A Novel Framework for Effective Deployment of E-Learning Environment in Developing Countries: A Case Study of Pakistan

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Abstract— **Best use of Information Communication Technologies (ICT) in education and online instructional capabilities are need of the hour and in coming decade it will be a must have capability for any future university or faculty. E-learning is seen as a catalyst to the evolution of higher education. While e-learning is getting a lot of attention in recent days, at the same time academia is stressing on the need of a mechanism to monitor its use and ensure quality in e-learning practices. E-learning is used in developed and developing countries with different objectives. In some cases more reputed institutes in developed countries are using it to standardize teaching and learning practices. It is also seen as a platform to increase collaborative work and to make it up to international standard. While in developing countries a major use of e-learning platforms is to extend the outreach of education and to minimize the capacity constraints of conventional institution infrastructure. With these diverse applications of e-learning there comes the need for a Quality Management System (QMS) that can be tuned to the overall objective, procedures, processes, resources, outcomes of a particular learning environment. Proposed work studies the existing monitoring and evaluation practices in e-learning environments and suggests a framework that ensures continuous feedback against defined performance indicators. The identification of performance indicators in conducted research work is focused especially on use of e-learning systems in developing countries such as Pakistan.**

QMS enables continuous monitoring and evaluation of e-learning performance factors which has been identified in the study. The work initially studied QMS prototype use in 10% of study centers of 3rd largest e-learning education provider of Pakistan COMSATS Institute of Information Technology (CIIT) Virtual Campus. 204 e-learners participated in the surveys conducted through QMS which identified 12 basic factors essential for safeguarding quality in e-learning. Further work is proposed that will implement this QMS on all study centers of not only author's host institute but also on other e-learning institutes of country. The outcome in form a comprehensive e-learning QMS will increase confidence of such education systems in general public, and will also help academia to reform e-learning practices.

I. INTRODUCTION

Electronic-learning (e-learning) is a form of distance learning which has true potential to attain the objective of education for all. In e-learning, the teacher and learners are separated far away, but they are in contact with each other and can communicate with one another online. In the recent times, e-learning has evolved explosively (Cuadrado, 2010). This explosive evolution can be credited to increased demand of higher education and observed benefits regarding education (Khan, 2001). In the past few years, a lot of studies have been conducted to assess the impact of e-learning. Research results show that there is no universally accepted definition of what an e-learning is, as practitioners and authors use both the term interchangeably according to their own individual needs (Chu, 2010), (Liu, 2009). Especially in developing countries e-learning requires motivation and interactions with technology, high-quality academic support, interactive computer training, and quality of learning materials (Chu, 2010),(Wagner, 2008).

The rapid developments in the information communication technology (ICT) have put more emphasis on lifelong learning. This requires students to update their skills and knowledge constantly by adopting to the global change (UNESCO, 2004). In addition, professionals are seeking to update their skill-sets via e-learning technology. In order for interactive pedagogies in on-line setting, seamless video and audio communication between instructor and learners is required (Bhuasiri, 2012). Interactive learning activities include group discussions, cross-questioning, and a demonstration using multimedia and online contents. Moreover, e-learning techniques reduce the time and space limitations in the existing traditional education model.

E-learning system is very much beneficial for both students and instructors located around the world. The learners are having advantages of e-learning such as accessibility to information without restriction of the time and location, interactivity, and flexibility to absorb the increasing number of students. Parsazadeh *et al*., (Parsazadeh, 2013), Al-Shboul *et al*., (Al-Shboul, 2013) and Liu *et al* (Liu, 2009), discussed e-learning critical success factors (CSFs). The CSFs were

grouped into 6 categories which are, ease of access, interface design, level of interaction, system quality, service quality and internet quality. The population lives in an extremely associated and globalized culture, where technological advancements have changed the behavior of students as well as organizations. Due to advancement of technology like mobile phones, Internet, and expansion of social networking. Internet has become very important part of human beings. The objective is to take benefits of the circumstances, looking for the ways to build relationships with existing customers or potential future customers (Romero, 2013).

