JOURNAL OF SOCIAL RESEARCH DEVELOPMENT

DIGITAL TECHNOLOGIES FOR ONLINE HIGHER-EDUCATION: THE CREATORS AND KILLERS OF DIGITAL DIVIDES

Allah Nawaz[1], Abid Hussain[2] & Aamir Sohail[3]

[1]Department of Management Sciences, Qurtuba University, Dere Ismail Khan, KPK, Pakistan
[2]Department of Public Administration, Gomal University, Dera Ismail Khan, KPK, Pakistan
[3]Lecturer, Commerce Department, University of Sargodha (S-Campus Bhakkar), Pakistan

KEYWORDS	ABSTRACT
Online Higher-Education, ICTs, E-Learning, Digital-Divide, Virtual Class/ Campus, Blended Learning, e-Solutions, e-Courses	The digital technologies have gained continuous momentum during the last decades in emerging economies. Contemporary world is divided into 'haves' and 'have-nots' on the basis of access to information and communication technologies (ICTs) mainly internet. This is called digital-divide: classification of the global-community into digitally literate and illiterate citizens. ICTs are said to be the main cause of this problem however the same technologies offer opportunities to not only bridge the digital divide but also improve life particularly, higher-education. This paper brings together the experience and viewpoints of researchers about the definition, causes, ICT-based solutions and hurdles in implementing online higher education in the universities to manage digital-divides in the developing countries. Based on the literature about the digital technologies and its application in the different spheres, it is argued that ICTs are not threats rather the opportunities provided they are harnessed in tune with the human and non-human contexts of the higher education in Pakistan.
Corresponding Author	Abid Hussain, **Email**: *abidhussainabid35@gmail.com*
DOI	

INTRODUCTION

There is more important the value of digital divide has the attached with decision-making policies, and plans (Koo, 2008). Despite the fact that computers in our life playing vital and successful role, those who have the knowledge of computer can easily understand (Nawaz, 2010). The use of the ICTs and the use of internet at the level of individuals, communities and cultures, digital divides defined the boundaries (Moolman & Blignaut, 2008). Access and digital divide have always been an issue for E-Learning in numerous countries (Stryjak & James, 2016; Nawaz & Irfanullah, 2019). The ICT-policies in education must be based on an educational philosophy, a more integrated approach of using ICTs which considers the social impact (digital divide) of ICT (Valcke, 2004). In this connection, international scope and the level, the digital divide framework has been followed the numerous international

"agencies such as World Bank, UNESCO and the United Nations, and at the G8 Meeting" (Macleod, 2005).

This the best claim E- learning is the better source and best way in developing countries to provide education (Hvorecký et al., 2005; Qureshi et al., 2009). Thus, digital technologies have been widely used in educational context with diverse significant outcomes. Education is "both a factor behind digital-divide" as well as a tool to bridge this gap. The role of the educational media is playing the dynamic role in the education institutes and developing new way of learning (Macleod, 2005). Furthermore, leading expectations from E-learning are about it is the ability that everyone has the equal chance to get results and education. Researchers argue that the availability of e-Courses for everyone is providing high quality of education to everyone (Hvorecký et al., 2005; Nawaz & Kundi, 2010c). Therefore, the top-rated universities provide the online education and certificates for concerned students (Bytesforall, 2016).

LITERATURE REVIEW
Digital divide is well-defined narrowly in terms of physical excess of the user to hardware and availability of the option to access the connectivity. To formulate solutions "simply by increasing the numbers of computers and Internet access" is not enough (Nawaz & Kundi, 2010). Like, within universities, ICTs have created local digital divide. In higher education use of sophisticated technologies requires dependence on IT-departments, which creates digital divide within universities (Qureshi et al., 2011). The grip of the poverty making the life of people more difficult and "(lack of control over decisions made both by them and for them)". The ICTs have proved capable to empowering these people has access on the information (Wims & Lawler, 2007). Obviously, the ICT solutions can help solving issues related to education like teacher shortages, the drop rate, lack of the opportunity and poor achievements (Stryjak & James, 2016). In this regard, disparity in access to the ICTs not properly exist in developing countries and the figures tell that developed world dominates in access to ICTs.

