Students and Teachers Perceptions of ICT Use in Classroom: Pakistani Classrooms

Ashar Johnson Khokhar, Forman Christian College, Pakistan
Sharoon Javaid, Forman Christian College, Pakistan

The Asian Conference on Technology in the Classroom 2016
Official Conference Proceedings

Abstract
The use of Information and Communication Technology (ICT) has become a major driving force in transforming education throughout the world. The usage of ICT in Pakistan has increased many folds in the last 10 years. The latest educational policy of the Government of Pakistan has stressed on using ICT in schools. The curriculum documents have also suggested teachers to integration ICT in their classrooms teaching and learning processes. This study focuses on the use of ICT in schools of Pakistan and it is restricted to four major cities of Pakistan. The study investigates students' and teachers' use of ICT in their everyday life. The study also explores students' views of their teachers using ICT in classroom teaching learning and assessment. The data were collected using survey questionnaire from students studying in secondary schools (classes 7, 8, 9, 10& 11.) and teachers teaching to secondary classes. The schools were invited to participate in this study. The study finds that students and teachers have access to computers in schools and at home and they use computer for different purposes, such as, entertainment, communication, and education. The study also highlights differences amongst teachers and students about what technology to be used in classroom and for what purposes. The study discovers two opposite views. On the one hand teachers believe they use ICT effectively while on the other hand students disagree with their teacher's idea of ICT integration in classroom.

Keywords: *ICT Integration, Technology, Perceptions, Teachers, Students, Classroom teaching*

iafor

Introduction and Background

Teacher education programme in Pakistan went through a rigorous review process that started in 2004 and concluded in 2009. The review process was initiated with the financial support of United States Agency for International Development and technical support of UNESCO, Pakistan. The committee formed to evaluate teacher education studied teacher education curriculum, teaching practices of teacher educators and resources available at the teacher education institutes (Jamil, 2004; UNESCO 2009; EDC, nd). The review resulted in changes in the teacher education curriculum, training of teacher educators at the national level and providing resources to teacher educational departments and institutes. The review committee suggested National Professional Standards for Teachers in Pakistan, a guide line for teacher educators teaching preservice teacher education courses at the college or university level. The Standard 7 focuses on ICT and suggests to teacher educators to equip preservice teachers with the skills to use different educational technologies, both hardware and software (Ministry of Education, 2009; National Accreditation Council for Teacher Education, 2009). The Standard 7 presumes that preservice teachers will integrate ICT in their classroom teaching practices during their school teaching experience, which is an essential component of the Bachelor Education (B.Ed.) programme.

This study investigated teachers' usage of ICT in their everyday lives and how this usage influenced teachers' ICT usage in their classrooms, especially focusing on teachers' teaching, learning and assessment practices. The study also explored teachers' perceptions of ICT efficacy on teaching and learning. The schools selected for this study were state and private schools, four from each category. The researchers approached public schools to participate in this research project but all our requests were turned down by the Principals. The schools participated in this research are from the private sector.

World Economic Forum in its latest Networked Readiness Index. Pakistan is ranked 118 on Usage index and ranked 123 in the Individual usage index (Dutta, Geiger & Lanvin, 2015). Pakistan Telecommunication Authority (PTA), the regulatory body of telecommunication services in Pakistan, has reported the telephone density at 62.79%, with mobile phones making up 60.7% of this telephone density (PTA, 2015). The data available with PTA shows that mobile phones are used all over the country with some exceptions of poor service quality in the Gilgit Baltistan province of Pakistan. The recent surge in the sale of low cost smart phones have made it possible to access internet wherever mobile services are available in Pakistan. A recent study published in 2015 suggested that Pakistan will have 40 million smartphone by end of 2016 (Baloch, 2015).