A. EXISTING WORK IN PAKISTAN

In Pakistan, a number of factors, such as the provisions of the National Education Policy 2009, limited places in higher education institutions, resource constraints, restricted institutional growth, high rate of returns associated with higher education, value of a university degree for career advancement, expanding size of the middle class and the increasing student population from the higher secondary level have created a big demand for higher education. However, due to limited places, only 8.1% of the age group 17-23 years has access to higher education and a large pool of talent goes wasted and is unable to get opportunities for higher education. The education policy 20009 targets 10% by 2015 and 15% by 2020, which translates into 4 million students from the current million. There are many who do not get admission, and there are other working professionals who would like others in to educate themselves without leaving their jobs and would like to have their professional career development. The lifelong learning, which has come in the wake of ever-continuous development of technologies, has opened new avenues and windows of opportunities to go for continuous learning.

The establishment of the Allama Iqbal Open University (1974) and the Virtual University (VU, 2002) by the Government of Pakistan has opened up vast opportunities to increasing the number of students who cannot afford formal education because of family, age, monetary or other considerations. COMSATS Institute of Information Technology (CIIT) started its e-learning with number of registered study centers in Pakistan (CIIT, 2013).

B. PROBLEM STATEMENT

Government of Pakistan invested a lot on physical infrastructure, computer laboratories and space to cater for the demand of increased enrolments in e-learning institutes over the past few years. Computers and equipments were provided to different e-learning educational institutes by higher education commission (HEC). Free Internet access was provided to many educational institutes for research and technical skills enhancements of students (Education Policy of Pakistan 2009).

➤ Considerable work has been done by Government of Pakistan on development of infrastructure etc. but very low efforts were made to train the administrators and students for the use of such systems.

➤ No or very little efforts were made to develop awareness of education support systems.

➤ Various stake holder including educational institutes, members of academia/teachers, students, technology experts of region were not taken on board before launching such initiatives.

➤ Customization elements of system remained unaddressed, where localization of system as per requirements of users can improve the accessibility of such systems by teachers/students.

➤ No mechanism was made to train teachers, students and support staff about e-learning system especially Learning Management System (LMS).

DROPOUT FALL-2012
(Total Registered Students 3151

DROPOUT SPRING-2013
(Total Registered Students 1123

DROPOUT FALL-2013
**(Total Registered Students 1797**
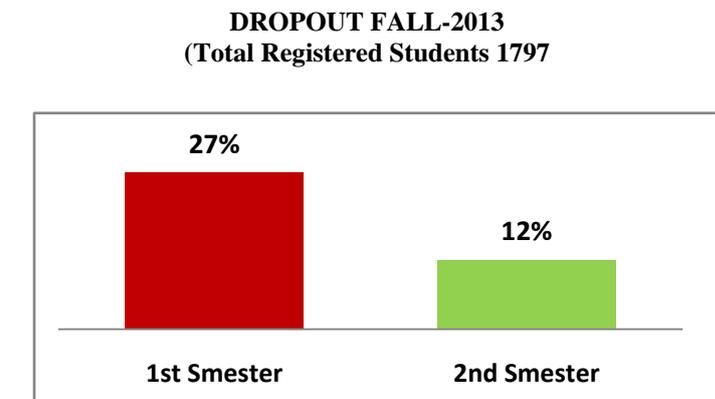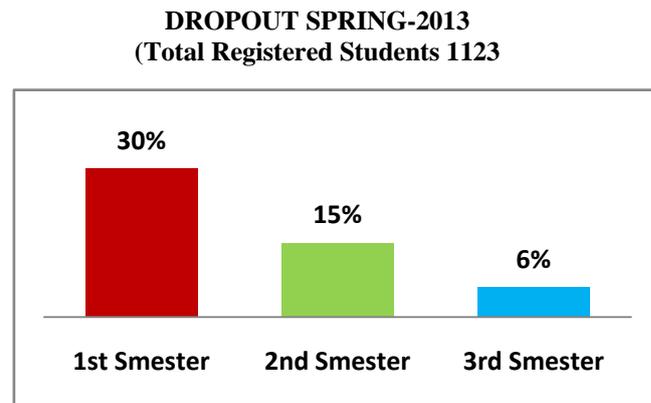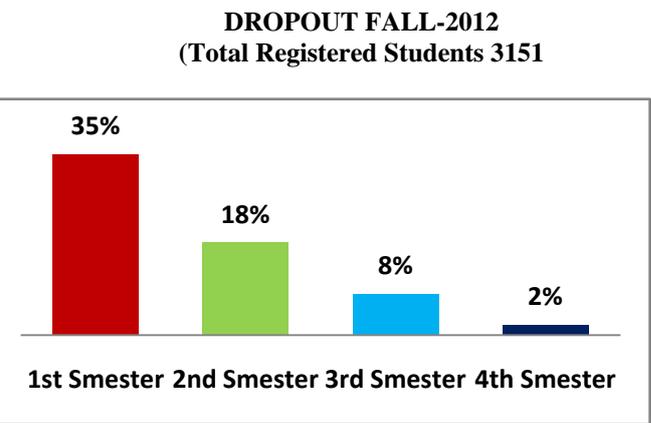
Figure 1. Dropout Rate of students in CIIT VC

