

Access to ICT in Teacher Education

Zeba Ilyas

*Assistant professor
AL-FALAH University, Haryana
&*

Harjeet Kaur Bhatia

*Professor and Head
Department of Educational Studies
Jamia Millia Islamia, New Delhi*

Abstract

Today is an era of cut throat competition and teacher educators have a challenging role to prepare their students academically and technologically fit for such competition by providing high quality education. ICT enabled education, to a great extent, can combat this problem. One of the most cited reasons for using ICT in the classroom is to prepare the learners for the situations where they feel most comfortable in efficient discharge of their responsibilities. However, many teacher education institutions have limited resources, teachers lack adequate qualification and training to engage their students in learning and in many cases access to ICTs to the students is still a great problem. The present paper is an attempt to examine the issue of access of pre service teachers to ICT in two premier universities of Delhi. The findings are revealing and have larger implications.

Key Words: ICT, teacher education institutions, training, access, pre service teachers.

Introduction

ICT has universal application in almost all walks of life. It is playing a big role in many disciplines like medicine, tourism, travel, business, law, banking, engineering and architecture. The impact of ICT across the past two or three decades has been enormous. The way these fields operate today is vastly different from the ways they operated in the past because of the rapid development of technology. In the past few decades the use of the technologies has expanded from, primarily as an instructional delivery medium to technology as a transformational tool and integral part of the learning environment. ICT plays a vital role in all the aspects of a country's economy, particularly education (Ankita & Husain 2017).

Within a very short time ICT have become one of the basic building blocks of modern society(Daniels2002). However many countries now regard understanding ICT and incorporating teaching of basic skills and concepts of ICT as part of the core education system. According to UNESCO (2002) information and communication technology (ICT) may be regarded as the combination of ‘Informatics technology’ with other related technology, specifically communication technology. (UNESCO, 2002) ICT is not just computer for management use but it is regarding teaching, learning process, evaluation, admission process, and quality enhancement of the education system. At around 1980 the term computer was replaced by IT, signifying a shift of focus from computing technology to the capacity to store and retrieve information. And then the term ICT was introduced at around 1992, so that general public could access facilities like emails etc. (Plomp, T ,Pelgrum, W.J., Law, N., 2003)

The field of education has been affected by ICTs, which have undoubtedly affected teaching, learning and research (Yusuf, 2005). Various ICT products have great impact on “education such as teleconferencing, email, audio conferencing, television lessons, radio broadcasts, interactive radio counseling, interactive voice response system, audiocassettes and CD ROMs etc have been used in education for different purposes” (Sharna 2003, Sanyal 2001 and Sanyal and Sharma 2007). Few active learning techniques viz. conversation, leading question, example-problems, guided examples and quizzes, used in PowerPoint format in the development of instructional material on fission of a covalent bond have potential to engage learners in purposive tasks (Bhatia & Haider 2016).A great deal of research has proven that ICT enhances the quality of education. ICTs have the power to enrich, accelerate, innovate and deepen skills to motivate and engage students” (Amin 2012).

ICT is used worldwide to increase access to, and improve the relevance and quality education. Geographical distance is no longer an obstacle to obtaining an education. Teachers and learners no longer have to rely solely on printed books and other materials in physical media housed in library for their educational needs. “Today’s teacher and student need to be adept in the language of technology and e-learning, only then will they be in a position to stay abreast with today’s time” (Husain & Nair 2016). This is an information age where use of new technologies in the classroom is essential for providing opportunities for students and teachers (Bhatia & Ilyas 2016).

Using internet anyone can access any information from anywhere at any time where learners get online learning materials, covering a wide range of subject that are up-to-date and produce by cutting edge technology. This is particularly significant for many institutions those have limited and outdated library resources. However, this is not always true for the countries like India. In spite of the advancement in almost all field access to ICT is still a big question mark particularly for the students in the country. Creation of infrastructure, lack of internet connections, teachers not equipped from the skills, knowledge and competence point of view to use ICT, lack of training for teachers, lack of software/ hardware etc. are the variety of reasons for the teachers which they are facing as barriers in using ICT (Bhatia & Ilyas 2017). Databases, simulations, and access to the Internet can provide rich experiences and information as students acquire the skills and knowledge represented by the content standards (Bhatia & Chugh, 2014). Application and process of e-learning include web based learning, computer based learning, virtual classrooms and digital collaboration where content is delivered via the internet, intranet, extranet audio/video tape, satellite TV etc. ICT also facilitate access to resource persons, mentors, experts, professionals, business leaders and peers all over the world.

