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E-Learning Framework Design For Medical Education Based On Requirement Analysis

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Abstract

This study proposes an e-learning framework for Turkish Family Medicine (FM) physicians by requirement analysis using e-learning survey and program educators' interview. The main data collection was done with an online survey complemented by a structured interview. According to the outcomes of e-learning survey, the Khan framework was modified with *Mobile*/*Wireless Technologies*, *Time*, *Content Control*, *Delivery Method dimensions*. The program educators declared that their opinions for potential solutions as getting training for e-learning; increasing human resources capacity for support; implementing training in asynchronous format; accepting online learning culture; eliminating hardware, software and connection problems; increasing financial support; getting managerial implementation support and improving personal rights.

Keywords: E-learning framework, e-learning dimension, medical education, educator interview, family medicine physicians.

1. INTRODUCTION

Information and Communications Technology (ICT) has given way to adopt e-learning practices by providing tools to enhance learning and to improve institutional efficiencies (Chan & Ngai, 2007; Salimi, Shojaei & Raissi, 2015; Erol, 2015). Nichols (2007) and Sharma and Mishra (2007) mentioned e-learning in educational institutions as *on-site campus*, *blended learning* and *distance education.* Schichtel (2010) stated that technological advances will keep its traditional feature guaranteeing affective, pedagogic, and organizational support in education. Therefore, technological advances have opened new horizons for education in a reliable manner to support education (Khader et al., 2011; Rozano & Romero, 2016).

Family Medicine (FM) in Turkey started family practice as a new system for health care. In the new system family medicine physicians are responsible for patients and preventive services (Akdağ, 2016). The Minister of Health of Turkey announced that by March 2017 there had been 3,500 patients per one physician in Turkey. Heavy workloads may not give opportunities to family physicians to take continuing education. To solve the face-to-face education problems for Turkish FM physician, an e-learning framework which was designed according to the survey which was delivered online to Turkish FM physician. In this context this study proposes designing an e-learning framework in order to provide medical training and education online with a framework designed survey outcomes.

2. LITERATURE

Health professionals need to regularly update their knowledge of changes and advances in medical sciences, technologies and techniques. This activity is often called continuing professional education (CPE) or continuing medical education (CME). CME is usually acknowledged as an indispensable part of the working life of physicians and health professionals (Fordis, King,&Ballantyne, 2005).

In medical education, content can be delivered either synchronously or asynchronously. Synchronous delivery refers to real-time, instructor-led e-learning, where all learners receive information simultaneously and communicate directly with other learners. With asynchronous delivery, the transmission and receipt of information do not occur simultaneously. The learners are responsible for pacing their own self- instruction and learning. The instructor and learners communicate using e-mail or feedback technologies, but not in real time. Synchronous content delivery is hard to achieve in medical education without some preconditions needed such as high speed Internet connections, free access to computers and high computer skills of students and teachers (Masic, 2008).

An e-learning framework is a detailed digital tool to organize learning for desired learning outcomes (Vrabie, 2016). Designing an e-learning framework needs analysis and investigation of the resources (Khan, 2009; Akhondi, Yarmohammadian & Haghani, 2015; Tiyar & Khoshsima, 2015).

In order to solve e-learning problems, policy makers need to follow the current developments in the world to reach the highest standards and solutions (Baskan & Atalar, 2014). One of the way to find solutions is to devise a framework for applications. Frameworks do not only address the issue of e-learning integration with other teaching methods. But they provide e-learning systems development, applications and adoptions (Bradley, 2015; Kituyi&Tusubira, 2013; Ozdamli, 2013).

As a first structured e-learning framework Khan's e-learning framework aims to design an e-learning environment having eight dimensions which are pedagogical, technological, interface design, evaluation, management, resource support, ethical and institutional. Below are descriptions of the eight dimensions.

Pedagogical: This dimension addresses content analysis, audience analysis, goal analysis, design, methods and strategies of instruction. Upon unsuccessful cases it prescribe alternatives that combines elements of on-site and online instruction.

Technological: This dimension assesses the hardware, software, and infrastructure planning. It addresses the most suitable learning management system (LMS) and communication tools to reach goals and objectives.

Interface: This dimension addresses pertain to the overall look and feel of an e-learning course related with web design, content design, navigation, accessibility, and usability testing.

Evaluation: This dimension addresses the assessment of learners, learning environment, content development processes, instructional design processes of the program.

Management: This dimension is used for the continuation, updating, and upkeep of the learning environment. Controlling the e-learning system for performance is aimed in order to sustain quality control, budgeting, staffing, security, and scheduling.

Resource Support: This dimension deals with the technical and human resources support to create successful online learning environments.

Ethical: This dimension relates with issues like social and political influence, diversity, bias, the digital divide, information accessibility, etiquette, and legal issues such as privacy, plagiarism and copyright.

Institutional: This dimension addresses issues of administrative affairs, academic affairs and student services. Before an online program is launched, each of the these issues should be solved for a smooth implementation (Khan, 2011).

