

## Puzzle of Developing E-Learning Systems for Higher Education in Developing States like Pakistan

Allah Nawaz<sup>\*</sup>Irfan Ullah Khan<sup>†</sup>

**Abstract:** *E-Learning [EL] systems are developed by professionals but used by those belonging to one or another field and not the computer as subject. Given this, EL has to be developed within a scenario of technical, human and social aspects of the environment wherein the new system is about to operate. Which technologies are available and how they are perceived determines the development and use processes however, this relationship is mediated by users' digital literacy issues and beliefs about the nature and role of ICTs in education? This is therefore incumbent upon developers and HEI-management to start with a broader picture of EL projects and make technical, human, social and organizational arrangements to develop and integrate the new system within the existing work environment making it supportive to prospected users. This paper develops theoretical model of theory of EL development and use in higher education in the background of developing states.*

**Key Words:** Information & Communication Technologies, Electronic Learning, Higher Education Institutions, Digital-literacy

### Introduction

E-Learning is an unprecedented opportunity for higher education to achieve their old and emerging objectives more powerfully provided, new systems are constructed in line with the requirements related to users' demographic attributes like gender, learning styles, and experience ([Graff et al., 2001](#)). Furthermore, the new technologies come with new tools and techniques as well as mundane user styles ([Kundi & Nawaz, 2012](#)). New digital tools can successfully assimilate education and styles of learning in a unique educational environment ([Hart, 2018](#)). A successful merger of new technologies with higher education institutions (HEIs) demands a unique modus operandi to deal with things beyond new technologies like, institutional readiness teachers' digital literacy, curriculum, and so on ([Qureshi, Nawaz, Samiullah, Yasin, Ali, Abbas, & Imran, 2019](#)).

The research reveals that those institutions which have developed and using successful e-learning systems, strongly believed that development and use of E-Teaching, E-Learning and E-Administration is driven by pedagogy, not the technology ([Lewis & Goodison, 2004](#)). Furthermore, experiences with E-learning around the world suggests besides technology, ([Jewels & Ford, 2006](#)) social issues can either make or break all efforts on computerizing higher education system. For example, culture is a highly influential factor in the pedagogical models of every institute ([Nyvang, 2006](#)). Practically, however, research tells that current e-learning practices have been centered more on technological aspects than the applications of pedagogy (Docebo, 2018).

ICTs have affected our life overwhelmingly ([Sirkemaa, 2001](#)) however, the introduction of E-Learning in HEIs is the same and easy process showing that educational benefits are not simple to achieve through digitization ([Tinio, 2002](#)). Many projects for constructing E-Learning in developing countries have turned into an end instead of working as mean to end ([Sahay, 2004](#)). To successfully integrate new digital systems, the universities, are struggling with several internal and external problems ([Nawaz, 2013](#)). Their ability to successfully using new gadgets hinges on the institutional maturity of the universities to adopt educational technologies (ETS) ([Hart, 2018](#)).

It is however notable that handling of social issues is important but taking care of the technical support for the users is mandatory for the HEI, and it must be timely and instant and must be customized

<sup>\*</sup> Professor, Department of Public Administration, Gomal University, Dera Ismail Khan, KP, Pakistan.

<sup>†</sup> Assistant Professor, Department of Public Administration, Gomal University, Dera Ismail Khan, KP, Pakistan.

Email: [irfanullah@gu.edu.pk](mailto:irfanullah@gu.edu.pk)

As per individualistic attributes of the users. Continuous technical support is vital particularly in the early days of introducing E-Learning work environments for teachers, students and administrators of higher education in the developing countries like Pakistan ([Nawaz & Siddique, 2012](#)). This article presents logics and evidence to emphasize the thesis of this paper: Continuous technical support drives and stops E-Learning in higher education.

### **Research Design**

Based on positivist philosophy, knowledge is whatever can be verified and it can be recorded, stored, processed and communicated using standard concepts/terminologies. Literature survey has been used to develop the research model of the topic as well as verify the model through a detailed literature survey. Further, 'thematic-analysis' has been used to process the data and reach the answers to the research questions.

