



Constructing Multi-Dimensional Criteria Model for Evaluating E-learning Systems Efficiency in the Higher Educational Organizations

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Abstract: E-learning systems are considered an important application in educational organizations today. It is considered one of the recent subject and basic technological development in information technology; nowadays most of universities take advantages of applying e-learning systems to deliver education to learners. So managing and controlling e-learning process are considered a critical issue. In light of this; the universities have to take advantages of using learning management systems that automate controlling, tracking, reporting learning process, introduced set of tools for managing learning resources and it has provided administrative functions and grading ways. Consequently evaluating and assessing e-learning systems is considered a critical issues for achieving effective systems. As a result of few research on evaluating of learning systems within higher education. This paper is focused on identifying and reviewing the over whole dimensions and factors that effect on efficiency of e-learning systems via three Basic dimensions technology based component used in e-learning systems, human factors of e-learning systems considering students and instructor's in e-learning Process and effectiveness of e-learning content quality.

Keywords: E-learning - learning management system - critical dimensions - e-learning evaluation-system quality

I. INTRODUCTION

E-Learning systems play a vital task in assessing the educational methods and increasing number of students around the world with increasing the degree of understanding for them. Educational organizations have introduced e-learning systems rather than the previous learning methods. Using e-Learning systems can lead to great advantages of saved cost, improve the delivery of courses content and provide effective and rapid access to courses and overall materials on e-learning systems for both students and instructors. As a result of importance and benefits of e-learning systems to educational organizations evaluation and measurements have become critical requirements for continuous improvements for these systems. In the field of evaluating and defining the most critical factors that effect on the success of e-learning systems in multi-dimensional way there were a few researchers defining and addressing these factors in a big scale evaluation. This paper introduced the most critical factors that effect on e-learning systems in proposed structure that combine the overall factors from different dimensions. In light of reviewing many e-learning systems and its structure, it is obvious that the most of e-learning systems in any higher education affected by three basic entities:

- 1) Technology based component used for building e-learning system in higher educational organizations [1], [2].
- 2) Human factors of e-learning systems considering students and instructors in e-learning process [3]
- 3) Importance and effectiveness of e-learning course materials [4]

The paper is organized the basic dimensions for evaluating e-learning systems into three basic criteria and each criteria decomposed into several other sub criteria used to evaluate the upper basic criteria with respect to all stockholders interacting with the e-learning systems.

II. MULTI-DIMENSIONAL EVALUATION CRITERIA

Most of Previous studies in evaluating e-learning systems have been reviewed and determined the most critical dimensions on evaluating e-learning systems and found that inside each basic dimension there were many other multi dimensions used to evaluate the upper basic one for evaluating overall e-learning systems. The basic dimensions for evaluating e-learning system decomposed into three parts:-

A. *Technology component based for evaluating e-learning systems*

Through reviewing most of previous research found that evaluation of technology based component occurred through other three sub dimensionsevaluation [5]

- 1) System quality
- 2) Internet quality
- 3) Service quality

A.1. System quality evaluation is considered one of the most critical dimensions for evaluating technology component used in BuildingE-learning system which occurred through evaluation of two basic components:

- 1) Evaluation of e-learning systems software
- 2) Hardware component used in e-learning systems

1) *Learning management system software*

Evaluating e-learning software's pass through evaluation of other sub criteria as shown on [6], [7],[8], [9]involving:

- Security of system
- Stability
- Well design structure
- Ease of using system
- Personalization
- Scalability of system
- System backup procedure
- System error tracking

The process of evaluating software quality for most of e-learning systems have to occur through these sub criteria to reach for effective software used by users that lead to effective learning management system for the whole systems.

2) *Hardware component used in e-learning systems*

Evaluating e-learning hardware used in e-learning systems lead to effective e-learning systems on [6], [8]

Showingevaluation of hardware used in e-learning systems involving:

- Wellness of Microphones
- Electronic blackboards
- Earphones
- Electronic mail
- Multimedia tools
- Desktop video conferencing

Evaluating the overall hardware tools used in e-learning systems occurred by evaluation each of these criteria play a vital role in achieving efficiencyof over whole e-learning systemsquality.