Dimensions of access

In a growing country like India reaching out to education is only possible when we study about the ways in which education can be accessible and not only this but we need to study that how ,when and what are the factors which influence access of ICT in teacher education. The present study focuses on some significant dimensions of access which dominant access of ICT in teacher education.

The material access-equality in material access- accessing material for study is a major issue in teaching learning. Students and teacher must have access to the latest study material for upliftment of teacher education. And here ICT tends to expand access to education. Through ICT, learning can occur anytime and anywhere. “Online course material is accessible 24 hours a day and seven days a week. Latest technologies like Teleconferencing classrooms allow both teacher and learner to interact simultaneously with ease and convenience. Multiple resources are abundant on the Internet, and through this knowledge can be acquired for example visual presentation, video clips, audio sounds, and so on”(Shan Fu 2013).

Functional access- knowledge and skills to use the tool- The next important element of focus is that, teachers of today should be confident enough to use ICT in their classroom and this can only be possible when teachers themselves have knowledge of ICT and the skill to use it in the class. “However, the resources available to teachers in terms of hardware, software, networking and professional development vary greatly at different levels. Thus, the development of a pedagogically based framework of constructs that are related to learning to use and an approach for its application in teacher preparation shows promise for meeting the challenges”(Khirwadkar).

The acquisition of fundamental ICT skills among teachers and students helps knowledge sharing, thereby multiplying educational opportunities. In order to implement ICT-driven education programmes, the teachers must first understand and be comfortable with the technologies. They must be given opportunities for acquisition of a new knowledge. “ICT is used as a tool for students to discover learning topics, solve problems, and makes knowledge acquisition more accessible... (Brush, Glazewski and Hew (2008) and Shan Fu (2013).

Experiential access –making tools relevant-It is evident that teachers should be using ICT in classroom that is the only and the best way to incorporate ICT in teaching learning. By this way every subject can be properly linked to a proper ICT tool, for example teaching of science can be best done by PowerPoint presentation in which the teacher can easily demonstrate various topics like teaching the topic cell, reproductive system or teaching of geography like mountains and river etc. “We should bring ICT to the class first then only we can examine that which kind of ICT will work best for certain subject or content. ICT involves purpose-designed applications that provide innovative ways to meet a variety of learning needs.” (Chai, Koh and Tsai 2010).

Critical access-ability to critique-At present our education system is focusing on holistic development of student and to accomplish this task teacher and students need to develop the ability to critique. Critical access is important because it important that student and teacher should develop the ability to critically chose between the ample amounts of data which is available on net. It develops an ability to critically assess the quality of learning material before using it. Through ICT one may be more capable of critically analyzing and converting different information and data collected from various sources as a meaningful source of learning. ICT may provide opportunity to become critical thinkers, problem solvers,

information literate citizens, knowledge managers and, finally, team members who are proficient in collaborating with others.

Transformative access – inclusion into the development and decision-The ability of critical thinking is developed by the use of ICT and this will lead to the development of skills among students and teachers transforming their behavior, teaching style and selecting and including appropriate material for teaching. “The increasing use of technologies has brought changes in the modes and methods of instructional processes which are becoming more learner-centered. Teacher education programs at the pre-service and in-service levels must have ample scope for inducting pedagogic skills and management of technologies as important components of teaching learning environment to enhance efficacy to transaction” (Jindal and Gupta2012). This is essentially possible with the use of effective access of ICT.

Objectives

- To study the role of ICT in various forms of access of pre service teachers in
 - a) Admission Process
 - b) Teaching Learning Process
 - c) Evaluation
- To compare the role of ICT in various forms of access between the students enrolled in pre service teacher education programme at-
 - a) JMI and DU
 - b) Science, social science and language
 - c) Urban, semi urban and rural areas

Hypotheses –The following Null hypotheses were tested:

Null Hypothesis 1: There is no significant difference between the scores of pre service teachers in their perception on access of ICT in terms of institution with respect to **a)** admission process, **b)** teaching learning process, and **c)** evaluation

Null Hypothesis 2: There is no significant difference between the scores of pre service teachers in their perception on access of ICT in terms of the teaching subject with respect to **a)** admission process, **b)** teaching learning process, and **c)** evaluation