### **E-Learning in Higher Education**

For higher education community, e-learning is a current issue however, some teachers and students talk of it as a fashion while others are serious to learn and integrate educational technologies (ETS) in teaching and learning practices ([Young, 2003](#); [Gray et al., 2003](#)). E-Learning is modern digital environment for pedagogy, learning and education-management using internet and web technologies ([Kundi & Nawaz, 2012](#); [Nawaz, 2013](#)). Most of the teachers and students in higher education use Internet for surfing, messaging, chatting, and blogging thereby learn to add new dimensions to their teaching and learning practices ([Qureshi et al., 2019](#)).

### **Digital Technologies**

Contemporary education has shifted from its old models to new paradigms where educational applications of ICTs are diverse, for example, they are being used for simple information delivery (digital library) on one extreme and personalization and adaptation of ETS with user styles on the other end ([Chan & Lee, 2007](#)). E-Learning reflects a stretch of educational applications like internet based search engines for teachers and students and MS-Office and email for administrators, but carrying nominal impacts on teaching, learning and administrative practices while conversely, there are virtual learning systems using web-applications for educational deliveries (Docebo, 2018). There is therefore a wide range of opportunities for higher education to digitize their work environments for effective digital literacy of their teachers, students and administrators ([Hart, 2018](#)).

**Computers as the Core Gadget:** Computers started the story of e-learning in higher education. Though the machine has been downplayed by the emergence of 'connectivity' and 'telecommunications' but no digital system can exist without computers. Users can access and use the resources around the world but all this happens through a terminal (or a computer workstation). In 1980s a real user-friendly machine emerged with the name of PC (Personal Computer) which still continues as the integrating system for all the peripheral digital technologies ([Qureshi et al., 2019](#)).

**Networking and Telecommunications:** Networking connects computers to share resources accessible to all on network. These technologies help with a diversity of gadgets to communicate across the platforms ([Glogoff, 2005](#)). Internet is becoming indispensable for learning and social life ([Dalsgaard, 2006](#); [Sattar et al., 2011](#)). It is evolving from simple networks to advanced Internet facilities thus generating a 'global-village,' by eliminating the geographical constraints for interaction. The technologies like e-mail, facebook, and twitter are supporting teachers however, Web, and most recently WebCT, are the most popular software tools. Most education sites offer basic information like syllabus, schedule, communication, announcements, discussion forums, conferences, and streaming video ([Ezziane, 2007](#)). Networking in higher education is about delivering through network where students can access materials and communicate with teachers and other students ([Epignosis 2014: 8](#)).

#### *c. Internet as an Information Highway*

Internet is a network of networks, which links all networks working at local, private, public, business, academic, and networks of government. Internet is a universal communication system where Web is a store of “data-sources that are linked together through hyperlinks and URLs ([Wikipedia, 2018](#)).” Free & Open Source Software (FOSS) is an emerging free source of knowledge for anybody on the network. FOSS has transformed the software industry ([Stephenson, 2006](#)). Open source systems are introducing new educational culture in the higher education. ([Kundi & Nawaz, 2012](#)). While some material has been available from the start of Internet however, new more and more libraries are becoming virtual learning platforms by uploading increasing data sources online. For example, the University of Texas has made an effort for a bookless library by publishing sixty thousand volumes online and planning to post all their collections online ([Nawaz, 2013](#)) with open sources, open standards, open architecture, and open communities ([Epignosis 2014: 8](#)).

### **E-Learning Models in Higher Education**

The concepts of “E-Pedagogy ([Kuriloff, 2005](#))”, “E-Course ([Hvorecký et al., 2005](#))”, “E-Student ([Dinevski & Kokol, 2005](#))” and “E-Training ([Blázquez & Díaz, 2006](#))”, all collectively portray a digital picture of teaching and learning environments. High-quality E-Learning, however, requires the management and administration to provide moral, political and financial support to the levels of user requirements ([Ezziane, 2007](#); [Qureshi et al., 2019](#)).

**E-Teaching:** There are five forms of teachers as computer users including: tools builders, users of tool, abiders of tool, adapters, and those who don't use computers ([Johnson et al., 2006](#)). It is suggested that universities must create a body of users of tools. Simultaneously, motivate some of the creative faculty members to play the roles of adapters. These members must be provided with incentives and support in all required aspects. The most important type of teacher user is the adapter of tools, who are professional digital users with intention to customize the digital gadgets according to the student requirements and preferences. Tool adapters must be permanent faculty members to perform teaching as well. The digital literacy program must focus on creating these types of teachers ([Nawaz & Kundi, 2010](#)).