Integration and adoption of technology in classrooms of developing countries undergo several stages and challenges which then determine the case of how successful the integration has been in execution of learning outcomes (Richardson, 2011). Pakistan saw a fast paced penetration of computers and internet in the personal lives of teachers and students but the pace of integrating ICT in classrooms for learning purposes is slow. It appeared that the major decline in adopting technology comes not from students but mostly from teachers (Bingimlas, 2009). Not only teachers are resistant to adopt technology but other factors such as lack of hardware and software,

attitudes of teachers towards technology, lack of confidence, lack of competence play a very pivotal role to undermine the effective integration (Bingimlas, 2009). Another study by Youssef (2008) presented direct and indirect effects of ICT on students' academic performance and organizational change. This study did not find any link between the effects of ICT investment on students' academic performance.

Literature Review

The very early researches tried to define a computer-using teacher (Pelgrum & Plomp, 1991). The definition derived from the survey was teachers using computer sometimes in relation to their work with the students. According to the findings of this study, 75% of the teachers were computer-using teachers. A few years after this study, Becker (1994) developed a sophisticated mechanism and analysed the same data set. The result of this analysis was very different and only 25% teachers could be considered computer-using teachers. Since then the number of computer using teachers have expanded as new and inexpensive technologies have continued emerging and their penetration has increased many folds in teachers' everyday lives and their teaching usage, inside and outside the classrooms. This has further complicated the concept of a computer-using teacher as the idea of computer usage has shifted from mere an end product user to collaborator in designing educational technology.

Computer self-efficacy is explained by Christensen and Knezek (2006) as confidence in using computer with competence in different classroom teaching and assessment settings. The many recent studies (Peralta & Costa, 2007; Compeau & Higgins, 1995; Liaw, Huang and Chen, 2007; Yuen & Ma, 2008; Christensen and Knezek, 2006) have found a link between teachers' use of ICT and their perception of computer self-efficacy. The higher the self-efficacy of teachers the more open teachers are to experiment with technology in their classroom teaching practices.

Earle (2001), Zhao and Frank (2003) & McKenzie (2004) identified four main purposes of technology use by teachers: (1) to develop material to prepare their classroom teaching (e.g. classroom presentations); (2) doing administrative work (e.g. compiling students data, typing assessment tasks and feedback etc.); (3) to facilitate students' learning in a classroom; (4) teacher directed use of ICT to complete the assigned tasks. The first two uses of computer benefit teachers directly and thus keep teachers' interest high and engaged in the teaching and learning process. The use 3 & 4 of computer help teachers in managing their classes and has immediate benefits for teachers and students though the fourth use of computer is rarely practiced in classrooms. Hawkins (2002) and Tiene (2004) observed an increase in ICT adoption in less developed countries, such as Pakistan. This adoption as noted by them also focused on meeting the needs of the users, that is, teachers and students. Tiene (2004) also observed that ICT integration efforts by schools in less developed countries have resulted in very little changes in classroom teaching practices of teachers. The reason of this as suggested by Tiene (2004) was "overly ambitious and overly optimistic" (p. 90) ICT integration plans which were beyond what these schools and teachers could achieve. The schools focused on procurement of hardware and software ignoring teachers in the whole process and thus this exercise resulted in minimum use of the expensive equipment procured by school administration.

Cheng and Townsend (2000) and Cheng (2001 & 2007) in their studies on ICTs in the Asia-Pacific schools highlighted four reasons for the lack of ICT integration in classroom teaching and assessment; first, ICT usage was incongruent with the educational aims; second, there was a gap of training to use the hardware and software available (free) and provided (purchased) to teachers; third, there existed a gap between ICT and its integration with the curriculum; fourth, difficulty in bridging the technological change and cultural norms gap that existed in Asian societies. Tien (2004) added another reason to these by suggesting that the end-user, that is, teachers, lacked trouble-shooting ability also hampered ICT integration process in schools and in classrooms. Dede (1998) warned the schools and teachers that adapting to technological innovation also demands innovations by schools and teachers on their end too, that is, innovation in classroom pedagogy and assessment and innovative school organization and management of resources.