- When we explored up-to-date e-learning frameworks, we found that The Society of Teachers of Family Medicine (STFM) has been researching and testing several e-learning frameworks. STFM is an association of nearly 5,000 innovative family medicine educators. These teachers include medical school professors, preceptors, residency program faculty, residency program directors and others involved in family medicine education. During the study a close research relation and collaboration was done with STFM e-learning staff. And useful information and implementation clues were derived from their experiences.

STFM needs were very specific, a lot of time was spent weighing the pros and cons of each system relative to how closely they met those needs. Their first realization was that no LMS would ever be perfect. Finally, they chose Docebo which offers a dynamic catalog with a high "ease of use" factor. It is also compatible with the latest editions of the SCORM standard, which is necessary for tracking quizzes and saving a user's information. Key issues for choosing an e-learning system for STFM **:**

Mobile friendly. The users were considered first. Because physicians are incredibly busy, want to give priority to mobile use.

Reporting. No reporting system is perfect. LMSs come with standardized reporting. This means that what is important to us is not necessarily important to the LMS provider. STFM is working with Docebo to develop custom reporting at additional cost.

Accessible Catalog. It was also important to us that our catalog be visible on website. This was an issue with most LMSs, since everything is hosted on their servers.

Modularity. The courses should be structured in modules that can be handled independently and be components of a course.

In doing the research on e-learning framework the level of tracking, mobile use of the system, modularity and user licenses were seen important from STFM experiences.

3. METHODOLOGY

In this study data collection was performed using quantitative and qualitative methods separately. A survey was used for main data collection and a structured interview was done to get program educators opinions.

Participants

Turkish Family Medicine (FM) physicians were main participants. Participation was based on volunteerism. Participants were informed with e-mails and the survey was done online.

The Survey

The survey instrument was developed to gain as much information as possible for the family medicine (FM) physicians in Turkey. The survey was divided into demographics, communication issues and e-learning parts. Question analysis of the Survey Instrument was performed by the experts who have been providing training and consulting to the Turkish FM physicians in Biostatistics and Medical Informatics Department of Yıldırım Bayezit University in Ankara-Turkey. The survey questions were analyzed and updated. Thereafter the survey was pilot tested before used for data collection.

The content and construct validity of the survey instrument according to Cronbach's Alpha analysis was found overall to be high consistency (Cronbach alfa=0.72 Table 2). A five-point

Likert scale was used to get responses ranging from 1 being “strongly disagree”, 2 “disagree”, 3 “neutral”, 4 “agree”, and 5 “strongly agree”.

The Interview

The interview was done to investigate the opinions and critical factors of educators to implement e-learning. The interview was done to discover the coherency of program educators statements and to support the online survey. Program educators were invited to participate in the interview. Six educators participated in interview: 4 male and 2 females. The interview was conducted at the Yıldırım Bayezit University in their office, and the discussion lasted 3 hour totally. After the interview, coding, analyzing, commenting, labeling, highlighting, and grouping the key facts were done. Findings were written and were examined. It was conducted in three steps:

- Interview procedure development
- Recognize the opinions of educators
- Identifying critical factors and potential barriers.

4. FINDINGS AND DISCUSSIONS

An online survey was performed by 1055 Turkish FM Physicians. The results show that four new dimensions (*Mobile*/*Wireless Technologies*, *Time*, *Content Control*, *Delivery Method)* were found in addition to Khan’s e-learning framework dimensions (Pedagogical, Ethical, Evaluation, Technological, Interface Design, Institutional, Management, Resources Support). In the study the e-learning framework dimensions findings were evaluated as follows:

Mobile/Wireless Technology. Mobile/Wireless technologies open new windows and opportunities for education improvement and redesigns the organizational and educational settings (Uzunboylu & Tugun, 2016). In the study It was determined that 92,6 % of physicians have at work internet connection and 82,4 % of physicians have at home internet connection. And also %55,2 have mobile internet connection, %19,1 have Wi-Fi internet connection. This means that family physicians have enough internet connection for e-learning readiness and mobile technology must be considere while designing e-learning framework (Kocakoyun & Bicen, 2017) since it facilitate visualization (Tong & Bakan, 2016).

Time. Time refers the users’ eager to devote time to use the required innovation (Idrus 2008). In the study the participants declared that they spend 30-60 minutes daily for e-learning by 58.25%.

Content Control. Students utilize the different learning styles interchangeably during the learning process in order to have an effective learning experience. In the study the participants declared that they want to have control over teaching materials by 76.38% and want to have discussions with teachers and others by 67.54 %.

Delivery Method. In medical education content can be delivered either synchronously or asynchronously. In this regard, 82 % of participants think e-learning should be asynchronous because it is difficult to manage and teach for large number of participants for synchronous implementation.

Technology. In the study 84.47% of participants have home internet connection, 95.05% have working place connection and 55.24 % have mobile internet access. This shows us that Turkish Family medicine doctors have enough internet access technology both in their working posts and in their daily life.

Interface Design. The interface design is a very important element because it could be the way to the success, or failure of any framework. In the study for interface design, participants agreed on good and effective design by 84.53 %.