The term digital-divide describes a wide range of gaps in the provision of the technology, information, and education (Macleod, 2005). The issue is multidimensional, for instance, digital divide does not exist only between developed nation and developing nation, but also within nations thereby the concept of the inequality is in developing and developed countries (Drucker, 2006). Digital divide is a "relative differential in access" to ICTs between and within regional groupings. The digital technologies playing important role for success of education but everyone has not opportunity to avail digital technologies (Nawaz, 2010). The developing and poor countries have several problems which divide them from rest of the world. The poverty, illiteracy, political turmoil and social unrest are leading issues due to which these countries face global isolation (Beebe, 2004), disempowerment (Shimabukuro, 2005; Wiley, 2006; Wims & Lawler, 2007), deprivation from benefits of new technologies.

Furthermore, among these problems, Illiteracy is single most important factor contributing to the digital divide. In this connection, ICTs require not only traditional literacy but also demands 'Digital-literacy' (Stryjak & James, 2016) to fight against digital isolation (Nawaz & Irfan, 2019).

Furthermore, our world culture is not literary but also scientific and moderate therefore no country can avoid it (Sasseville, 2004). Furthermore, recent pressing issues in developing countries due to globalization has been more raised by facilitating the global diffusion of ICTs (Nawaz & Kundi, 2010b). These technologies are seen as current era of information and access for everyone (Bytesforall, 2016). More surely, ICTs can help in solving following causes of digital-divide:

1. Shortage of qualified teachers in the institutions due to one and other reasons in contemporary situations.
2. Achievements at low level: Introducing ICTs can also the highlights the negativity in the educational institutes, such as high ratio of students, the teacher turnover and the lack of institutional equipment's.
3. High student drop-out rates: Research tells that the students enjoy learning using technology thereby chances of quitting education is reduced.
4. Lack of "opportunities in remote areas: Distance learning can help to overcome the problems associated with geographical isolation" over virtual access and reduction in educational cost of physical education.
5. Lack of educational material and resources: Study and teaching materials are very sparse in many of educational institutions in developing countries (Wims & Lawler, 2007; Qureshi et al., 2011).

Likewise, there are obstacles to introduce ICTs in developing countries and thereby reduce digital divide, for example:

1. The issues of electronic literacy (the knowledge and skills required to use ICTs) for educators.
2. The availability of the digital tools or products of the educational-technologies, for example, lack of relevant online materials.
3. Cultural issues of compatibility between existing and new technologies (Nawaz, 2010).

RESEARCH METHODS

The role and "development of educational multimedia" is playing effective role in reducing the impacts of digital-divide particularly, in the countries that are doing progress for the development. Nevertheless, bridging the digital divide "should not be guided only by the technologically deterministic approach rather" according to the broader "social, cultural, political and economic" contexts. Development of electronic literacy, "culturally relevant

online content, interfaces and educational multimedia can enhance social inclusion for the developing countries" (Macleod, 2005). So, incorporation of the role of ICTS promoting in the educational institutes bring the main change in the education sectors (Wims & Lawler, 2007; Stryjak & James, 2016). Appropriate use of ICTs can improve "many aspects of life in the developing countries from health to education to economic growth". In education ICTs help in creating a people or learner-centered approach to teaching and learning (Young, 2003). Digital gadgets "facilitate a pedagogical shift resulting in an educational interaction between the teachers and learners" (Qureshi et al., 2009). The role ICTS is not provide the support but also provide the meaningful information and aims. (Kundi & Nawaz, 2010; Sattar et al., 2011).