There are a number of studies such as Yildirim (2007 & 2011), Slaouti & Barton (2007), Balanskat et al. (2007) and Chigona & Chigona (2010) investigated factors that hinder teachers' use of ICT in classrooms. The studies found out that teachers used technology to prepare teaching notes and assessment worksheets and plans instead of focussing on improving students' academic performances and making classroom into constructivist classrooms. These researches revealed many other obstacles that teachers face such as classrooms having more students than they are designed to accommodate; insufficient training of end users to use different technological devices available in schools; non-existent technical and pedagogical support to teachers; rigid school structures and syllabi; de-motivated teachers, students and school administration; lack of coordination between school administration and teachers; lack of access to required resources; time pressures to complete the given curriculum; lack of mentoring opportunities for newly inducted teachers in schools and which discourage teachers from integrating ICT into their classroom teaching.

Teachers' attitude towards ICT and their perceptions of ICT effectiveness plays an important role in their making use of ICT in their teaching and assessment activities in the classrooms. Studies conducted in Europe (Huang & Liaw, 2005; Korte & Hüsing, 2007; Becta, 2008) have highlighted conflicting perceptions of teachers towards effectiveness of ICT in making teaching learning interesting and classroom constructivists teaching and learning places. There were teachers who believed that the use of ICT have had positive impact on students' and their own learning; helped in individualizing learning and also helped in strengthening the link between classroom learning and the learning outside the classroom. However, there is evidence in these researches suggesting that some teachers believe that the benefits of ICT were not visible in students' performance. A study by van Braak, Tondeur & Valcke (2008) showed that teachers' positive attitude towards new technological innovations would increase their integration in classroom teachings and assessment strategies. Woodrow (1992) recommended a positive attitude towards educational innovation for a successful transformation of educational practices and places.

The present generation of students is tech users and they often question the ICT facilities available in their schools and how their teachers used it in classrooms. A study conducted by Geoffrey (2010) in a private university revealed that students wanted their teachers to use ICT in their teaching because students found it useful and

believed that it helped them to learn whatever the teacher was teaching. Students also asked the administration to provide them better ICT equipment and faster internet connectivity in their classrooms and computer labs. Students who participated in this research agreed with the idea that ICT improved enhanced academic performance. This research also suggested that availability, accessibility and the competence of the users affect the learning process. A study by Littlejohn, Margaryan, & Vojt (2009) conducted at a study with university students and they identified the gap that existed between the use of technology by students and how and what they are expected to learn from it. This study revealed that the study patterns of university students throughout their 4 year degree programme remained unchanged. This study indicates that study practices of students are influenced by their prior study experiences as the result did not show any correlation between the usage of ICT by the students and their expectations of how they might learn. Omwenga (2005) argues that its not just the use of ICT but also the context and the need to apply the pedagogy. The limitations of the use of technology also depends on the teacher and students ability to handle it and apply in the learning process.

The use of ICT in school by the teachers and the students is at times seen as very beneficial, mostly in the case of students, a study revealed that students of three age groups 8, 10, and 12 in six secondary schools who participated in focused group interviews saw technological tools not just helpful in presenting work but also an opportunity to learn and complete effectively and efficiently (Deaney, Ruthven, & Hennessy, 2003). The Punjab province of Pakistan initiated an ICT lab project in 2009 in 6 districts which aimed at providing public schools with ICT equipment and encouraged teachers and students to use them. Hameed and Qadir (2014) conducted a study to find out the perceptions of students regarding usefulness of this proejct . This study highligthed very interesting point that although adequate facilities were provided under this proejct to seocndary school but only those teachers and students used them who were either teaching or studying computer science subject. Teachers and students from other subjects were also not using computers because they lacked IT skills. Another finding from this study was that teachers and students from urban areas used these facilities. This study highligted the aspect of providing training to teachers and studetns alongwith the ICT equipmet so that it can have a postive impact on teaching learning settings, that is classrooms. There was another study by Bughio, Abro, Rashdi (2014) indicated the positive link between training to use of ICT equipment the students' academic competency and performance. Hassan & Sajid (2013) found that students were postively inclinced towards ICT and considered it an important part of quality teaching and learning environment. However, successful integration of ICT is still a matter of debate because of digital divide among students and teachers and difference of perceptions among each.