No effort was made with opportunities for inter-learner discussions about their program, for example through a program discussion forum or web-based conferencing. Ground rules and protocols for communication with other students and tutors, as well as events and activities which are compulsory or optional.

Due to these reasons, there is high dropout rate of those students who opt e-learning and enroll themselves in different courses. Most of the enrolled students leave their degree programs simply because they do not know about the computer and LMS usage. During 1st semester about 30% of the students withdrew the program. Figure 1 reveals the live statistics obtained from CIIT virtual campus (VC). High numbers of students prefer to join e-learning institute due to time and finance limitations associated with them. However, at the very start of the semester when they do not get their desire results due to the lack of computer knowledge and LMS usage, they withdraw from courses. This data was collected from examination and IT department of CIIT, VC. From figure below it is clear that during first semester more than 30 % students left their courses because they are not too much familiar with computer and e-learning system. In second semester, dropout rate settles as students become familiar with system. In third and fourth semester, dropout rate becomes very low when compared with first semester.

Table 1 shows dropout rate of students from Virtual University of Pakistan due to different factors. The majority of students who apply for freeze of semester did not rejoin because of confusion whether they would be able to deliver due lack of their computer background and training (Muhammad & Raza n.d.)

Table 1: Dropout rate of Virtual University of Pakistan

Year	No. of Students Admitted	Students Left VU	Students Freez the smester	Active Students
2002	2706	59%	3%	38%
2003	1533	66%	5%	29%
2004	1917	72%	4%	24%
2005	1992	63%	4%	32%
2006	5600	57%	9%	34%
2007	11495	56%	14%	30%
2008	20921	51%	20%	29%
2009	27425	36%	32%	31%
2010	24131	20%	49%	31%
2011	17906	18%	44%	38%
2012	20016	8%	23%	68%

II. AIM AND OBJECTIVES OF RESEARCH

This research aims to develop a novel framework For effective deployment of e-learning environment in developing countries, with a focus on rural Areas of Pakistan.

A. OBJECTIVES

To build in depth understanding of e-learning concepts and the factors that contributes to the effective deployment of e-learning system.

To review existing literature on e-learning system especially to review the literature that focuses on the deployment of e-learning system in urban and rural areas of developing countries.

To find the factors that influence towards the effective deployment of e-learning system in urban and rural areas of Pakistan.

To find reasons of lack of deployment of e-learning process in urban and rural areas of Pakistan.

To design and develop a framework that helps in effective deployment of e-learning in developing countries such as Pakistan.

To optimize the proposed framework by developing a QMS to monitor the quality issues related to the e-learning process. This will help to enhance the implementation of technology based E- learning in higher education.

To critically analyze the performance of the optimized framework with existing approaches.

To deploy and test/commission the optimized framework and integrate into current infrastructure available.

B. GAP IN RESEARCH

Advancements in information technology and new developments in learning sciences provide opportunities to create well designed, interactive, affordable, efficient, easily accessible, flexible, and facilitated e-learning environments. E-learning methodologies have been extensively explored, but still there is a need to improve the effectiveness of e-learning framework and it is also required to develop a system which can monitor the quality related issues in the e-learning environment. Appropriate measures must be taken well in time to ensure the accuracy of the direction of quality. Many researchers focused to investigate the effectiveness of e-learning environment, but there is still a gap in e-learning environment and no validation of the existing framework has been done. The current study will focus to investigate the effective deployment of e-learning system in developing countries such as Pakistan and will help to improve the effectiveness of the e-learning infrastructure through development and deployment of Quality management Systems (QMS).