**E-Learning:** Students are the best users of the new technologies. They can customize their systems as per their individual preferences and thus make most productive use of the computers, networks and information sup[er highway on internet ([Sasseville, 2004](#)). Research shows that utilization of digital technologies by students is preferable than teacher's application of new gadgets (Docebo, 2018). The issues of new pedagogy to meet their needs is scary, but teachers know that despite the fact that these students learn differently, but they are more inclined to learn ([Hart, 2018](#)).

**E-Administration:** ICTs are more relevant in educational administration for scheduling and institutional management to improve the time-management of teachers, students and staff thereby reducing costs substantially ([Sanyal, 2001](#)). ICTs are fostering administrative processes, transportation of materials and communication at the institutional level (Valcke, 2004). It is not possible for teachers and students to successfully work in digital environments unless the education management and administrators working therein are also updated to digital work environments ([Buzhardt et al., 2005](#)). Educational administration can assist a lot in the whole institution if latest digital facilities are provided to them along with proper training and continuous technical support ([Nawaz, 2013](#)).

### **Development of E-Learning Systems in Higher Education Institutes**

The introduction of E-Learning in higher education is not “automatic ([Tinio, 2002](#)).” It is a socio-technical process with a diversity of technical and social issues ([Sahay, 2004](#); [Loing, 2005](#); [Qureshi et al., 2009](#)). Effective incorporation of computer technologies in HEIs is a complex process of considering about the teaching requirements, teacher requirements, students and their need analysis as well as concerns of the administrators ([Nawaz, 2013](#)). [Lewis & Goodison, \(2004\)](#) researched universities and found that universities with successful E-Learning-initiatives have made efforts to handle social and cultural issues along with technical demands of computerization ([Hart, 2018](#)).

## **Approaches to E-Learning Development**

Several approaches have been developed to construct computer based information systems like E-Learning in higher education institutions ([Gray et al., \(2003\)](#) suggesting that different approaches are successful in varying contextual work environments like contexts of developing states are different from those of the advanced countries ([Aaron et al., 2004](#)). Approaches represent the diversity of beliefs about the role, nature and benefits of E-Learning systems ([Kundi & Nawaz, 2012](#)). Appropriate approaches help creating successful and beneficial E-Learning systems for the students, teachers, and administrators of education institutions (Docebo, 2018; [Qureshi et al., 2010](#)).

The choice of approaches for E-Learning development depends on the E-Learning paradigm prevalent at the moment in HEI. For instance, under 'objectivism' 'technical' ideas dominate and emphasis are on the instrumental role of the new system where technology guides about the features of newly developed E-Learning system ([Young, 2003](#)). On the other hand, constructivist paradigm asserts the 'substantive view' of E-Learning with a strong belief in the cultural dimensions of new technologies thereby focusing on 'collaborative' approaches ([Willis, 2006](#)). In short, if ICTs are perceived as tools similar to other technologies, the development practices will be more techno-centric however, if a 'big-picture' of E-Learning is visualized, the development approaches will be more 'socio-technical' ([Kundi & Nawaz, 2012](#)).

## **User-Need Analysis**

Since, users determine the success or failure of any newly developed E-Learning system therefore the developers are needed to have the abilities to identify user needs and accommodate them in the developing process from start to end ([Ekstrom et al., 2006](#)). The success of any E-Learning software is squarely anchored on how far this product meets the needs of users or stakeholders ([Qureshi et al., 2009](#)). Although it is a time consuming activity to properly underline the user needs and successfully infuse them into the hardware and software of the new system but these are unavoidable and must be undertaken skillfully ([Nawaz, 2013](#)). Research verifies over and over that only those E-Learning systems come up with appreciations from the users which match the user requirements of every single individual user (Docebo, 2018).

Several methods are used to know and accommodate user needs in the new E-Learning system in higher education work environment including questionnaires, interview as well as different levels of giving participation to the users across the development trajectory of the new system ([Gray et al., 2003](#)). It is however, widely suggested that users must be given some level of participation in the development practices so that they can successfully incorporate their needs into the system. It however, depends on the computer-literacy of the users ([Nawaz & Kundi, 2010](#)). Developers must be in liaison with the heads of departments to identify technology role models among the faculty members who can be supportive of the development team ([Kundi & Nawaz, 2012](#)).