FINDINGS OF STUDY

E learning is the 'education for those who cannot be the contribute and come at the place of education so that education for everyone" (Stryjak& James, 2016). This is undeniable that illiterates cannot access new technologies even if hardware and software is available (Tinio, 2002). So, the biggest cause of digital divide is lack of education and biggest issue for education in developing countries is the absence of infrastructure, teachers and funds to create education facilities for every citizen. ICTs are commonly blamed for creating and expanding digital divide however it also offers opportunities to bridge this divide by using eSolutions. In background of education, there are two broad options: Distance learning (virtual education) and Blended learning (residential education) (Abrami et al., 2006; Kundi & Nawaz, 2010).

E-Learning & Online Higher-Education

Variety of terms are used to express computer-mediated learning like electronic learning, online instruction, distance education, "computer mediated communication, multimedia instruction, online courses, virtual classroom, computer-assisted instruction", telemedicine and e-health (Abrami et al., 2006). ICTs "provide great opportunity for the universities of developing countries" playing the role to enhance the level of education and productivity "developing countries to improve teaching and learning processes". Most of universities doing working provide the assistance material in shape of the DVDs audio and other technologies facilities (Sife et al., 2007; Nawaz & Kundi, 2010b). For most E learning does not means they provide the education at domestic level but also provide education at any level and every one at place where faculties exist (Pfeffer, 2004). E-Learning has "become general term about application of computer technologies to education occurring in face-to-face environment, in blended and hybrid courses, in mediated DE in online learning" climate (Abrami et al., 2006).

Blended E-Learning

The increasing dissemination and speed of ICT is "showing that our local universities and learning and research communities are no longer strictly local, they have gone" the global

(Beebe, 2004). Residential education "relies on direct interaction, while distance education traditionally is the material-based interaction'. Blended learning 'merges both approaches and helps both residential and distance education to compensate their weaknesses" with the help of ICTs (Pfeffer, 2004). In this connection, universities in the developing countries are creating blended learning system to benefit both from traditional and new technologies, i.e., African universities are "experimenting with blended learning" or multi-modal learning to attain the desired academic standards (Beebe, 2004) as the 'blended E-Learning within the higher education sector" continue to experience growth (Kanuka, 2007; Nawaz, 2010; Sattar et al., 2011).

Virtual Education with Virtual Campuses
Today virtual "learning environments (VLEs) comprise facilities for both" managing course materials and interaction using a diversity of communication tools. The application of web for education is rising and now include millions of pages, archives, portals and databases. In the future, web will not be used only to deliver knowledge rather developing research skills and capabilities for searching the web (Gray et al., 2003). In E-Learning the "students would study on own pace by self-learning" (Hvorecký et al., 2005). Because E-Learning is individualized program for everyone. E-Learning was first called 'IBT and then WBT (Nawaz & Kundi, 2010c). The virtual-class signifies that two or more people can come together as telepresence for instruction" (Irons et al., 2002). Off-the-shelf commercial VLEs currently used in UK HEIs include WebCT, blackboard, and virtual campus however, there are several problems of integrating new technologies with existing systems (Drinkwater et al., 2004; Abrami et al., 2006). The impact of E-Learning is "highest in distance education, where its presence is required and lowest in face-to-face instructional settings" (Kundi et al., 2008; Bytesforall, 2016).

When used appropriately, digital "tools are beneficial to students to facilitate development of higher order thinking" (Abrami et al., 2006). Similarly, teacher in the 21st century faces a challenge of updating their knowledge to make "appropriate use of ICTs either as teacher in the classroom, or as an e-teacher of open and distance learning" (Stryjak& James, 2016). Higher education institutions are integrating "next-generation education technologies into learning activities and struggling to find cost-effective approaches". learning management systems provides support for distance education (Klonoski, 2005). New "social software tools enable different way of using web within educational context". These tools "include discussion forums, chat, file sharing, video conferences, shared whiteboards, e-portfolios, weblogs and wikis. It is possible to integrate different tools in a single stand-alone system, a learning management system (LMS)or E-learning systems" (such as, Blackboard, WebCT, and Moodle) (Dalsgaard, 2006). LMS can "enrich the learning environment; help reduce low motivation and feelings of isolation among the distance learners" (Abrami et al., 2006; Nawaz, 2010).