Institutional. In the study the participants declared that lack of legal provision on intellectual property has hindered the development of e-learning by 16.66%. They need a central agency to control and make policy are required by 61.51 %.
Resources Support. The results show that the level of *resources support* was 65.86%. Participants declared that the organizational vision is moderate 50.14 % and middle level managers have positive attitudes of 68.5% for technology and innovation.
Management. The management of e-learning refers to the maintenance of the learning environment and distribution of information and lack of ongoing support from management, failure to perform meaningful reviews to ensure an environment of continuous process improvement, etc. (Idrus, 2008).The participants declared that institution should create a budget by 74.68% and give mobile and portable devices by 68.43%.
Pedagogical. The technology effects teaching and learning. It depends on integration with curriculum and instruction (Bielefeldt, 2006). The importance of *Pedagogical was* ranked by 64.22%.
Ethical. The participants declared that they can share in e-learning environment by 76.35%, and the e-learning acceptation rate was 59.40%.
Evaluation. The evaluation should be done for both the instruction and learning environment. The participants declared by 87.31% that evaluation regularly should be done.

Interviews
By analyzing interviews, it was seen that all participants had positive attitudes about the possibility of implementing e-learning in family medicine. Almost all educators believed that e-learning allows people to access economically and exchange information effectively and efficiently for research and development. The other opinions are as follows:

- *Technical knowledge:* The educators need to take e-learning and course design training.
- *Human resources:* In general, the levels of qualifications were satisfactory across Turkish FM program educators. However, in order to deploy successful e-learning, the human resources capacity should be developed.
- *Attitude.* Overall, educators reported that family medicine physicians were enthusiastic about technology. They have claimed that asynchronous course format is more appropriate than others. Because of heavy workloads, physicians study at home or wherever, whenever it is convenient.
- *Culture.* Educators believed that before developing and implementing e-learning, it is important to encourage the acceptance of an online culture throughout Turkish FM. They believe that it is important to be less formal. It is necessary to encourage self-awareness to change the conventional method to e-learning habits.
- *Equipment and infrastructure:* Educators say that they have no infrastructure and internet connection problems. A special department should be established for planning, designing and implementing e-learning.
- *Financial support:* Educators say that for effective implementation, physicians' salaries should be increased and financial support should be given for development and modern systems, as well.
- *Management support:* Educators say that they have upper level support from their managers. They want written and executable rules and regulations about working system and personal rights.

Barriers to e-learning implementation. Educators declared several barriers. They say that some are curable, but need time. These barriers are as follows:

- Inadequate knowledge about e-learning systems,
- Need for more modern equipment/hardware/software,

- Lack of human resources,
- Internet connection/capacity/speed,
- Lack of financial support for development,
- Resistant to using technology,
- Unwillingness to be involved in an e-learning environment,
- Huge number of family medicine phyisicians,
- Need for written regulations.

Depending on the outcomes of both the e-learning survey and educators' interview, it was required to add *Mobile*/*Wireless Technologies*, *Time*, *Content Control*, *Delivery Method dimensions* to Khan's Framework in order to propose an e-learning framework for Turkish FM Physicians.

5. CONCLUSION AND SUGGESTIONS

After the study, it was seen that it is wise to add *Mobile*/*Wireless Technologies*, *Time, Content Control*, *Delivery Method dimensions* to Khan's Framework for proposing an e-learning framework for Turkish FM physicians' medical education. According to the result of interview, the program educators require a training need for e-learning, need to develop human resources capacity for assistance and personal support, implement training in asynchronous format, encourage the acceptance of online learning culture, eliminate equipment and infrastructure and Internet connection problems, give more financial support to develop modern systems, and get support from managers.

İhtiyaç Analizine Dayalı Tıp Eğitimi İçin E-Öğrenim Çerçevesi Tasarımı

ÖZET
Bu çalışma, e-öğrenme anketi ve program eğitmenleri ile görüşme yöntemlerini kullanarak ihtiyaç analizine dayalı Türk Aile Hekimliği (FM) hekimleri için bir e-öğrenme çerçevesi önermektedir. Veri toplama, yapılandırılmış bir görüşme ile tamamlanan çevrimiçi bir anket ile yapıldı. E-öğrenme anketinin sonuçlarına göre, Khan Çerçevesi Mobil / Kablosuz Teknolojiler, Zaman, İçerik Denetimi, Teslim Yöntemi boyutları ile geliştirildi. Program eğitmenleri, e-öğrenme için eğitim almak, potansiyel; destek için insan kaynakları kapasitesinin artırılması; eşzamansız formatta eğitim uygulamak; çevrimiçi öğrenme kültürünü kabul etmek; donanım, yazılım ve bağlantı sorunlarını ortadan kaldırmak; artan finansal destek; yönetsel uygulama desteği almak ve kişisel hakları geliştirmek. çözümlere yönelik görüşlerini beyan ettiler.

Anahtar Kelimeler: E-öğrenme çerçevesi, e-öğrenme boyutu, tıp eğitimi, eğitimci görüşmesi, aile hekimliği hekimleri.

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