International Journal of Instruction *July 2012 ● Vol.5, No.2*
e-ISSN: 1308-1470 ● www.e-iji.net *p-ISSN: 1694-609X*

BARRIERS TO THE INTRODUCTION OF ICT INTO EDUCATION IN DEVELOPING COUNTRIES: THE EXAMPLE OF BANGLADESH

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Within a very few years, Information and Communication Technology (ICT) has turned out to be an effective educational technology which promotes some dramatic changes in teaching and learning processes. Technologies allow students to work more productively than in the past, but the teacher's role in technology-rich classrooms is more demanding than ever (Keengwe, Onchwari et al. 2008). ICT has the potential to transform the nature of education (improving teachers' design work, enhancing the roles of students and teachers in the learning process and helping to create a collaborative learning environment, etc). Although ICT has the potential to improve the educational system to a great extent, developing countries are far from reaping these benefits because of certain barriers. The aim of this paper is to present a comprehensive review of international articles relating to barriers encountered when introducing ICT into classrooms. This review will help identify the factors that influence teachers' decisions whether or not to implement ICT in teaching-learning situations. Connections will be made with existing literature to explore possible barriers for introducing ICT into education in Bangladesh. Further, this paper also offers a number of recommendations to reduce these barriers and maximize the beneficial use of ICT on education.

Key Words: educational technology, teachers' design works, student learning, ICT implementation

INTRODUCTION

The growth of information and communication technologies (ICT) has dramatically reshaped teaching and learning processes in higher education (Pulkkinen, 2007; Wood, 1995). ICT for education is more critical today than ever before since its growing power and capabilities are triggering a change in the learning environments available for education (Pajo & Wallace, 2001). The use of ICT offers powerful learning environments and can transform the learning and teaching process so that students can deal with knowledge in an active, self directed and constructive way (Volman & Van Eck, 2001; de Corte et al., 2003). At present ICT is considered as an important means to promote new methods of instruction (teaching and learning). It should be used to develop students' skills for cooperation, communication, problem solving and lifelong learning (Plomp et al., 1996; Voogt, 2003). Although computers and technology are prevalent throughout our society (Cuban, 2001), developing countries are far from reaping their benefits because of certain barriers.

The aim of this paper is to present a comprehensive review of international articles relating to barriers encountered when introducing ICT into classrooms. This review will help identify the factors that influence teachers' decisions whether or not to implement ICT in teaching-learning situations. Connections will be made with existing literature to explore possible barriers for introducing ICT into education in Bangladesh. Understanding the pedagogical, psychological and cognitive barriers to the successful use of information technology may be a vital precondition for improving the utilization of computers and other technological aids in the educational process (Benzie, 1995). It is hoped that this paper will be useful for the educators, policymakers and other decision makers who are directly involved in introducing ICT into education in Bangladesh

During the last two decades, the implementation of ICT in education has become an important topic in research on educational reform (Drent and Meelissen 2008). Research findings over the past two decades provide some evidence as to the positive effects of the use of information and communications technology (ICT) on pupils' learning (Mumtaz, 2000; Hattie, 2009). Sanyal (2001) states that there are four ways ICT can support basic education: (i) supporting education in schools, (ii) providing non-formal education for out-of-school children and adults, (iii) supporting pre-service distance education of teachers and their in-service professional development, and (iv) enhancing the management of schools. Sanyal (2001) makes a cautionary observation by quoting IIEP (1995), ''Putting computers in classrooms and wiring up schools does not of itself create exciting new learning

situations that are about changing the ethos of classrooms and the culture of institutions''.

By adopting ICT, we can offer high quality education. Ehrmann (1994) identified four distinct faces of quality education, which can be supported by ICT: learning by doing, real time conversation, delayed time conversation and directed instruction. Hawkridge et al (1990) suggested that the use of ICT could improve performance, teaching, and administration, have a positive impact on education as a whole, and develop relevant skills in the disadvantaged communities - helping in liberation and transformation. The Dakar Framework for Action (World Education Forum, Dakar, Senegal, April 2000) also stressed the use of ICT for achieving 'Education For All' (EFA) goals and recommended, "ICT must be harnessed to support EFA goals at an affordable cost. These technologies have great potential for knowledge dissemination, effective learning and the development of more efficient education services."