**Issues of Online-education/E-Learning Solutions**

Though most "educators appear to acknowledge importance and relevance of ICTs within teaching however, worries continue to appear within processes" of technology-adoption. For example, "there is a gap between the value and relevance of these skills and the extent to which they are executed" (Knight et al., 2006). Higher education institutions are mixing "next-generation education technologies into learning activities and struggling to find cost-effective approaches". learning management systems provides support for distance education (Klonoski, 2005). This gap is "confirmed by the fact that despite the best of intentions, many of these projects ultimately fail due to many reasons such as, technology may not be the best solution in the first place, projects may be weakly-implemented, equipment may be unsuitably used, there may be a lack of follow-up, stakeholders may be less trained to support the program, or it may simply be difficult to develop and sustain a project within a specific social and political context" (Wells, 2007; Qureshi et al., 2009; Nawaz & Irfan, 2019).

DISCUSSIONS

What is "required to address the digital divide is a social and community informatics perspective, based on a critical theory of technology, which places greater emphasis on broader development" goals (Macleod, 2005). Several metaphors have been used as models to express E-Learning as a tool to bridge the digital divide. The language of e-learning contains powerful metaphors that are used to emphasize "how e-learning can overcome barriers. A review of the literature reveals three" kinds of metaphor: Equality and the "level playing field" metaphor; access and the "divide" or "gap" metaphor; and accessibility and the "bridge" metaphor (Seale, 2006). The role of the India county is the more in the technology and largest industries in the world. This county has the multiple wed sites and program for the assistance of online education (Macleod, 2005). The use of "computers in the classroom has proven advantageous in more contexts than one" respect (Bataineh et al., 2006).

Technology is not providing the education but also provide the skills in students that enhance the level of the ability and cope the level of the stress at any stage, this also provide the facilities to students can enhance the level of desired education (Bytesforall, 2016). In this connection, for that there is difference between developing and developed countries to provide the education through E learning, this is also the difficult task for developing countries to provide the quality education. These "differences are widely attributed to the demographic variations in the context of E-Learning development and use". In this connection, this difference due to demographic factors the living standard and the economic condition of the people matter in this regard, so the problems in the e learning is not the technology but economic issues that are more concerned and important for getting education so that e learning not can be fruitful in case of economic issues (Nawaz, 2010).

Figure 1 Digital-Technologies both Creator &Killer of Digital Divide
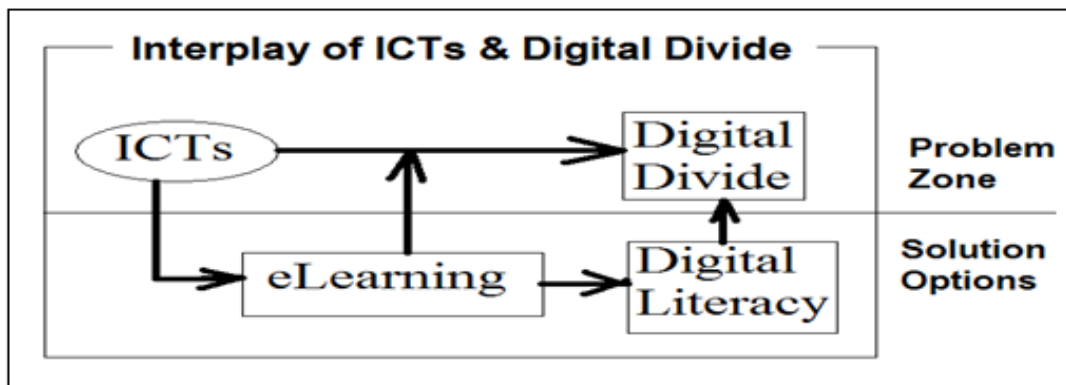
CONCLUSIONS