 Methodology and methods

This study used the survey research design. Two different survey questionnaires were designed for two groups of research participants, that is, teachers and students with the intention of mapping their ICT usage in their daily lives and in their academic settings. The survey questionnaire comprised of three sections: (1) Non-academic usage, (2) academic usage, (3) beliefs about ICT usage in academic settings. The data was collected from four schools, two from Punjab province and two from Sindh province. The secondary schools approached to participate in this research have at

least 1000 students and teachers also agreed to participate in this research project. The teachers selected for this study were from the secondary section of the school, that is, they were teaching to classes 7, 8, 9, 10 and 11, both matric and Cambridge classes.

The number of questionnaires distributed amongst students in four schools was 1200 and the researchers received 75% (900) questionnaires back from students. The number of questionnaires found unusable due to incomplete information was 120 and these were dropped from the final data set leaving researchers with 780 questionnaires for final data analysis. The researchers distributed 45 questionnaire amongst teachers and received 40 completed questionnaires. After first analysis, 8 questionnaires were found unusable because they contained incomplete information. These were also dropped from the final data set. The final data set used 32 questionnaires, representing 71% of the distributed questionnaires amongst teachers. The data was analysed using SPSS's 20. The researchers used descriptive statistics to analyze responses received from the participants.

Findings & Discussion

The first purpose of this study was to map out the access and usage ICT devices. The data received from students and teachers showed that 95% of students and teachers have access to ICT devices, such as desktop PCs, laptops, Tablet PCs, iPads, and internet enabled smartphones. The usage of these devices also had many similarities such as to contact others, to search for information, to prepare assigned tasks. There was one difference observed and that using ICT devices for social networking purposes. Students (100%) tended to use ICT devices more for the social networking purposes as compared to their teachers (70%). Teachers spend less time (5-6 hours per week) using ICT devices which include personal and academic use as compared to students who spend three times more than their teachers and mostly for communication purposes using social networking websites.

The second purpose of this study was to identify how students and teachers use it in their classrooms. The former used ICT devices to search information, to plan and prepare their assessment tasks while the latter's use of ICT devices was restricted to classroom teaching, such as finding content that they need to teach, finding activities or worksheets to use in their classrooms. The teachers assigned tasks such as researching a topic and presenting their research in the class and students (100%) used PowerPoint presentations for this purpose. The other usage was administrative work such as keeping students' attendance record and recording and preparing marks sheets. These findings support the findings from the earlier conducted studies by Earle (2002), Zhao and Frank (2003) & McKenzie (2004). This study also found incongruence between the responses of students and teachers. On the one hard students said that their teacher provided no opportunity to them to use technology in classroom and they themselves use it very rarely, most of the teachers, on the other hand, provided an account of using technology in classroom very frequently for instructional, evaluative, communicative and organizational purposes.

The third focus of this research project was to identify the gaps between teachers' use of ICT and whether students' idea of ICT use in classroom matched with this. The students believed that their teachers did not use ICT as a collaborative learning tool and did not focus on the application aspects of the content taught in the classroom and

many students (70%) felt that teachers' use of ICT in classrooms was restricted to PowerPoint presentations in the classroom. The teachers felt that they were integrating ICT in their classrooms but students found their teachers' usage of ICT in the classroom teaching and assessment as insufficient. They wanted their teachers to move beyond finding information and reading them and present the information in PowerPoint presentations and include collaborative learning and design project based assessment tasks. The students felt that their teachers lacked ICT knowledge and skills and should integrate ICT more in their teaching and assessment activities because the present usage pattern provide very little opportunities to use technological tools in their classroom learning.