C. MOTIVATION FOR THE STUDY

There are very limited numbers of studies which focus on the successful deployment of e-learning in developing countries. Hence, primary motive for studying in this area is to develop a novel framework for the successful implementation of e-learning in developing countries particularly Pakistan. Secondly, the author is working in 3rd largest an e-learning institute of Pakistan (COMSATS Institute of Information Technology, Virtual Campus). The system is very naïve at the moment, students' dropout ratio is very high, and system effectiveness is very low. Existence of these issues has ignited my motivation to develop and implement a successful framework for e learning. Thus, the ultimate motivation of the proposed research is not only an academic contribution by presenting a framework for future researchers to develop on, but also an applied one in the sense that it will alleviate the existing issues of successful deployment in developing countries like Pakistan.

III. RELATED WORK

In the modern era, ICT is playing an imperative role in the e-learning environment. Hence authors are witnessing the presence and wide acceptance of e-learning. E-learning is the way in which we design, develop and convey the learning materials by utilizing technologies and internet in learning. Cross *et al* (Cross, 2004) defined e-learning is an approach that connects Internet and learning with the help of networks. These networks may comprise Internet technologies as well satellite to acquire and share knowledge and information. Corner (Corner, 2006) defined e-learning is defined as the blend of Internet and learning. It relies upon the information and communication technologies to acquire, store, disseminate, and enable learning anytime and anywhere in the world.

Existing literature provides comprehensive support for the fact that e-learning has been an effective tool in the higher education. Volery *et al* (Volery, 2000) mentioned that if the universities continued to deliver education using traditional classroom based education, they should expect only marginal improvement and accelerated costs over the time. Ruiz *et al* (Ruiz, 2006) conducted a study on four higher education institutions and found that e-learning had no less productivity than the traditional form of education. The study further revealed the cost savings effect and student satisfaction from e-learning. The research conducted in (Adanu, 2010) investigated two universities on the effectiveness of e-learning. They also found that students perceived e-learning to be more effective than other forms of learning. The authors of (Shu-Sheng, 2007) discussed factors for considerations during e-learning process. These factors affect behavioral intention to use e-learning by perceived usefulness ad self-efficacy. Learners' attitudes, self-paced, teacher-led, and multimedia instruction are some of the major factors to influence e-learning.

To properly deploy e-learning in higher education institutions some critical success factors must be kept in mind. Following section will discuss the previous literature on the critical success factors that have been investigated so far. Author look into some other critical success factors that are specifically suitable for deployment of e-learning in the Pakistani context.

A. CHALLENGES IN E-LEARNING DEPLOYMENT IN DEVELOPING COUNTRIES

E-learning provides numerous advantages over the traditional form of learning. However, it comes with several challenges in the successful implementation. Kearsley *et al* (Kearsley, 2002) argues that the development in the technology and internet has provided easier and faster connectivity, yet everyone does not have access to Internet and lacks basic computer skills. This leads to the inequitable availability of e-learning. The authors in (Johnston, 2005) reported that it is assumed e-learning may result in lack of social development in students and a feeling of isolation. However, they pointed out that the availability of live chat facilities and discussion forums allows students to interact and reduce the feeling of isolation.

Gunga and Ricketts (Gunga, 2007) conducted a study on the challenged faced in implementation of e-learning in African universities. Study focused on solving the problem of infrastructural barriers and weak information and communication technologies. The study highlights those collaborative networks such as sponsors in e-learning networks, the policy makers, telecommunication infrastructure and educators are major forces to overcome problems with online education. Picciano & Seaman (Picciano, 2007) found that most common problems associated with e-learning deployment are the new skill sets required to effectively utilize the technology and e-learning models.