## **Socio-Technical Infrastructure**

A socio-technical infrastructure is made of computer and social networks. It is not simply the provision of computers only rather relations between developers, users, system and institution are given parallel importance and consideration ([Qureshi et al., 2009](#)). The creation of an updated socio-technical infrastructure is not an easy task. Technologies are changing every day and moment therefore the current technological infrastructures become outdated in a spell of time. Thus, having a state of the art technological infrastructure is an uphill task. Further, socio aspect of this infrastructure is more challenging and hard to create and maintain ([Nawaz & Kundi, 2010](#); [Qureshi et al., 2010](#)).

Another sensitive aspect of having and maintaining updated technological infrastructure is that HEIs need latest and cutting edge technologies to keep themselves competitive and popular in the market of technological education, which again demands a lot of funds and expertise ([Tinio, 2002](#))." Similarly, latest technologies are expensive while, "time is right for collaborative action because the time is wrong for any approach other than cost-sensitive, resource-smart deployments ([Nawaz & Qureshi, 2010a](#))." Sustained technical support refers not only to onetime training of users rather requires

Continuous and refreshing training and updating of the users to stay in touch with the new technologies and their applications in educational environment ([Nawaz & Siddique, 2012](#)).

### **User-Training**

As said earlier, the training of users is the key to have a successful E-Learning system in the higher education. Teachers, students and administrators all need proper training in making best use of new technologies in the favor of their work environment ([Oh & French, 2004](#)). Reaching the stage of full command over best use of E-Learning system needs long time but training must be so designed that it gives every user a good start and then he/she will continue with learning new systems by continuous use of its tools and techniques (Nawaz, 2011). The training materials and process must be in tune with the user requirements so that the best results can be expected from the users. They must be prepared to take interest in adopting new systems and adapting their behavior as per new technologies ([Kundi & Nawaz, 2012](#)).

The training of users is fundamental in both instrumental as well as substantive uses of the new system ([Young, 2003](#)). Instrumentalists have the opinion that since technology is neutral therefore, its advantages totally depend on how these technologies are used in favor of different purposes ([Macleod, 2005](#)). Likewise, substantive advocates of technology assert that ICTs have deeper effects on the attitudes of the users therefore, cultural changes in the behavior and attitudes of the users also mandatory to make better use of new technologies ([Kundi & Nawaz, 2012](#)). The training must not only develop the users as best users of technology but also create best possible collaboration between the users and the ICT-based work environments, extended to the teachers, students, and administrators ([Qureshi et al., 2019](#)).

### **Continuous Technical Support**

Once the e-learning system is developed and delivered for use, the need for continuous and uninterrupted technical support is required by teachers, students and administrators in handling their hardware and software problems, which are common to any computer application. The researchers have continuously published findings saying that continuous and sustained technical support is indispensable to the successful application of new technologies in higher education ([Nawaz & Siddique, 2012](#)). It is however notable that researcher also verifies the fact that provision of such robust technical support for all types of users is also very challenging and demands continuous efforts on the part of university administration (Docebo, 2018).

### **Opposing Perceptions of New Technologies**

There is a diversity of beliefs about and thus attitudes towards computers both among the developers and users of new technologies ([Graff et al., 2001](#)). It has been found that if teachers' perceptions of digital technologies are known they can be accommodated properly into the training packages to be handled and managed as per new requirements ([Zhao & Bryant, 2006](#)). Likewise, students' use of computer also depends on their perceptions about the usefulness of these technologies in learning and research assignments ([Hart, 2018](#)).

Resistance to change is commonly reported behavior of users of new technologies ([Tinio, 2002](#)) ([Sasseville, 2004](#)). It has been found through research that technical issues are placed on priority over the educational issues of change i.e., management of digital-change is still not connected with institution-wide strategies (Valcke, 2004). Although most educators accept the role of E-Learning, the issues of technological integration still continue creating critical gap between perceptions and practices of users in higher education. E-learning offers the learners with the facility to fit learning as per their lifestyles, thereby helping even the busiest individual to enhance his/her career ([Epignosis 2014:5](#)).