Null Hypothesis 3: There is no significant difference between the scores of pre service teachers in their perception on access of ICT in terms of their place of residence with respect to **a)** admission process, **b)** teaching learning process, and **c)** evaluation

Sample

The researcher selected following sample to achieve the above objectives:

- Two hundred (200) students enrolled in B. Ed. programme at Two central universities from Delhi , which are running teacher education programme i.e. JamiaMilliaIslamia (JMI) and Delhi University (DU) have been included in the sample.
- The total sample was 400 students of B.Ed. However, in spite of all the efforts of the researcher, she could collect the data from only 180 students from JMI and 150 from DU.

Description of Tool (Scale on Access of ICT)

The researcher developed a scale of access to ICT for the students on the dimensions of admission process, teaching learning process and evaluation. Initially the investigator constructed approximately 95 items for the scale and then it was handed over to the experts in the field for their consideration seeking their opinion. The items which were discarded by the majority of the experts were dropped. Thus finally 65 items were retained.

Reliability

Reliability of the scale was tested using a split half method which was found to be .788 for the scale as a whole.

Reliability of the dimensions of access was also calculated which was found as follows.

Dimensions	Relationship
Material access	0.76
Functional access	0.77
Experimental access	0.82
Critical access	0.79
Transformative access	0.80

The scale was administered on the pre service B.Ed. students enrolled in JMI and DU.

Analysis of data

The analysis was done both quantitatively and qualitatively.

Statistical Techniques used

Basic statistical tools viz. mean, range, standard deviation, percentage have been used .On the other hand, a comparison has been drawn among two groups using inferential data analysis via t-test. ANOVA has been used to compare three groups. It helps us understand as to whether there is a significant difference among the three groups, while it lacks in giving a

distinction on which group is significantly different from the others. It is thus, that ANOVA is followed by Post – Hoc test.

Table 1: Descriptive Scores of Various Dimensions of Access for Pre service teachers (N=341)

Variable/Dimension	Range of Scores	Mid value	Mean	Std. Deviation
Admission Process	11-55	33	27.75	5.14
Material Access	6-30	18	13.74	3.81
Functional Access	13-65	39	29.46	8.69
Experiential Access	6-30	18	14.24	3.82
Critical Access	11-55	33	24.78	7.60
Transformative Access	8-40	24	17.57	5.93
Evaluation	10-50	30	22.87	6.16

The descriptive scores of various dimensions of ICT for access to teacher education have been given in table 1. In all the 7 dimensions of role of ICT in access to teacher education the mean scores are near to the mid value thus we can infer that pre service teachers perceive that they have sufficient access to ICT. The mean score of role of ICT i.e. 27.75 in admission process is very near to mid score i.e.33, so we can infer that pre service teachers perceive that ICT has enhanced this dimension of access the most. The responses are homogeneous in Experiential access (S.D-3.82) and material access (S.D-3.82) and heterogeneous in case of Functional Access (S.D-8.69) i.e. the perception of pre service teachers toward role of ICT varies the most in Functional Access and least in Experiential access and material access.

1 Institution-Based Comparison

Table 2. Result of Independent Sample t-test-Institution-based for pre service teachers

Variables					Std. Error Mean	t-value	Significance
	Institution	N	Mean	Std. Deviation			

Admission Process	Jamia Millia Islamia	180	28.43	5.079	0.379	2.61	P<0.01
	University of Delhi	161	26.99	5.11	0.403		
Material Access	Jamia Millia Islamia	180	14.5	3.454	0.257	3.98	P<0.01
	University of Delhi	161	12.89	4.017	0.317		
Functional Access	Jamia Millia Islamia	180	32.4	6.193	0.462	7.07	P<0.01
	University of Delhi	161	26.17	9.843	0.776		
Experiential Access	Jamia Millia Islamia	180	14.67	3.433	0.256	2.19	P<0.05
	University of Delhi	161	13.76	4.165	0.328		
Critical Access	Jamia Millia Islamia	180	27.1	5.436	0.405	6.3	P<0.01
	University of Delhi	161	22.18	8.758	0.69		
Transformative Access	Jamia Millia Islamia	180	19.28	4.389	0.327	5.89	P<0.01
	University of Delhi	161	15.66	6.8	0.536		
Evaluation	Jamia Millia Islamia	180	24.66	5.338	0.398	5.93	P<0.01
	University of Delhi	161	20.88	6.417	0.506		

The results show that students of Jamia Millia Islamia have a better perception than the students of Delhi University. It may be because of the facilities provided by the university for students. In Jamia Millia students are provided with 24 hour Wi Fi service and good laboratory facilities. This might have impacted in their perception.