The research in (Ali, 2008) studies the impediments to the implementation of e-learning in Kuwait while surveying the 11 largest companies. The survey revealed that four barriers hindered the implementation of e-learning in Kuwait are lack of support from management, language barriers, technology problems, higher workload and time shortage. Another research conducted in conducted Sri Lanka (Andersson, 2008) pointed out the major hurdles in the implementation of e-learning and surveyed 1887 respondents from 2004-2007. Their research showed that the seven most important challenges are guidance and support for the students, flexibility in learning, teaching and learning processes, access to the technology, previous academic confidence, local adaptation of the course content, and attitude towards information technology and e-learning.

Mahmud and Gope (Mahmud, 2009) worked on the indemnification of factors that restrict the implementation of e-learning in higher education institutions of Bangladesh. The study depicted that resistance to change the learning environment, deficiency in English language, lack of technical

and financial resources, low confidence level to use computer applications, lack of infrastructure (electricity and telephone line problems) are the most prevalent issue concerning successful e-learning deployment. The research in (Shraim, 2013) studied the opportunities and hindrances in the e-learning processes in Palestine. The authors found that both the faculties as well as students are well aware of e-learning benefits but they are not well prepared to adopt it. Rehma and Miliszewska (Rehma, 2010) studied the application of information and communication technologies and electronic learning in Libyan higher education. They found that the issues which need to be tackled are the infrastructure, course and contents development, cultural consideration, language barriers, and support from the management. Kahiigi *et al* (Kahiigi, 2011) researched on the students in Uganda for the effective implementation and utilization of collaborative e-learning. Study found that through e-learning students were able to share and acquire knowledge, access the learning material and understand the concepts. However, the process was hindered by the lower internet bandwidth, lack of internet and computer access, lack of interpersonal interaction, and information and communication technologies skills shortage were major obstacles in the overall effectiveness of e-learning process. The authors of (Oye, 2014) conducted a study in four developed countries UK, Australia, Korea and France to present a framework for developing countries. They found that a clear vision and action plans for e-learning, financial support and proper government policies, sufficient funds to pursue goals, proper research on e-learning, and due diligence on awareness, training and motivation of e-learning programs are reasons for success in developed countries.

Mohamadzadeh *et al* (Mohamadzadeh, 2012) surveyed 160 faculty members in Iran to identify the challenges posed by the e-learning development. They found that certain barriers such as contents incompatibility, unavailability of skills set, attitude, cultural differences, infrastructure, and barriers in the incorporation of electronic learning in the traditional learning process are the main challenges in the development of e-learning. Bugi *et al* (Bugi, 2012) performed a survey research in Nigera by gathering data from 200 e-learners. They found that most prevalent challenges presented are lack of proper electric power supply, internet access problems, service providers' efficacy, skills set required to operate and utilize, and cost of a computer system are the key challenges in e-learning process. Qureshi *et al* (Qureshi, 2012) conducted a study to highlight the constraints in the deployment of e-learning in Pakistan using empirical approach. The study demonstrated the power crisis (electricity failure) and the lack of proficiency in English language were the biggest issues in e-learning implementation in Pakistan. Other barriers include technical, lack of access, lack of personal assistance and privacy issues.

The authors in (Bell, 2013) discussed two main issues in large usage of e-learning in higher education; whether e-learning is a useful method of delivery as compare to conventional education, the researcher found that the outcomes of e-learning are equal to other delivery media. They also

answer the question that what are main challenges of e-learning in postsecondary education, by concluding the research they addressed that, barriers include fraud and cheating, low income and unprepared students. This author also discussed the number of registered students in E-learning system in 2011, they found that worldwide more than 70,000 students were registered in at least one online course at University of Maryland University College and the university registered more than 230,000 students in different programs. The research conducted in (Yang, 2013) reported that more than 20 percent students suffered from stress and more than 40 percent suffered from poor work life balance due to online learning process. They also proposed that with the intervention of education technology preparation (ETP); these issued could be brought down to some extent by booting their confidence and attitude towards online learning. Misra *et al* (Misra, 2013) emphasized on the importance of electronic learning in the current era and proposed an affective interface for the e-learning. They suggested that when the user's cognition, cultural background, social and affective state are kept in mind by the interface designers and implementers; an effective e-learning environment can be created.