Technology should be used as a tool to support educational objectives such as skills for searching and assessing information, cooperation, communication and problem solving - which are important for the preparation of children for the knowledge society (Drent and Meelissen 2008). Cox et al (1999) carried out a study examining the factors relating to the uptake of ICT in teaching. The results showed that the teachers who are already regular users of ICT have confidence in using ICT, perceive it to be useful for their personal work and for their teaching and plan to extend their use further in the future. The factors that were found to be the most important to these teachers in their teaching were: making the lessons more interesting, easier, more fun for them and their pupils, more diverse, more motivating for the pupils and more enjoyable. Additional, more personal, factors were: improving presentation of materials, allowing greater access to computers for personal use, giving more power to the teacher in the school, giving the teacher more prestige, making the teachers' administration more efficient and providing professional support through the Internet

ICT enhances higher education in a number of ways:

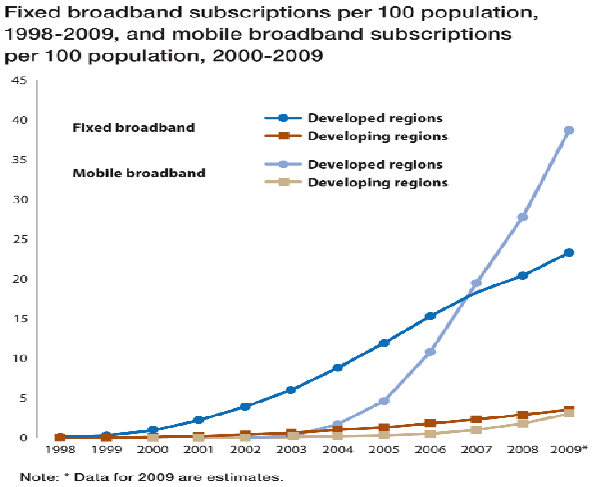
- It enables the effective storing/sorting of information, and can offer new fast ways of communication;
- It enables the reduction of information quantity towards a higher quality and better structure;
- It can be integrated into teaching and learning strategies – and used to support relative learning theories; and
- ICT (computers, Inter and Intranet) can be used to create new types of interactive learning media for improved quality, equity, and access in higher education (Rosswall, 1999).

Researchers have also found that computers enhance teaching and learning by providing opportunities to practice and to analyze, offering better access to relevant articles and teaching and learning materials. Every classroom teacher should use learning technologies to enhance their students' learning in every subject - because ICT can engage the thinking, decision making, problem solving and reasoning behaviors of students (Grabe & Grabe, 2001). In fact, innovative use of ICT can facilitate student-centered learning (Drent, 2005), engage students in constructivist classrooms and enhance their social interaction (Dodge, Colker, & Heroman, 2003). It has been shown to improve their cognitive development (Nir-Gal & Klein, 2004), increase creativity (O'Hara, 2008), and improve their problem solving skills (Sarama & Clements, 2001).

The International Society for Technology in Educational (ISTE) emphasizes that teachers of today should prepare to provide technology-based learning opportunities for their students (Hamidi, Meshkat et al. 2011). ICT use has increased dramatically over the last few years. In the developed regions, the percentage remains much higher than in the developing world (MDG Report 2010) (see Fig. 1). On the other hand, adoption and usage of ICT are not restricted to the developed countries, and several developing countries have adopted technology in their educational systems (Ihmeideh, 2009). For instance, in 2007, the Minister of Higher Education in Lebanon announced the distribution of 400 computers for public schools, connected to the Web through broadband[1](Nasser, 2008). In Kenya, Wims and Lawler (2008) examined the impact of ICT projects in educational institutions, and found tangible benefits to students from exposure to ICT.

[1] Broadband is high-speed Internet access (can be up to 50 times faster than dial-up access) so as downloading a web page are noticeably quicker. Fixed Broadband is the fastest Internet access in which has a high rate of data transmission. Two common ways to obtain fixed broadband Internet access are with a cable modem provided by a cable company, or a digital subscriber line (DSL) provided by a telephone company Savage, S. J. and D. Waldman (2005). "Broadband Internet access, awareness, and use: Analysis of United States household data." Telecommunications Policy **29**(8): 615-633.. Mobile broadband is a form of wireless Internet access in which data is transferring through the cellular carriers to cell phones and laptops. Mobile broadband works through a variety of devices, including portable modems and mobile phones Here Internet speeds (mean data transmission rate) are in general less than fixed broadband services, such as cable, DSL.

Figure 1: Comparison between developed and developing regions over the last decade



Source: The Millennium Development Goals Report 2010 (p. 72)

Bangladesh is one of the developing countries in the world with a growth rate of GDP around 5.6% and having poor ICT infrastructure like the other less developed countries (Islam & Selim 2006). Bhuiyan (2011) states that recently, Bangladesh has made considerable progress in introducing ICT in the public sector, although, in terms of e-readiness, the latest UN E-Government Readiness Survey 2008 identified Bangladesh as one of the poor performers in the Southern Asian region (see Table 1). This global survey report has ranked Bangladesh 142 among 189 countries with an index value of 0.2936, which, while perhaps low in comparison with some of the other countries studied, is nonetheless a clear improvement from its 162 position in the 2005 survey (UN, 2008).

Table 1: e-Government readiness for Southern Asia.