A.2.Evaluation of internet quality used in e-learning systemsis considered one of the most critical issues in evaluating the overall technology component of e-learning systems, by reviewing the most of previous studies found on [7],[9],[10], [11], [12].

The most critical dimensions for evaluation internet quality involve:

- 1) High broadband internet connection [10]
- 2) Slower download speed of audio/video [7],[10],[11]
- 3) Web 2.0 application [12]

Through evaluating and measuring these factors can led to effective evaluation for internet quality that can led to effective evaluation for technology based component of e-learning systems.

A.3.Service qualityof e-learning systems evaluated through many other important dimensions. Through reviewing most of previous studies found that service quality dimension decomposed into four basic dimension effect on the total efficiency of e-learning system as shown on [11] [13].

- 1) Course management
- 2) Course authorization
- 3) Verifying identity of students
- 4) Security of these services

B. Human Factorevaluation for achieving effective e-learning systems including students and instructors evaluatio E-learning systemsare open systems so they are influenced by the people who use them Basic two actors of most e-learning systems students and instructors .consequently evaluating these two actors is considered the most important dimensions in evaluating e-learning system efficiency.

B.1 *Instructors dimensions evaluation*

It is evident from previous research [5] [14] quality of an instructor is a criticaldimension for an effective learning Management system. Evaluating instructors dimension occurred through multi-criteria dimensions.

- 1) Measure teaching effectiveness [11]
- 2) Teacher as facilitator [5]
- 3) Instructors should have enough time to interact with students in e-learning process [15]
- 4) Instructors' attitudes towards a technology control and teaching styles [10]
- 5) Availability and responsiveness
- 6) Staff willingness to learn new system [7]

Through these multidimensional evaluation led to effective evaluation for instructors in e-learning process

B.2. Students dimensions evaluation

Evaluating student's satisfaction of using e-learning systems is considered an important indicator for effective e-learning process [5] evaluation the students dimensions through these multi dimensions

- 1) Attitudes of learners towards the e-learning systems [5]
- 2) Understanding student's attitudes toward e-learning systems facilitates the building of suitable e-learning environments for teaching and learning.
- 3) Interaction with other students and teachers.
- 4) Learner characteristics such as motivation, belief and confidence [16]
- 5) Student commitment [11]

Achieving effective evaluation for both student's and instructor's in e-learning process led to effective learning management system consequently following these multi-dimensional issues on both instructor's and student's evaluation led to successfully e-learning systems.

C .Course content quality evaluation, the last critical dimensions in evaluation e-learning systems. it is considered the body of any e-learning systems .the higher effective content and courses quality lead to higher effective e-learning systems. Consequently most of Learners of e-learning systems depend on deeply on quality of this content, so measuring these dimensions is considered extremely critical. Evaluating course content quality and effectiveness occurred through set of criteria as shown on [6], [7], [8], [10], [11],[13]:

- 1) Interactive courses
- 2) Clearly written materials
- 3) purposeful materials
- 4) predefined online tests /quizzes evaluation criteria
- 5) up to date materials
- 6) Courses structure
- 7) Entire grades in time

Success of introducing courses content in effectiveness way depends on measuring the whole dimensions. Courses content effectiveness is critical to the success and acceptance of e-learning systems. So ensuring that courses content rich and capable of providing students with enough information and training tests will lead to effective e-learning systems.

Table 1. Summary of multi-dimensional criteria that effect on overall efficiency of E-learning systems

Critical Dimensions for evaluating e-learning systems efficiency	References	Advantages	Limitation	Applied on
Technology based Component	Islas et al., 2007) and (Ahmed Younis Alsabawy et al., 2013) [1] ,[2]	Evaluating all technical issues in e-learning systems such as system quality and Internet quality	Ignore other critical factor such as effectiveness of content of e-learning systems	applied in modern training systems
System quality including all this sub criteria (LMS software : Security-stability-well design structure-Ease of using system-	Kim & Lee, (2007), Selim (2007), Sun	Provide wide range evaluations for each factor effect on the e-learning systems quality as whole	_____	All these evaluations criteria applied on learning management