(Altameem, 2013) discussed that presence of certain importance technical enablers are key to the successful implementation of online learning environment. These technical enablers include access of the internet, navigation and structure of contents, multiplatform learning, information technology and network infrastructure, a 24/7 technical support, ease of use, online security and high privacy.

IV. DATA COLLECTION AND ANALYSIS

Distribution of the study centers in all provinces is already shown in the Table 1. Detail of data collection procedure is shown in Table 2. Study selected proportionate random sample of 10% from each category. QMS has been installed on 12 out of 115 selected study centers for the purpose of monitoring quality related issue of Learning Management System (LMS). Response rate was 85% which show high participation rate during the survey. Table 3 explains the demographic characteristics of the respondents. Demographic results indicated that 68% of the respondents were male and mode group of the age was 20-29 years in which 57% respondents exists. Most of the students responded were undergraduate students which are 52% of the respondent, 84% respondents are single, 35% respondents are in 2nd semester and most of them are full time students.

Table 2. Details of Sample Data

Public Sector	Study centers	QMS installed 10% of each area	% of Population	Students invited to survey	Students Participated in survey	% response
Federal	5	1	4%	20	18	90%
Punjab	69	7	60%	140	131	94%
Sindh	11	1	10%	20	12	60%
KPK	24	2	21%	40	29	73%
Baluchistan	1	0	1%	0	0	0%
AJK	5	1	4%	20	15	75%
Total	115	12	100%	240	205	85%

Table 3 - Demographic Data

Demographic Variables	Categories	Percentages
Gender	Male	68%
	Female	32%
Age	20-29	57%
	30-40	34%
	Above 40	9%
Study Level	MS	14%
	Master (MBA, MCS)	25%
	Undergraduate	52%
	Faculty (Teaching staff)	9%
Marital status	Single	84%
	Married	16%
Semester	First	19%
	2nd	35%
	3rd	24%
	Above than 3rd	22%
Employment	Self (Business)	14%
	None (fulltime students)	49%
	Employee (Working in any organization)	36%

A. EXPLORATORY FACTOR ANALYSIS (EFA)

Data generated through QMS has been analyzed through statistical procedures to determine the major factors effecting LMS. There are many factors that contribute towards E-Learning like IT infrastructure, the technology know-how of teachers and students, basic computer skills in E-Learning, the attitude of teachers and students, quality of technology, quality of system, trainings arranged by the institutes, awareness of and ability to use fundamental technology, the role of English proficiency, role of tutor, positive response of lecturers and student affair team, support from institution, training of learning management system, and quality of learning materials.

To explore the relative factor a statistical procedure to determine the factors has been employed. This procedure is generally known as Exploratory Factor Analysis (EFA). Further multidimensional construct are treated with EFA to analyze their dimensions and variation extraction through each dimension. Exploratory factor analysis is a statistical method to investigate linearity of number of variables of interest to a smaller number of unobservable factors; parameters of linear functions are called factor loadings. Exploratory factor analysis consists of two stages. First one loading set is calculated that shows theoretical variances and covariance which fit the observed ones as closely as possible. A method generally used to determine a first set of loadings is called the principal component method. These loadings might not agree with the prior expectations, or might not have reasonable interpretation. so second stage consist of factor rotation to find the point of loadings that fit equally well the observed variances and covariance's and interpreted more easily. There are a number of methods in order to obtain first and rotated factor solutions, and each solution might give rise to a different interpretation. Study used Varimax rotation method that encourages the detection of factors each of which is related to few variables and on the other hand it discourages the detection of factors that are influencing all variables. There is substantial subjectivity in the interpretation of factors and determining the number of factors. See Table 4, Acceptable value for the factor loading is 0.50 (heir et al 1997). Table indicated maximum values of factors loadings are above 0.50

and very few values are less than 0.50. Items having less factor loading are excluded from the further analysis.