The fourth focus was of this research project was to identify obstacles faced by teachers in their school settings while planning and executing ICT integration in the classrooms. The responses of teachers showed that they struggle to use ICT in classrooms because of their poor skill of using ICT as a teaching tool. The schools approached for this study did not have an ICT progarmme to support teachers to use ICT in their classrooms and to provide training to teachers if they lacked knowledge and skills in this area. The teachers who participated in this research believed that ICT is a useful tool and they need to use it creatively and more in their classroom teaching as it helped students in enhancing their academic performance. The finding that schools do not have an ICT policy and a programme is true for all schools, whether public and private and because of lack of such a policy, schools do not have an ICT trained person to support teachers in planning and teaching ICT integrated lessons.

Conclusion

The data showed that both teachers and students used ICT in their everyday lives, for both, the academic and non-academic purposes. Majority of the students and teachers have access to a personal ICT device equipped with internet connectivity and they use it for different purposes from communicating with other too to completing assigned task by their teachers. The study also found both the students and teachers believed that ICT is a very important tool to maximized learning in classrooms but students believed that their teachers' use of ICT was least creative and students wanted their teachers to go beyond PowerPoint presentation and showing videos in the classroom, that is, using ICT to create authentic teaching and learning classroom experiences.

The study also highlighted the need for having ICT programme in schools as teachers felt that to make most of the available ICT devices; they need training and guidelines from schools in the form of an ICT policy. This schools participated in this study did not have clear directions for teachers about what technology to use and this resulted in the procurement process of ICT equipment in schools. The schools will buy ICT equipment without consulting teachers and not knowing whether they can use it or not. The example of this was purchasing electronic board in schools without clearly setting rules about who should use and how this can be used. The lack of ICT programme also resulted in the recruitment policy of schools as they had not hired an ICT trained person to support teachers and students. This finding is also true to all schools in Pakistan, whether state or private schools.

References

Baloch, F. (2015, September 9). Telecome sector: Pakistan to have 40 million smartphones by end of 2016. *The Express Tribune*. Retrieved from http://tribune.com.pk/story/953333/telecom-sector-pakistan-to-have-40-million-smartphones-by-end-of-2016/

Balanskat, A., Blamire, R., & Kafal, S. (2007). *The ICT impact report: A review of studies of ICT impact on schools in Europe.* Brussels: European Commission.

Becker, L. (1994). *Analysis and trends of school use of new information technologies.* Washington, U.S.: U.S. Congress Office of Technology Assessment.

Becker, H. (1999). *Internet use by teachers: Conditions of professional use and teacher directed student use.* Irvine, CA: Center for Research on Information Technology and Organizations.

Becker, H., & Anderson, R. (2001). School investments in instructional technology. Irvine, CA: Center for Research on Information Technology and Organizations.

Becta (2008). *Harnessing technology: schools survey 2008.* The National Foundation for Educational Research: UK Retrieved from https://www.nfer.ac.uk/publications/TSV01/TSV01.pdf

Bingimlas, K. (2009). Barriers to the successful integration of ICT in teaching and learning
environments: a review of the literature. *Eurasia Journal of Mathematics, Science & Technology Education, 5(3)*, 235–245.

Bughio, I. A., Abro, M. M., & Rashdi R. S. (2014). Effective online distance learning in Pakistan and challenges. International Journal of Management Sciences. 6(2), 274-279.

Cheng, Y. C. (2001). *Educational reforms in the asia-pacific region: trends, challenges and research.* Paper presented at the Annual Institute of Asia-Pacific Education Development International Conference on Educational Research, Seoul, South Korea.

Cheng, Y. C., and T. Townsend. (2000). Educational change and development in the Asia-Pacific region: trends and issues. In J. P. Keeves and R. Watanabe ((Ed.), *Educational Change and Development in the Asia-Pacific Region: Challenges for the Future.* Dordrecht: Kluwer Academic Publishers.