### **Theoretical Framework of the Issue**

Following figure 1 gives a picturesque of all the issues and arguments as they are connected and operate together in the developing process of e-learning in higher education. Available technologies and Approaches adopted for the development process are mutually interdependent but they collectively

Determine the whole process. But due to several problems the process is mediated by, particularly, digital literacy of users (or user training) and the perceptions (mindset) of the developers and users. There are several other related factors but the discussed factors have been placed on the top by current researchers.

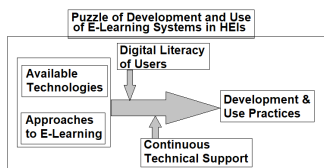


Figure 1: Schematic Diagram of the Puzzle

## Discussions

The teachers, students and administrators are still on their way to acquire the required digital literacy (Nawaz & Kundi, 2010) to become real world users of those digital devices (Nawaz, 2011) which are increasingly becoming indispensable in any walk of life. Researchers are also pinpointing the problems of successful integration of ICTs in teaching, learning and educational administration (Nawaz & Siddique, 2012). These issues include user resistance, poor digital literacy, absence of appropriate approach to development and execution, high rates of system failure, lack of administrative support, user dissatisfaction and incompatibility of new technologies and the institutional context (Nawaz, 2013). At the broader level the dominant problems working as barrier to the adoption of ICTs in HEIs are: the mindset problems and the digital literacy of the users (Hart, 2018).

Since teachers give credence to their academic traditions therefore they view change towards a new practice based in tradition, which can be defined as an anomaly that can hold back change and thus innovation however, teachers view ICT-related change as a re-interpretation of the traditional values (Kundi & Nawaz, 2012). The challenge in learning environments is to prepare the system compatible with differently skilled learners through proper and systematic motivation of the users (Hart, 2018). Given the fact that face-to-face interaction is critical for classroom relationships and interpersonal processes while E-Learning reduces social interaction. Taken together, barriers in the use of E-Learning tools can make the use of digital technologies frustrating for new users (Nawaz, 2011; Qureshi et al., 2019).

## Conclusions

Although e-learning is all due to the availability and accessibility of digital technologies for both the developing and developed countries, there are several other factors that interfere with the E-Projects for introducing ICTs in higher education. The process and problems are both similar as well as different from country to country, which must be understood by the developing states otherwise compatibility problems are reportedly very common. Research tells that although most of the time leading-edge technologies turn into bleeding-edge technologies but in reality most of the HEIs are adopting latest gadgets which are giving more problems than services. Similarly, researchers assert that contextual-compatibility is the key to successful E-Projects while most of the institutions in developing states are Borrowing models (approaches) from advanced countries, which is also a well published critical failure factor.

The context of an institution where new e-learning systems are introduced includes many things but most critical are the users. Their mindset and digital literacy are reported over and over as the critical success and failure factors for e-learning development and use practices. It is now becoming increasingly possible for developing countries to arrange for the infrastructure and other e-learning technologies. Similarly, they can have one or another approach to their project. These are comparatively controllable variables but developers and users are not easy to make available in the required form. Their behavior depends on their perceptions of technology, meaning that if they consider ETS positively, they will become a support to the development process but if otherwise, they pose serious threats to the e-learning projects in higher education. The perceptions depend on knowledge about ITCs thus; users' digital literacy can either make or break the destiny of e-Projects for e-learning.