TABLE 4. DETAILED FACTOR LOADING

	Resource content	Course Content & delivery	Learning Management System (LMS)	Assessments	Behavior	Usefulness	Ease of use	Perceived content quality	Network Externality	Self-efficiency	Course Attribute	Subjective norm
Proper Guidance available from Study center	0.61											
Study material was available in time online	0.64											
Work station (PC) was available when required	0.54											
Facilities such has power supply, heating, air conditioning at study center are satisfactory	0.67											
Necessary help was provided by VCOMSATS	0.52											
The study material was competed and well organized		0.54										
course objective were clear and understandable		0.55										
Content of the course was useful ands stimulated interest and through process on the subject area		0.71										
Workload was manageable with my job/business/ work		0.56										
Peace of the course was appropriate / Manageable		0.57										
Ideas/concept were presented & clearly		0.51										
Method of instructions was understandable at students' level		0.51										
Language was used easy to understand		0.55										
Lecture were interactive and attractive		0.71										
Lecture have direct linkage and reference with course content and objective		0.52										
LMS was useful medium in the process of process of learning			0.51									
LMS is user-friendly and easy to operate for use such as assigments upload, quiz, discussion and live sessions			0.71									
VCOMSATS services such as help desk student services and IT are helpful in solving the problem			0.54									

	Resource content	Course Content & delivery	Learning Management System (LMS)	Assessments	Behavior	Usefulness	Ease of use	Perceived content quality	Network Externality	Self-efficiency	Course Attribute	Subjective norm
Adequate number of iterative sessions were held during semester.			0.56									
Are the timings of the interactive sessions good for me to attend.			0.54									
Interactive live sessions were helpful/useful in the course.			0.62									
Problems were faced to log in for the interactive sessions			0.51									
Sessions were running smoothly without interruption			0.56									
Lecturers were responsive during the interactive sessions			0.61									
Writing on the white board was easy readable			0.54									
Schedule of Assignments/Quiz/exam was notified properly & timely				0.59								
Quality of Exams such as nature of questions alignment with content is satisfactory				0.58								
Method of assessment was fair, appropriate & reasonable				0.66								
Prompt feedback on tests/exams was provided and feedback was effective/helpful				0.42								
Environment at exam center was fair, conformable and convenient				0.63								
Do you use the e-learning system on regular basis.					0.67							
How much time you use e-learning system every week.					0.66							
I try to learn by some other ways like to attend class/online session.					0.61							
Uses of video lectures for learning replacement of e-learning system					0.49							
I try to use CD ROM to attend class session for learning					0.54							
Use video lectures instead of e-learning LMS for learning.					0.51							
If I have access of LMS I try to use it.					0.56							
Given that I have access to the LMS, I try to use					0.71							
LMS enhance my learning skills						0.61						
My productivity improves by using e-learning system.						0.63						
Using LMS improves efficiency in my learnig.						0.78						

	Resource content	Course Content & delivery	Learning Management System (LMS)	Assessments	Behavior	Usefulness	Ease of use	Perceived content quality	Network Externality	Self-efficiency	Course Attribute	Subjective norm
I find the LMS to be very useful for my learning.						0.71						
Using E-Learning system do not require extra efforts							0.56					
E-Learning system is easy to use for me							0.52					
Usage of E-Learnig system is very easy to understand.							0.61					
I find E-Learning system very easy to work for my different assignments.							0.66					
I use internet search engin for my learning								0.57				
My instructor also use search engine to help me for learning								0.55				
Content on the E-Learning system is updated on a regular basis								0.72				
The E-learning system helps for getting of updated contents								0.61				
Most students use E-Learning for their learning									0.62			
Like me all students use E-Learning system for learning.									0.61			
Maximum students use the E-Learning system,I think related services (such as training and support) will soon be available.									0.5			
As maximum number of students us e-learning system,, I am sure related software and hardware will soon be available									0.71			
I can use E-learning system with out any training										0.56		
I can handle my self in case of any problem during usage of E-Learning system										0.66		
I can use different modules of E-Learnig system for my learning.										0.67		
Modules of E-Learning system fulfill my all requirements related to my courses											0.71	
Available modules of E-Learning system help all the requirements of the course.											0.8	
My instructor recommend me to use E-Learning system												0.63
My friends also recommend me to use E-Learning system												0.51
My teachers think I do not need to use E-Learning system.												0.78