personalization – Scalability – system backup procedures – responsiveness-system error tracking) (Hardware component : wellness of microphones – electronic Blackboard-Multimedia tools-electronic mail-desktop video conferencing)	et al., (2008),Khan (2001) [5],[7],[17] , [18]	Provide degree of efficiency for each factor to the whole systems		systems used in e-learning fields		
Service quality involving all these criteria of : courses management –identity of students– courses authorization – security of services	Sevgi Ozkan (2009) [19]	Evaluating all administrative affairs introduced by learning management systems used in e-learning process	_____	Applied on most of e-learning systems that delivering courses via learning management systems		
Internet quality including dimensions of :high broadband connection – slower download speed- web 2.0 application	Khan (2001),Webster and Hackley (1997) [7], [10]	Ensuring efficiency of e-learning process with high quality services. Since learners expect on-demand for their materials anytime and anywhere.	Difficult to apply in several internet technologies used in development of e-learning systems	Applied on Web 2.0 applications that applied on constructing e-learning systems		
Human factors evaluation including Instructors dimension evaluation which include these dimensions :	(Selim ,2007) , (Khan, 2005). [5],[15]	Based on all theses Literaturesand results of evaluations these dimensions proved that there are strong relationship between instructor's quality and student's satisfaction and instructor's play an important role in efficiency of e-learning systems .	_____	Evaluation of instructor's dimension applied on most of e-learning systems such that : web-based learning management system at Brunel University, UK		
Measure teaching effectiveness	Govindasamy (2001).[11]					
Instructor's time interact with student's	Khan, (2005). [15]					
Teaching as facilorator	Selim, H. M. (2007). [5]					
Attitudes toward technology	Webster and Hackley (1997). [10]					
Willingness to learn new systems	Khan (2001) . [7]					
Availability and responsiveness	Wang et al.,(2007) [20]					
Student's dimension Evaluation	Selim, H.				Results of _____	

Including these dimensions to evaluate:	M. (2007) [5]	evaluation student's dimension proved that there are great positive relationship between learner's attitudes and overall learner satisfaction also attitudes of student's toward e-learning systems and its technology have an effect on success of learning management systems	web-based learning management system at Brunel University, UK
Attitudes of learner's towards e-learning systems and understanding it	Sevgi Ozkan (2009) .[19]		
Interaction with other student's and instructor's	Selim, H. M. (2007) [5]		
Learner characteristic's such as belief- confidence	Passerini, K., and Granger, M. J. (2000) [16]		
Student's commitment	Govinda samy,(2002) [11]		
Course content quality evaluation: Including these dimensions to evaluate :		Evaluating all dimensions of content quality enables learners to feel more comfortable with the course content, resulting in higher retention and satisfaction rates.	Evaluation of content quality dimension applied on most of e-learning systems such that: E-learning system at Amity university Dubai.
Interactive course	Khan (2001),Govindasamy (2002). [7][11]		
Cleary written materials	(Shee & Wang, 2008). [6]		
purposeful materials			
predefined online tests /quizzes evaluation criteria	Khan (2001) [7]		
up to date materials	Holsapple, C. W. and Lee-Post, A. (2006) [13]		
Entire grades in time			
Courses structure	Khan (2001) [7]		

III. RESULTS AND DISCUSSION

Based on a comprehensive research review of previous studies found that the most dimensions and factors within e-learning systems in higher educational organizations are three critical dimensions (technology Based component, human factors (students and instructors) and course content quality and effectiveness)

Each specific dimension is composed of other sub dimensions effect on the upper one .consequently evaluation the over whole e-learning systems efficiency have to occur through multi-dimensional criteria evaluation to reach for effective evaluation for most of e-learning systems in higher education.

Based on multi-dimensional criteria section and review of most of previous studies on evaluation e-learning systems. Evaluation of most e-learning systems have to follow these proposed schema for evaluating over whole system.