Since, all the comparisons are found statistically significant the null hypothesis 1 (a) There is no significant difference between the scores of pre service teachers in their perception on ICT for access to teacher education in terms of institution with respect to **admission process** is **rejected at 0.01 level**.

The null hypothesis 1(b) There is no significant difference between the scores of pre service teachers in their perception on ICT for access to teacher education in terms of institution with respect to **teaching learning process** is **rejected at 0.05 level**. Similarly the null hypothesis

1 (c) There is no significant difference between the scores of pre service teachers in their perception on ICT for access to teacher education in terms of institution with respect to **evaluation is rejected at 0.01 level.**

Teaching Subject-Based Comparison

Table 3. Summary of ANOVA-Teaching Subject-based for pre service teachers

ANOVA						
		Sum of Squares	Df	Mean Square	F	Sig.
Admission Process	Between Groups	105.963	2	52.981	2.02	0.134
	Within Groups	8866.348	338	26.232		
	Total	8972.311	340			
Material Access	Between Groups	63.568	2	31.784	2.204	0.112
	Within Groups	4874.203	338	14.421		
	Total	4937.771	340			
Functional Access	Between Groups	719.316	2	359.658	4.873	0.008
	Within Groups	24947.32	338	73.809		
	Total	25666.63	340			
Experiential Access	Between Groups	29.911	2	14.956	1.027	0.359
	Within Groups	4924.37	338	14.569		
	Total	4954.282	340			
Critical Access	Between Groups	337.388	2	168.694	2.957	0.053
	Within Groups	19283.67	338	57.052		

	Total	19621.06	340			
Transformative Access	Between Groups	184.749	2	92.375	2.653	0.072
	Within Groups	11770.74	338	34.825		
	Total	11955.49	340			
Evaluation	Between Groups	79.202	2	39.601	1.044	0.353
	Within Groups	12823.12	338	37.938		
	Total	12902.32	340			

Summary of ANOVA, while comparing the perception scores of difference groups of students formed out of their teaching subjects, has been given in table 3. Obtained F values for admission process (2.02), material access (2.204), experiential access (1.027), critical access (2.957), and transformative access (2.653), evaluation (1.044) are found not significant at 0.05 level. The comparison of scores of functional access is found significant since the F value 4.873 is validated at 0.05 level. It can be thus inferred that there is no significant difference among the groups of students, formed based on teaching subject, in their perception on use of ICT for access to teacher education.

Place of Residence-Based Comparison of pre service teachers.

Table: 4. Summary of ANOVA-Place of Residence-based

ANOVA						
		Sum of Squares	df	Mean Square	F	Sig.
Admission Process	Between Groups	900.966	2	450.483	18.865	0.01
	Within Groups	8071.345	338	23.88		
	Total	8972.311	340			

Material Access	Between Groups	493.672	2	246.836	18.773	0.01
	Within Groups	4444.099	338	13.148		
	Total	4937.771	340			
Functional Access	Between Groups	3336.003	2	1668.001	25.247	0.01
	Within Groups	22330.63	338	66.067		
	Total	25666.63	340			
Experiential Access	Between Groups	445.876	2	222.938	16.714	0.01
	Within Groups	4508.405	338	13.338		
	Total	4954.282	340			
Critical Access	Between Groups	2780.214	2	1390.107	27.9	0.01
	Within Groups	16840.85	338	49.825		
	Total	19621.06	340			
Transformative Access	Between Groups	1413.475	2	706.737	22.66	0.01
	Within Groups	10542.02	338	31.189		
	Total	11955.49	340			
Evaluation	Between Groups	506.69	2	253.345	6.908	0.001
	Within Groups	12395.63	338	36.673		

	Total	12902.32	340			
--	-------	----------	-----	--	--	--

Table 4 shows the results of the analysis of variance on perception scores of students, viz. a. viz. locality. In all the dimension of ICT for access to teacher education, the F values are significant. The F values for admission process, material access, functional access, experiential access, critical access, and transformative access, and evaluation are 18.865, 18.773, 25.247, 16.714, 27.9, 22.66, and 6.908 respectively. All the F-values are found significant at 0.01 level. It is thus inferred that there are significant differences in their perception scores among the students groups formed out of their locality of residence.