Cheng, Y., W. Tam. (2007). School effectiveness and improvement in Asia: three waves, nine trends and challenges. In T. Townsend (Ed.), *International Handbook of School Effectiveness and Improvement.* New York: Springer.

Chigona, A., & Chigona, W. (2010). *An investigation of factors affecting the use of ICT for teaching in the Western Cape schools.* Paper presented in the 18th European Conference on Information Systems, Pretoria, South Africa.

Christensen, R.& Knezek, G. (2006). Pathway for preparing tomorrow's teacher to infuse technology. *Computers in the schools, 23(3/4),* 1-21.

Compeau, D.R., & Higgins, C.A. (1995). Computer self-efficacy: Development of a measure and initial test. *MIS Quarterly*, *23(2),* 145-158.

Deaney, R., Ruthven, K., & Hennessy, S. (2003). Pupil perspectives on the contribution of information and communication technology to teaching and learning in the secondary school**.** *Research Papers in Education, 18 (2),* 141-165.

Dutta, S., Geiger, T. & Lanvin, B. (2015). *The global information technology report 2015: ICTs for inclusive growth*. Retrieved from http://www3.weforum.org/docs/WEF_Global_IT_Report_2015.pdf

Earle, R. (2001). The integration of instructional technology into public education: promises and challenges. *ET Magazine*. (42(1). 5-13.
Retrieved from http://www.bookstoread.com/etp/earle.pdf

EDC (n.d.). *Pre-Service teacher education in Pakistan (Pre-STEP)*. Retrieved from http://idd.edc.org/sites/idd.edc.org/files/Pakistan%20Pre-STEP.pdf

Hasan, T., & Sajid, A. R. (2013). ICTs in learning: problems faced by Pakistan. *Journal of Research and Reflections in Education* 7(1), 52 -64.

Hawkins, R. J. (2002). Ten Lessons for ICT and education in the developing world. In G. Kirkman, J. and P. K. Cornelius, (Ed.), *The Global Information Technology Report 2001–2002: Readiness for the Networked World*. Oxford, U.K.: Oxford University.

Huang, H. M., & Liaw, S. S. (2005). Exploring users' attitudes and intentions toward the Web as a survey tool. *Computers in Human Behavior*, *21(5)*, 729-743.

Jamil, B.R. (2004). *From teacher education to professional education devleopment in Pakistan: A (Draft) Position Paper*. Presented at the National Conference on Teacher Education, Islamabad, Pakistan.

Korte, W.B., & Husing, T. (2007). Benchmarking access and use of ICT in European schools 2006: Results from Head teacher and a classroom surveys in 27 European countries, learning papers, *29(10)*, 1-6.

Liaw, S., Huang, H., & Chen, G. (2007). Surveying instructor and learner attitudes toward E-learning. *Computers & Education*, *49(4)*, 1066-1080.

Littlejohn, A., Margaryan, A., & Vojt, G. (2009). Exploring students' use of ICT and Expectations of Learning Methods. *Electronic Journal of e-Learning, 8(1)*, 13–20.

McKenzie, J. (2003). The technology presumptions: could integrating technology sometimes be wrong minded? *The Educational Technology Journal, 12(9)*. Retrieved from http://www.fno.org/may03/wrongminded.html

Mirza, M. S. (2009) *Accreditation standards and procedures for quality assurance in teacher education in Pakistan.* National Accreditation Council for Teacher Education: Islamabad.

Omwenga, E., Waema, T., Eisendrath, G, & Libotton, A. (2005). *Development and application of an objectives-driven E-content structuring and deployment model.* Paper presented at World Conference on Educational Multimedia, Hypermedia and Telecommunications, Montreal, Canada. Retrieved from http://www.learntechlib.org/awards/EDMEDIA/2005/

Policy and Planning Wing. (2009). *National professional standards for teachers in Pakistan*. Ministry of Education, Government of Pakistan: Islamabad.