## References

- Aaron, M., Dicks, D., Ives, C. & Montgomery, B. (2004). Planning for Integrating Teaching Technologies. *Canadian Journal of Learning and Technology*, 30(2), Spring.
- Blázquez, F. E. & Díaz, L. A. (2006). A Training Proposal for e-Learning Teachers. *European Journal of Open, Distance and E-Learning*.
- Buzhardt, J. & Heitzman-Powell, L. (2005). Stop blaming the teachers: The role of usability testing in bridging the gap between educators and technology. *Electronic Journal for the Integration of Technology in Education*, 4, 13.
- Chan, A. & Lee, M. J. W. (2007). We want to be Teachers, Not Programmers: In Pursuit of Relevance and Authenticity for Initial Teacher Education Students Studying an Information Technology Subject at an Australian University. *Electronic Journal for the Integration of Technology in Education*, 6, 79.
- Dalsgaard, C. (2006). Social software: E-learning beyond learning management systems. *European Journal of Open, Distance and E-Learning*.
- Dinevski, D. & Kokol, D. P. (2005). ICT and Lifelong Learning. *European Journal of Open, Distance and E-Learning*.
- Docebo (2018). e-learning Trends for 2018. Copyright © 2017 DOCEBO - all rights reserved. At: [www.docebo.com](http://www.docebo.com).
- Ekstrom, J. J., Gorka, S., Kamali, R., Lawson, E., Lunt, B., Miller, J. & Reichgelt, H. (2006). The Information Technology Model Curriculum. *Journal of Information Technology Education*, 5.
- Epignosis LLC (2014). E-Learning concepts, trends, applications. © Epignosis LLC. All rights reserved. 315 Montgomery Street, 8th and 9th Floors, San Francisco, California, A 94104, United States of America, at: [www.efrontlearning.net](http://www.efrontlearning.net).
- Ezziane, Z. (2007) Information Technology Literacy: Implications on Teaching and Learning. *Journal of Educational Technology & Society*, 10(3), 175-191.
- Glogoff, S. (2005). Instructional Blogging: Promoting Interactivity, Student-Centered Learning, and Peer Input. *Innovate Journal of Online Education*, 1(5), June/July.
- Graff, M., Davies, J. & McNorton, M. (2001). Cognitive Style and Cross Cultural Differences in Internet Use and Computer Attitudes. *European Journal of Open, Distance and E-Learning*.
- Gray, D. E., Ryan, M. & Coulon, A. (2003). The Training of Teachers and Trainers: Innovative Practices, Skills and Competencies in the use of e-learning. *European Journal of Open, Distance and E-Learning*.
- Hart, Jane. (2018). *Introduction to Modern Workplace Learning in 2018*. Centre for Modern Workplace Learning. Centre for Learning & Performance Technologies. January 2018. Modern Workplace.
- Hvorecký, J., Manažmentu, V. S. & Cesta, P. (2005). Can E-learning break the Digital Divide? *European Journal of Open, Distance and E-Learning*.
- Jewels, T. & Ford, M. (2006). The Development of a Taxonomy of Desired Personal Qualities for IT Project Team Members and It's Use in an Educational Setting. *Journal of Information Technology Education*, 5.
- Johnson, D.W., Bartholomew, K.W. & Miller, D. (2006). Improving Computer Literacy of Business Management Majors: A Case Study. *Journal of Information Technology Education*, 5.
- Kundi, G.M., & Nawaz, A. (2012). E-Learning opportunities & prospects in Higher Education Institutions of Khyber Pakhtunkhwa, Pakistan. *Global Journal of Computer Science and Technology Software & Data Engineering, USA*, 12(15): 29-37.
- Kuriloff, P. (2005). Breaking the Barriers of Time and Space More Effective Teaching Using e-Pedagogy. *Innovate Journal of Online Education*, 2(1), Oct/Nov.
- Lewis, D. & Goodison, R. (2004). Enhancing learning with Information and Communication Technology (ICT) in Higher Education. *Research Report RR533, Department for Education and Skills*. © University of Wolverhampton 2004, ISBN 1 84478 225 5.
- Loing, B. (2005). ICT and Higher Education. *General delegate of ICDE at UNESCO. 9th UNESCO/NGO Collective Consultation on Higher Education (6-8 April 2005)*.