Metaphors develop a view of the issue to guide in understanding problems and sorting out the solutions. Digital distribution exists with different degrees of intensity in every developing country, so efforts to handle this issue differ not only in countries but also in institutions and communities within a country. Despite the author's belief that eLearning has this potential, it is not difficult to express many answer arguments against such more optimistic results. The "key element in all of these is either "access" to infrastructure or the end of user terminals" (deleting hardware "distributions). What is important, rather, is to "access knowledge, expertise, and supportive organization and social edifices to effectively use this access, and e-technology can enable social and community objectives". In a very "short time span, technology has become so integrated into our consciousness that we cannot fully absorb the full range of changes' that have been wrought. Role of universities id to contribute at high level of education. Contribution of universities not only develop the education level but also improve living standard and focused on applied education. So, for the education contribute economic in country the more educated people technical they can be more productive and skillful labors. Teaching abilities can be improved due to use of technology. Assessment and classroom environment and school technology devices improve education level.

REFERENCES

Aaron, M., Dicks, D., Ives, C., & Montgomery, B. (2004). Planning for Integrating Teaching Technologies. *Canadian Journal of Learning and Technology*, 30(2), Spring.

Allan, M. K. (2007). Millennial teachers: Student teachers as users of information and communication: A New Zealand case study. *International Journal of Education and Development using ICT*, 3(2).

Aviram, A., & Alkalai, Y. (2006). Towards a theory of digital literacy: Three scenarios for the next steps. *European Journal of Open, Distance and E-Learning*.

Bataineh, R. F., & Rahman, A. A. (2006). Jordanian EFL students' perceptions of their computer literacy: An exploratory case study. *International Journal of Education and Development using ICT*, 2(2).

Beebe, M. A. (2004). Impact of ICT revolution on the African academic landscape. CODESRIA Conference on Electronic Publishing and Dissemination. Dakar, Senegal. 1 -2 September 2004.

Blázquez, F. E., & Díaz, L. A. (2006). A training proposal for e-Learning teachers. European *Journal of Open, Distance and E-Learning*.

Bytesforall (2016). Internet landscape of Pakistan 2016. PECB, a damaging law for the cyberspace.

COST Action (2007). The good, the bad and the unexpected: The user and the future of information & communication technologies. Transdisciplinary conference organized by COST Action 298. Moscow, Russian Federation. 23rd-25th May 2007.

Dalsgaard, C. (2006). Social software: E-learning beyond learning management systems. *European Journal of Open, Distance and E-Learning*.

Drinkwater, P. M., Adeline, C. M., French, S., Papamichail, K. N., & Rickards, T. (2004). Adopting a Web-based collaborative tool to support the Manchestermethod approach to learning. *Electronic Journal on e-Learning*, 2(1), 61-68.

Ezziane, Z. (2007) Information technology literacy: Implications on teaching and learning. *Journal of Educational Technology & Society*, 10 (3), 175-191.

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*.

Hvorecký, J., Manažmentu, V. S., & Cesta, P. (2005). Can E-learning break the digital divide? *European Journal of Open, Distance and E-Learning*.

Irons, L. R., Jung, D. J., & Keel, R. O. (2002). Interactivity in distance learning: The digital divide and Student Satisfaction. *Journal of Educational Technology & Society*, 5(3).

Juniu, S. (2005). Digital Democracy in Higher Education Bridging the Digital Divide. *Innovate Journal of Online Education*, 2(1), October/November.

Kanuka, H. (2007). Instructional Design and E-Learning: A Discussion of Pedagogical Content Knowledge as a Missing Construct. *E-Journal of Instructional Science and Technology* (e-JIST). 9(2).

Klonoski, E. (2005). Cost-Saving Collaboration: Purchasing and Deploying a Statewide Learning Management System. Innovate Journal of Online Education, 1(4), April/May.

Knight, C., Knight, B. A., & Teghe, D. (2006). Releasing the pedagogical power of information and communication technology for learners: A case study. International *Journal of Education and Development using ICT*, 2(2).

Kundi, G. M., & Nawaz, A. (2007). Politics in IT Projects. *Gomal University Journal of Research (GUJR)*, 23(2), 54-58.

Kundi, G. M., & Nawaz, A. (2009). IT in Pakistan: Threats and opportunities for eBusiness. *The Electronic Journal of Information Systems in Developing Countries (EJISDC)*, 36(1), 1-31.