Pelgrum, W. J. (2001). Obstacles to the Integration of ICT in Education: Results from a Worldwide Educational Assessment. *Computers and Education, 37,* 163–78. http://dx.doi.org/10.1016/S0360-1315(01)00045-8

Pelgrum, W.J., & Plomp, T. (1991). *The use of computers in education worldwide: Results from the IEA 'Computers in Education' survey in 19 educational systems*. Oxford: Pergamon Press.

Pelgrum, W.J., & Plomp, T. (Eds.). (1993). *The IEA Study of Computers in Education: Implementation of an innovation in 21 education systems*. Oxford: Pergamon Press.

Pelgrum, W. J., Janssen Reinen, I. A. M., & Plomp, T. J. (Eds). (1993). *Schools, Teachers, Students and Computers: A Cross-National Perspective*. Hague: International Association for the Evaluation of Education Achievement.

Pelgrum, W., & Anderson, R.E.(1999). *ICT and the emerging paradigm for life-long learning: an IEA educational assessment of infrastructure, goals and practices in twenty-six countries*. Amsterdam: the International Association for the Evaluation of Educational Achievement (IEA).

Peralta, H., Costa, F.A. (2007). Teachers' competence and confidence regarding the use of ICT. *Educational Sciences Journal*, *3*, 75-84.

Qadir, M. J. & Hameed, A. (2014). *A study of the usefulness of Punjab IT labs project in schools of Punjab, Pakistan as perceived by students*. Paper presented at the International Conference on Engineering & Emerging Technologies, Lahore.

Richardson, J. W. (2011) Challenges of adopting the use of technology in less developed countries: the case of Cambodia. *Comparative Education Review, 55(1)*, 008-029.

Slaouti, D., & Barton, A. (2007). Opportunities for practice and development: newly qualified teachers and the use of information and communication technologies in teaching foreign languages in English secondary school contexts. *Journal of In-service Education*, *33(4)*, 405-424.

Tiene, D. (2004). Bridging the digital divide in the schools of developing countries. *International Journal of Instructional Media*, *31(1)*, 89–97.

Tondeur, J., van Braak, J., & Valcke, M. (2007). Curricula and the use of ICT in education: Two worlds apart? *British Journal of Educational Technology, 38(6),* 962-976.

Tondeur, J., Valcke, M., & van Braak, J. (2008). A multidimensional approach to determinants of computer use in primary education: Teacher and school characteristics. J*ournal of Computer Assisted Learning*, *24*, 494–506.

UNESCO Pakistan. (2006). *Analysis of teacher education: Towards a strategic framework for teacher education and professional developmen*t. Retrieved from http://unesco.org.pk/education/teachereducation/files/sa1.pdf

UNESCO Pakistan. (2006). *Strategic framework for teacher education and professional development*. Retrieved from http://unesco.org.pk/education/teachereducation/files/sa2.pdf

UNESCO Pakistan. (2008).*Status of teachers in Pakistan*. Retrieved from http://unesco.org.pk/education/teachereducation/files/sa3.pdf

Woodrow, J. E. (1992). The influence of programming training on the computer literacy and attitudes of pre-service teachers. *Journal of Research on Computing in Education*, *25(2)*, 200-219.

Yuen, A. H. K., & Ma, W. W. K. (2008). Exploring teacher acceptance of E-learning technology. *Asia-Pacific Journal of Teacher Education*, *36(3)*, 229-243.

Yildirim, S. (2007). Current utilization of ICT in Turkish basic education schools: a review of teacher's ICT use and barriers to integration. *International Journal of Instructional Media*, 34(2), 171-86.

Youssef, A. D., & Dahmani, M. (2008). The Impact of ICT on student performance in higher education: direct effects, indirect effects and organisational change. *RUSC. Universities and Knowledge Society Journal. 5(1)*. Retrieved from http://www.uoc.edu/rusc/5/1/dt/eng/benyoussef_dahmani.pdf

Zhao, Y., & Frank, K. A. (2003). Factors affecting technology uses in schools: An ecological perspective. *American Educational Research Journal, 40(4)*, 807-840.