- Macleod, H. (2005). What role can educational multimedia play in narrowing the digital divide? *International Journal of Education and Development using ICT*, 1(4).
- Nawaz, A. & Kundi, GM. (2010) Predictor of e-learning development and use practices in higher education institutions (HEIs) of NWFP, Pakistan. *Journal of Science and Technology Education Research*. 1(3):44-54.
- Nawaz, A. & Qureshi, AQ. (2010). Sustained technical support: Issues & prospects for e-learning in HEIs. *Global Journal of Management & Business Research*, 10(9):32-39. [http://globaljournals.org/GJMBR\\_Volume10/6-Sustained-Technical-Support-Issue-Prospectsfor-E-Learning-In-Heis.pdf](http://globaljournals.org/GJMBR_Volume10/6-Sustained-Technical-Support-Issue-Prospectsfor-E-Learning-In-Heis.pdf)
- Nawaz, A. & Siddique, M. (2012). Continuous technical support for the effective working of e-learning in higher education. *International Journal of Current Research Review*, 4(23):42-52. At: <http://www.ejmanager.com/mnstemps/45/45-1355389338.pdf?t=1356373574>.
- Nawaz, A. (2013). Using e-Learning as a tool for 'education for all' in developing states. *International Journal of Science and Technology Educational Research*, 4(3):38-46.
- Nyvang, T. (2006). *Implementation of ICT in Higher Education as Interacting Activity Systems*.
- Oh, Eunjoo & French, Russell (2004). Pre-service Teachers' Perceptions of an Introductory Instructional Technology Course. *Electronic Journal for the Integration of Technology in Education*, 3(1).
- Qureshi, QA, Nawaz, A., Samiullah, Yasin, MA., Ali, R., Abbas, M. & Imran, M. (2019). User's e-readiness for E-Health and traditional healthcare: a case of Dera Ismail Khan, Khyber Pakhtunkhwa, Pakistan. *International Transaction Journal of Engineering, Management, & Applied Sciences & Technologies*, (Sami, Asim, Rafaqet, Mazhar, Imran.). 10(5):607-615. ISSN 2228-9860; eISSN 1906-9642 <http://TUENGR.COM/V10/607.pdf> DOI: 10.14456/ITJEMAST.2019.57.
- Qureshi, Q.A., Ahmad, S. Najibullah, Nawaz, A., & Shah, B. (2009) e-learning development in HEIs: Uncomfortable and comfortable zones for developing countries. *Gomal University Journal of Research*, 25(2), 47-56. (GUJR)
- Sahay, S. (2004). Beyond utopian and nostalgic views of information technology and education: Implications for research and practice. *Journal of the Association for Information Systems*, 5(7), 282-313.
- Sanyal, B. C. (2001). New functions of higher education and ICT to achieve education for all. *Expert Roundtable on University and Technology-for-Literacy/Basic Education Partnership in Developing Countries. Paris, 10 to 12 Sep, 2001. International Institute for Educational Planning, UNESCO*.
- Sasseville, B. (2004). Integrating Information and Communication Technology in the Classroom: A Comparative Discourse Analysis. *Canadian Journal of Learning and Technology*, 30(2), Spring.
- Sattar, A., Nawaz, A., & Najibullah (2011). Evolution of e-learning in HEIs: Challenges & Opportunities for Developing Countries like Pakistan. *Journal of Emerging Trends in Economics and Management Sciences*.
- Sirkemaa, S. (2001). Information technology in developing a meta-learning environment. *European Journal of Open, Distance and E-Learning*.
- Stephenson, R. (2006). Open Source/Open Course: Learning Lessons for Educators from Free and Open Source Software. *Innovate Journal of Online Education*, 3(1), Oct/Nov.
- Tinio, V. L. (2002). ICT in education. *Presented by UNDP for the benefit of participants to the World Summit on the Information Society. UNDP's regional project, the Asia-Pacific Development Information Program (APDIP), in association with the secretariat of the Association of Southeast Asian Nations (ASEAN)*.
- Valcke, M. (2004). ICT in higher education: An uncomfortable zone for institutes and their policies. In R. Atkinson, C. McBeath, D. Jonas-Dwyer & R. Phillips (Eds), beyond the comfort zone: *Proceedings of the 21st ASCILITE Conference (pp. 20-35). Perth, 5-8 December*.
- Wikipedia, (2018) Internet. <https://en.wikipedia.org/wiki/Internet>.
- Willis, J. (2006). Creating a Working Model for Technology Integration through a Lesson Planning WebQuest. *Electronic Journal for the Integration of Technology in Education*, 5, 25-33.



- Young, L. D. (2003). Bridging Theory and Practice: Developing Guidelines to Facilitate the Design of Computer-based Learning Environments. *Canadian Journal of Learning and Technology*, 29(3), Fall/Autumn.
- Zhao, Y. & LeAnna Bryant, F. (2006). Can Teacher Technology Integration Training Alone Lead to High Levels of Technology Integration? A Qualitative Look at Teachers' Technology Integration after State Mandated Technology Training. *Electronic Journal for the Integration of Technology in Education*, 5, 53-62.