Kundi, G. M., & Nawaz, A. (2010). From objectivism to social constructivism: The impacts of information and communication technologies (ICTs) on higher education. *Journal of Science and Technology Education Research* (JSTER), 1(2):30-36.

Kundi, G. M., & Nawaz, A. Shah, B. (2007). De-Escalating the IT projects. *Journal of Information Systems and Technology Management* (JISTM), 4(3), 325-332.

Kundi, G, M., & Nawaz, A. (2011). Predictor of e-learning development & use practices in HEIs of KPK, Pakistan. *Turkish Online Journal of Distance Education* (TOJDE), 12(1).

Kundi, G M., Nawaz, A., & Khan, S. (2010). The predictors of success for E-Learning in HEIs of NWFP, Pakistan. *Journal of Information Systems and Technology Management* (JISTEM), 7(3):545-578.

Kundi, GM., Shah, B., & Nawaz, A. (2008) Digital Pakistan: Opportunities and Challenges. *Journal of Information Systems and Technology Management* (JISTM), 5(2):365-390.

Lemke, J. L. (1993). Hypermedia and higher education. *Interpersonal Computing and Technology* (eJournal). 1(2), April.

Luck, P. & Norton, B. (2005). Problem Based Management Learning-Better Online? *European Journal of Open, Distance and E-Learning*.

Macleod, H. (2005). What role can educational multimedia play in narrowing the digital divide? *International Journal of Education and Development using ICT*, 1(4).

Manochehr, N. (2007). The Influence of Learning Styles on Learners in E-Learning Environments: An Empirical Study. *Computers in Higher Education and Economics Review*, 18.

Mehra, P. &Mital, M. (2007). Integrating technology into the teaching-learning transaction: Pedagogical and technological perceptions of management faculty. *International Journal of Education and Development using ICT*, 3(1).

Moolman, H. B., &Blignaut, S. (2008). Get set! E-Ready,e-Learn! The e-Readiness of Warehouse Workers. *Journal of Education. Technology & Society*, 11 (1), 168-182.

Nawaz, A. & Irfan, U. K. (2019). Puzzle of Developing E-Learning Systems for Higher Education in Developing States like Pakistan. *Global Educational Studies Review,* (IV)I:12 – 20.

Nawaz, A., & Ahmad, B. (1996). Management information systems: A raison d'etre for new age enterprises. *Gomal University Journal of Research* (GUJR), 13(2), 247-260.

Nawaz, A. & Amanullah (1996). Decider's Toolkit: The Information Technology. *Gomal University Journal of Research* (GUJR).

Nawaz, A., & Kundi, G. M. (2010a). Demographic implications for the E-Learning user perceptions in HEIs of NWFP, Pakistan. *Electronic Journal of Information Systems for Developing Countries*, 41(5), 1-17. (EJISDC).

Nawaz, A., & Kundi, G. M. (2006). IT-organization alignment. *Gomal University Journal of Research*, 22(2), 202-206 (GUJR), December.

Nawaz, A. & Kundi, G.M. (2010). Digital literacy: An analysis of the contemporary paradigms. *Journal of Science and Technology Education Research* (JSTER), 1(2):19-29. (c).

Nawaz, A., & Kundi, G. M. (2010). Predictor of e-learning development and use practices in higher education institutions (HEIs) of NWFP, Pakistan. *Journal of Science and Technology Education Research* (JSTER), 1(3):44-54. (b)

Nawaz, A., & Kundi, G.M. (2011). Users of e-learning in higher education institutions (HEIs): Perceptions, styles and attitudes. *International Journal of Teaching and Case Studies* (IJTCS), 3, 2/3/4, 161-174.

Nawaz, A., & Qamar, A. Q. (2010). E-Learning/E-Pedagogy: Threats & Opportunities for teachers in HEIs. *Global Journal of Management & Business Research* (GJMBR), 10(9):23-31.