Table: 5. Post hoc comparison Results- Residence based for pre service teachers

Multiple Comparisons							
LSD							
Dependent Variable	(I) Residence	(J) Residence	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
						Lower Bound	Upper Bound
Admission Process	Urban	Semi-Urban	1.523*	0.69	0.028	0.17	2.88
		Rural	4.205*	0.69	0	2.85	5.56
	Semi-Urban	Urban	-1.523*	0.69	0.028	-2.88	-0.17
		Rural	2.682*	0.851	0.002	1.01	4.36
	Rural	Urban	-4.205*	0.69	0	-5.56	-2.85
		Semi-Urban	-2.682*	0.851	0.002	-4.36	-1.01
Material Access	Urban	Semi-Urban	1.246*	0.512	0.015	0.24	2.25
		Rural	3.094*	0.512	0	2.09	4.1
	Semi-Urban	Urban	-1.246*	0.512	0.015	-2.25	-0.24
		Rural	1.848*	0.631	0.004	0.61	3.09

	Rural	Urban	-3.094*	0.512	0	-4.1	-2.09
		Semi-Urban	-1.848*	0.631	0.004	-3.09	-0.61
Functional Access	Urban	Semi-Urban	3.392*	1.148	0.003	1.13	5.65
		Rural	8.014*	1.148	0	5.76	10.27
	Semi-Urban	Urban	-3.392*	1.148	0.003	-5.65	-1.13
		Rural	4.621*	1.415	0.001	1.84	7.4
	Rural	Urban	-8.014*	1.148	0	-10.27	-5.76
		Semi-Urban	-4.621*	1.415	0.001	-7.4	-1.84
Experiential Access	Urban	Semi-Urban	1.475*	0.516	0.004	0.46	2.49
		Rural	2.869*	0.516	0	1.85	3.88
	Semi-Urban	Urban	-1.475*	0.516	0.004	-2.49	-0.46
		Rural	1.394*	0.636	0.029	0.14	2.64
	Rural	Urban	-2.869*	0.516	0	-3.88	-1.85
		Semi-Urban	-1.394*	0.636	0.029	-2.64	-0.14
Critical Access	Urban	Semi-Urban	3.784*	0.997	0	1.82	5.74
		Rural	7.132*	0.997	0	5.17	9.09
	Semi-Urban	Urban	-3.784*	0.997	0	-5.74	-1.82
		Rural	3.348*	1.229	0.007	0.93	5.77
	Rural	Urban	-7.132*	0.997	0	-9.09	-5.17
		Semi-Urban	-3.348*	1.229	0.007	-5.77	-0.93
Transformative Access	Urban	Semi-Urban	3.833*	0.789	0	2.28	5.38
		Rural	4.485*	0.789	0	2.93	6.04

	Semi-Urban	Urban	-3.833*	0.789	0	-5.38	-2.28
		Rural	0.652	0.972	0.503	-1.26	2.56
	Rural	Urban	-4.485*	0.789	0	-6.04	-2.93
		Semi-Urban	-0.652	0.972	0.503	-2.56	1.26
Evaluation	Urban	Semi-Urban	1.930*	0.855	0.025	0.25	3.61
		Rural	2.915*	0.855	0.001	1.23	4.6
	Semi-Urban	Urban	-1.930*	0.855	0.025	-3.61	-0.25
		Rural	0.985	1.054	0.351	-1.09	3.06
	Rural	Urban	-2.915*	0.855	0.001	-4.6	-1.23
		Semi-Urban	-0.985	1.054	0.351	-3.06	1.09

Since all the F-values are significant and there are differences among students in terms of their perception with regard to place of residence, the null hypothesis 3 (a) -There is no significant difference between the scores of pre service teachers in their perception on access of ICT in terms of their place of residence with respect to **admission process is rejected**.

The null hypothesis 3(b) -There is no significant difference between the scores of pre service teachers in their perception on access of ICT in terms of their place of residence with respect to **teaching learning process is rejected**.