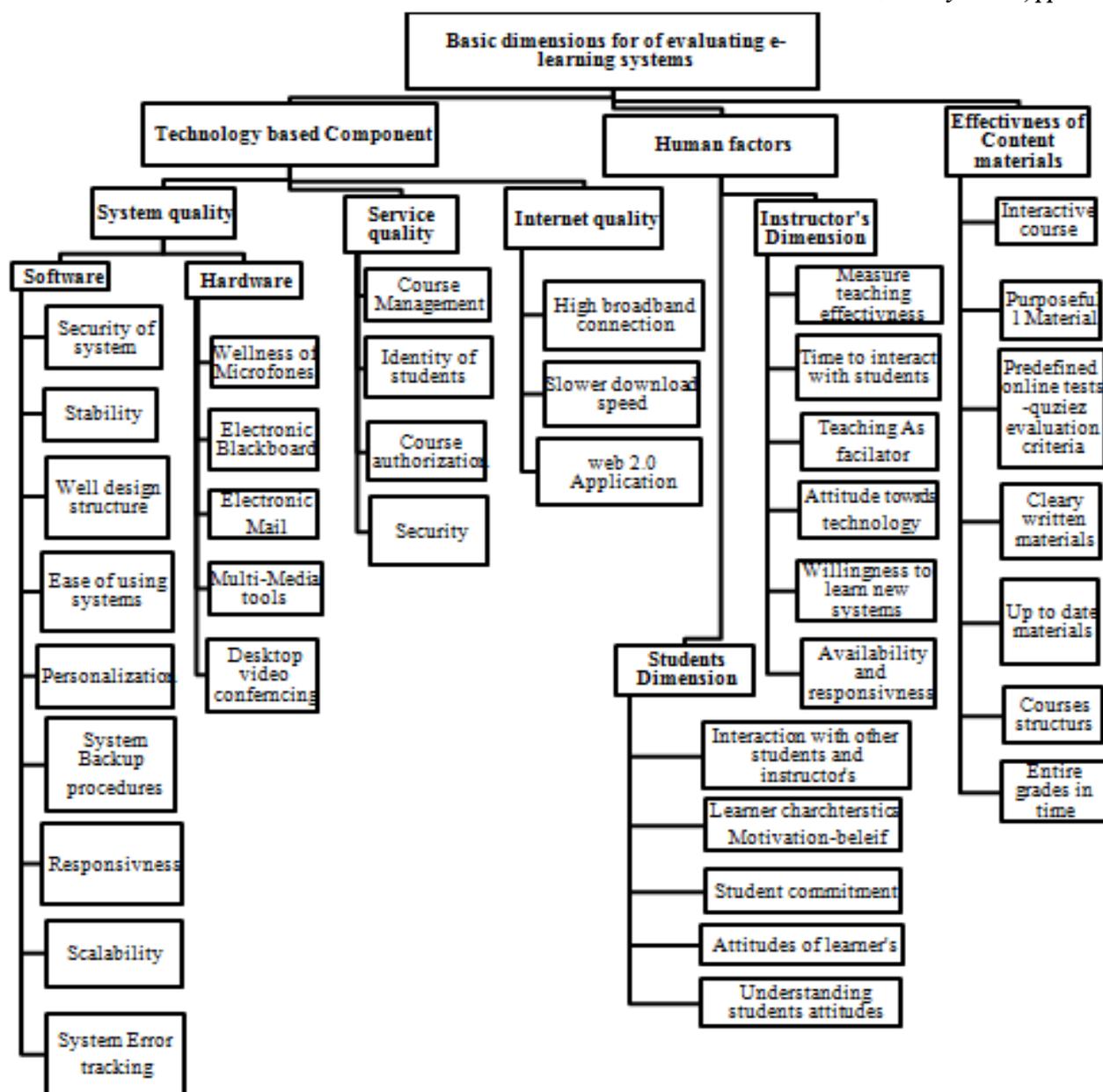


Fig 1 Proposed schema of multi-dimensional criteria for evaluating the overall E-learning systems efficiency

The overall e-learning systems success can be defined as cumulative sum of evaluating of this entire individual evaluation for each specific dimension.

IV. CONCLUSION

E-learning systems has been developed and used by many different higher education institutions around the world. Consequently, there were different evaluations related to different dimensions and critical factors for each system. This research attempt to introduce comprehensive e-learning evaluations schema based on reviewing the most of previous studies in this area collecting set of multi-dimensions criteria that effect on the most of e-learning system evaluation. This research focus on evaluation through three basic dimensions evaluation of technology based component used in systems, human factors evaluation for both students and instructors and evaluation for course content quality .inside each basic dimension there were other dimensions effect on the overall evaluation of the most of e-learning systems .using proposed schema as shown on figure one gained better understanding and collecting the most of dimensions of evaluating e-learning applications and focused on achieving effective evaluation for most of e-learning systems.

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