Nawaz, A., & Qamar, AQ. (2010). Sustained technical support: Issues & prospects for E-Learning in HEIs. *Global Journal of Management & Business Research* (GJMBR), 10(9):32-39.

Nawaz, A., & Shah, B. (1996). Databases: An expensive but indispensable warehouse. *Gomal University Journal of Research* (GUJR), Vol. 1.

Nawaz, A. (2010) Using E-Learning as a tool for 'education for all' in developing states. *International Journal of Science and Technology Education Research* (IJSTER), Vol 1(6).

Nawaz, A. (2011) Users' training: The predictor of successful E-Learning in HEIs. Global *Journal of Computer Science & Technology* (GJCST), 11(4):1-8.

Nawaz, A., Ahmad, B., & Amanullah (1996). Public Administration: The major benefactor of Computec. *Gomal University Journal of Research* (GUJR-B), 15(2), 223-236.

Nawaz, A., Khan, S., & Khan, H. (2011). Stepwise Regression of Demographics to Predict e-Learning Problems & User-Satisfaction in HEIs of Khyber Pakhtunkhwa (KPK) Pakistan. *Global Journal of Computer Science and Technology* (GJCST), 11(2) Version 1.0 February.

Nawaz, A., Kundi, G.M. & Shah, B. (2007). Metaphorical interpretations of information systems failure. *Peshawar University Teachers Association Journal* (PUTAJ), Vol. 14, 15-25.

Pfeffer, T. (2004). Open sources for higher education. Do information technologies change the definition of public and private goods? CHER 17th Annual Conference, Enschede, The Netherlands, 17-19 September 2004.

Qureshi, Q. A., Ahmad, S., Najib, U., Nawaz, A., & Zaman, G. (2009). ICTs for decision making: Problems and prospects. *Gomal University Journal of Research* (GUJR), 25(2), 39-46. (a)

Qureshi, Q. A., Ahmad, S., Najib, U., 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.

Qureshi, Q.A., Nawaz, A., & Najeeb, U. (2011). Prediction of the problems, user-satisfaction and prospects of e-learning in HEIs of KPK, Pakistan. *International Journal of Science and Technology Education Research* (IJSTER), 2(2):13-21, February.

Roknuzzaman, M. (2006). A survey of Internet access in a large public university in Bangladesh. *International Journal of Education and Development using* ICT, 2(3).

Sasseville, Bastien (2004) Integrating Information and Communication Technology in the Classroom: A Comparative Discourse Analysis. *Canadian Journal of Learning and Technology*. 30(2) Spring/Printemps.

Sattar, A., Nawaz, A., & Najib, U. (2011). Evolution of E-Learning in HEIs: Challenges & Opportunities for Developing Countries like Pakistan. *Journal of Emerging Trends in Economics and Management Sciences* (JETEMS). Retrieved October 12, 2011.

Sattar, A., Nawaz, A., Khan, S., & Qureshi, Q. (2010). Digital literacy: The criteria for being educated in information society. *Global Journal of Computer Science and Technology* (GJCST), 10(5).

Seale, J. K. (2006). The rainbow bridge metaphor as a tool for developing accessible e-learning practices in higher education. *Canadian Journal of Learning and Technology*, 32(2), Spring.

Shah, B., & Nawaz, A. (1995). Online professing: The crescendo of MIS. *Gomal University Journal of Research* (GUJR), 12.3.1995.

Shimabukuro, James (2005) Freedom and Empowerment: An Essay on the Next Step for Education and Technology. Innovate: Journal of Online Education. June/July, 1(5).

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).

Wells, R. (2007). Challenges and opportunities in ICT educational development: A Ugandan case study. *International Journal of Education and Development using ICT*, 3(2).

Wiley, D. (2006) Open Source, Openness, and Higher Education Journal of Online Education. October/November. 3(1).

Wims, P. & Lawler, M. (2007). Investing in ICTs in educational institutions in developing countries: An evaluation of their impact in Kenya. *International Journal of Education and Development using ICT*, 3(1).

Young, Lisa, 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.