Conclusion

The study reveals that the pre service teachers have no problem in the access of ICT, related to completing the admission formalities. Their perception towards role of ICT is however better, the most for Functional access and the least for Experiential and material access. The comparative analysis shows that students of Jamia Millia Islamia have a better perception for ICT than the students of Delhi University. Laboratory facilities with 24 hour Wi Fi service might have impacted their perception. So far as the perception of pre service teachers towards the role of ICT in various forms of access in respect of their teaching subjects, the analysis reveals no significant difference. On the basis of analysis of ANOVA it is inferred that the

perception of pre service teachers towards the role of ICT in various forms of access with respect to their place of residence differs remarkably. To further establish as to which group of these three has better perception, Post hoc analysis was done which revealed that urban group of pre service teachers has better perception towards role of ICT in access to teacher education as compared to semi urban and rural group.

Recommendations

- The entire ICT usage in universities should be adequately backed by policy framework of the Government which could positively impact and use of ICT both for pre service teachers and teacher educators.
- The difference in the perception of pre service teachers of languages vs. others needs to be bridged by putting a framework to build additional help for the ones needing them more. This will help bridge this divide and build parity among all the different streams.
- There is also a growing need to mitigate the difference in the knowledge and usage of ICT between pre service teachers residing in different localities. This needs to be addressed by various ways to enhance the reach of training centres of ICT in areas which require them the most.

References

- Amin, N.(2012): An Effective use of ICT for Education and Learning by Drawing on Worldwide Knowledge, Research, and Experience: ICT as a Change Agent for Education (A LITERATURE REVIEW)
- Bhatia, H.K., & Chugh, A. K. (2014). Technology integration to enhance quality: A study of pre-service teachers` perception. In *Education as a right across the levels: Challenges, Opportunities and Strategies The International Education Conference* (pp. 1332-1344). Delhi, Faculty of Education.
- Bhatia, H. K., & Ilyas, Z. (2016). Barriers of ICT integration in teaching learning. *Jamia Journal of Education*, 3(1), 54-62.

- Brush, T., Glazewski, K. D., & Hew, K. F. (2008): Development of an instrument to measure pre-service teachers' technology skills, technology beliefs, and technology barriers. *Computers in the Schools*, 25(1-2), 112-125.
- Daniels J.S. (2002).“ Foreword” in *Information and Communication Technology in Education–A Curriculum for Schools and Programme for Teacher Development*. Paris, UNESCO.
- Husain, I. & Nair, N. (2016). Disposition of Teachers and Students Towards the use of E- Learning. *Jamia Journal of Education-An international biannual publication*, 3(1), pp. 44-53.
- Husain, I. & Ankita (2017). National Policy on ICT in School Education: A Critical Analysis. *Jamia Journal of Education -An international biannual publication*, 3(2), pp. 45-55.
- Ilyas, Zeba (2018). ICT for Quality Enhancement in Teacher Education. *Jamia Journal of Education- A peer Reviewed Refereed International Biannual Publication*, 4(2)(In Press)
- Pelgrum, W. J., Law, N. (2003): ICT in Education around the World: Trends, Problems and Prospects, UNESCO-International Institute for Educational Planning. Available:
www.worldcatlibraries.org/wcpa/ow/02d077080fcf3210a19afeb4da09e526.html.
- Plomp, T.; Pelgrum, W. J. & Law, N. (2007): 'SITES2006—International comparative survey of pedagogical practices and ICT in education', *Education and Information Technologies* Vol.12, No. (2)
- Sanyal, B. C. (2001): 'New functions of higher education and ICT to achieve education for all, Paper prepared for the Expert Roundtable on University and Technology-for Literacy and Education Partnership in Developing Countries, International Institute for Educational Planning, Paris ,UNESCO
- Sharma, R. (2003).Barriers in Using Technology for Education in Developing Countries', IEEE0-7803-7724-9103.Singapore schools, *Computers & Education* Vol. 41, No.(1)
- Shan Fu ,(2013),’ ICT in Education: A Critical Literature Review and Its Implications” *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 2013, Vol. 9, Issue 1

- UNESCO (2002) Information and Communication Technology in Education–A Curriculum for Schools and Programme for Teacher Development. Paris, UNESCO.
- Yusuf, M.O. (2005). Information and communication education: Analyzing the Nigerian national policy for information technology. International Education Journal Vol. 6 No. (3)