. 75% of the students' responses to final questionswere considered desirable with confidence interval of ±0/07. This showed that their learning level has progressed towards analysis and synthesis.

According to the experiences of Oliveira et al. in studies conducted on "teaching strategies to promote active learning in higher education", class discussion affects learning process. In addition, blended learning is consistent with traditional educational values and has demonstrated potentials to increase the efficacy and efficiency of significant learning experiences[23].

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