B. USING VARIMAX ROTATION

Exploratory Factor Analysis converted the 62 items (questions) into 12 factors which further suggested names according to the nature of items included in the factors. Factor one suggested the name Resource Centers having 5 items, second factor is Course Content & Delivery having 10 items ranging factor loading 0.51 to 0.71, items of factor 3 related to LMS having loading range 0.51 to 0.71, factor four related to Assessments having 5 items and ranging 0.42 to 0.66. Further 0.42 loading is less than acceptable value so item having loading 0.42 has been eliminated from the analysis. Factor five consist of eight items and named Behavior having factor loading range from 0.49 to 0.71, items of factor six related to usefulness and seven is ease of use both having four items and loading above acceptable range, eight factor related to content quality, ninth factor is network externality, tenth self-efficacy, eleventh Course attributes ant last factor is Subjective norm. Further to test the reliability of instrument cronbach Alpha has been calculated which prescribed acceptable value is 0.70 (Heir, 1997). Moreover relative index and rank of each factors has been calculated to find the most important factors that can affect the effectiveness of the E-learning. Table 5 shows the relative index and rank of each factor along with cronbach Alpha and mean. Detailed factor loading has been shown in Table 4 . Results reviled that the most important factor contributing the effectiveness of e-learning is ease of use of the system and usefulness among twelve factors identified by the study according to user of the e-learning process. Based on our findings, we propose a framework for effective deployment of e-learning environment in developing countries (Figure.1)

Table 5: Reliability and Relative Index

Factors	Number of items	Reliability	Mean	Relative index	Rank
Resource Centers	5	0.79	3.14	0.628	10
Course Content & Delivery	10	0.73	2.71	0.542	12
Learning Management System (LMS)	10	0.881	3.87	0.774	3
Assessments	5	0.697	3.01	0.602	11
Behavior	8	0.77	3.2	0.64	9
usefulness	4	0.82	4.01	0.802	2
Ease of use	4	0.87	4.2	0.84	1
Perceived content quality	4	0.8	3.33	0.666	8
network externality	4	0.7	3.7	0.74	5
self-efficacy	3	0.91	3.8	0.76	4
Course attributes	2	0.84	3.5	0.7	7
Subjective norm	3	0.72	3.6	0.72	6

V. CONCLUSIONS

Developing countries are consistently facing challenges in implementation of E-learning and optimizing its benefits for the users. This challenge leads to the identifications of the factors which cause barriers for effectiveness of the e-learning. Study identified 12 basic factors which influence the e-learning effectiveness in developing countries through the implementation of QMS on selected study Centre of the e-learning in Rural and Urban Areas of Pakistan. Further these factors are merged into twelve factors using dimension reduction techniques in statistics (Exploratory Factor Analysis). Study reveals that some factors are powerful contributor towards effectiveness of E-Learning. Most important factor contributing to the effectiveness of e-learning process is ease of use. Ease of use related to the user complicity to the system. Some users are not much aware of computer and their computer skills are very less, most of the cases in rural area of Pakistan user are not skilled in computing and same with the proficiency of English language which cause major inefficiency in the e-learning process. Similarly the usefulness of the system and the interface of LMS should influence e-leaning process. LMS self-efficacy is also matter of concern to the user which may increase through providing training and development to the user about the e-learning environment and use.   These factors required consistent monitoring for the evaluation of the effectiveness of the E-learning in rural and Urban Areas of Pakistan to counter the challenges of e-learning effectiveness. Study suggests continuous use of QMS to monitor the effectiveness of the E-learning process to improve learning and efficiency of the system.

The study to date has two major limitations, which need further working. First, this is a pilot study used proportionate sample of
10% study centers from each region. This low small size can cause variation in the results. Secondly it is cross section study based on one survey. Study suggests applying QMS on all study centers for better monitoring of results and repeated data collection may cause the variation in the results. So for practitioners of e-learning it is mandatory to monitor the e-learning effectiveness at regular basis to avoid major failure in the learning process.
As such, the research will now focus on these two limitations to improve effectiveness of e-learning in rural and urban area of Pakistan. The usefulness of the proposed system will be evaluated through a thorough comparison of the feedback from the respondents from the different areas of the Pakistan. A comparison should be made on the rural and urban areas of Pakistan due to change in the intensity of each factor in rural and urban areas

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