Country	*2008 Index*	*2005 Index*	*2008 Ranking*	*2005 Ranking*
Maldives	0.45	0.43	95	77
Sri Lanka	0.42	0.40	101	94
Iran	0.41	0.38	108	98
India	0.38	0.40	113	87
Pakistan	0.32	0.28	131	136
Bhutan	0.31	0.29	134	130
Bangladesh	0.29	0.18	142	162
Nepal	0.27	0.30	150	126

Afganistan	0.20	0.15	167	168
Region	0.34	0.31		
World	0.45	0.43		

Source: UN (2008, p. 33).

The ITU has developed ICT Development Index (IDI) to measure the level of advancement of ICT in more than 150 countries globally and to compare progress made between 2002 and 2007 (ITU, 2009, p. iii). By employing this new benchmark tool, ITU ranks Bangladesh 138 in their 2007 survey with an IDI value 1.26 (ITU, 2009), one of the lowest of all the Southern Asian countries (see Table 2).

Table 2: ITU ICT development index for Southern Asia.

Country	*Rank 2007*	*IDI 2007*	*Rank 2002*	*IDI 2002*
Maldives	71	3.16	88	1.96
Iran	78	2.94	92	1.93
Sri Lanka	100	2.38	97	1.75
Bhutan	115	1.63	118	1.17
India	118	1.59	117	1.19
Pakistan	127	1.46	146	0.89
Bangladesh	138	1.29	132	1.02
Nepal	139	1.23	133	1.01

Source: ITU (2009, p. 22).

Against the background of the ICT situation depicted above, the new democratically elected Bangladesh government, installed in January 2009, has a political agenda is to digitize the country: to accelerate a "Digital Bangladesh" movement so as to achieve "Vision 2021." (Bhuiyan 2011). The Government of Bangladesh has emphasized the implemention of ICT in all sectors including education. In spite of this effort and initiative, there are still some limitations in the effective use and spread of ICT. The main reason is poverty, which restricts the free flow of information. Either the government may not be in a position to part with information or may not do so intentionally, due to corrupt practices. Then 'conflict' may also impose restrictions on free access to information (DFID, 2000). Before identifying the emerging various constraints that hinder the effective implementation of ICT into education, we need to clarify the term what ICT stands for this paper.

DEFINITION OF ICT IN EDUCATION

According to a United Nations report (1999)[2] ICTs cover Internet service provision, telecommunications equipment and services, information technology

2 1 United Nations Economic Commission (ECA 1999) in Adeya, N.C. (2002)

equipment and services, media and broadcasting, libraries and documentation centres, commercial information providers, network-based information services, and other related information and communication activities.

Moursund (2003 online) accepts this definition of ICT but details more comprehensively the range of technologies embraced by ICT:

> ICT includes the full range of computer hardware, computer software, and telecommunications facilities. Thus it includes computing devices ranging from handheld calculators to super computers. It includes the full range of display and projection devices used to view computer output. It includes the local area networks and wide area networks that allow computer systems and people to communicate with each other. It includes digital cameras, computer games, CDs, DVDs, cell telephones, telecommunication satellites, and fiber optics. It includes computerized machinery, and computerized robots.

In a brief the term ICT as applied to education, are those technologies include computers, the Internet, broadcasting technologies (radio and television), and telephony that can facilitate not only delivery of instruction, but also learning processes itself. These technologies has been identified as an important tool for realizing a new paradigm of learner-centered education that better supports learners' needs through differentiated and personalized instruction (Watson and Watson 2011). Components such as providing interactive content, giving immediate feedback, diagnosing student needs, providing effective remediation, assessing learning, and storing examples of student work (e.g., portfolios) are critical elements in digital technology that is able to support learner-centered instruction for diverse learners (Bush & Mott, 2009; Reigeluth et al., 2008).

Moreover ICT can promote international collaboration and networking in education and professional development. There are a range of ICT options - from videoconferencing through multimedia delivery to web sites - which can be used to meet the challenges teachers face today. In fact, ICT will be able to provide more flexible and effective ways for lifelong professional development for today's teachers. As a result both teachers and students will get enormous benefits for their empowerment and development.

BARRIERS TO THE IMPLEMENTATION OF ICT IN EDUCATION

Although the Government of Bangladesh is committed to implementing ICT in education, the process is hindered by a number of barriers. The barriers are categorized as external (first-order) or internal (second order) (Keengwe, Onchwari et al. 2008). According to Snoeyink and Ertmer (2001), first order barriers include lack of equipment, unreliability of equipment, lack of technical

support and other resource-related issues. Second-order barriers include both school level factors, such as organizational culture and teacher level factors, such as beliefs about teaching and technology and openness to change. How these external and internal barriers negatively influence the use of ICT in education are described below.

ICT Supported Infrastructure and Lack of Resources

Bangladesh is one of the developing countries that lack the resources and appropriate infrastructure for implementing ICT in education. The effective use of ICT would require the availability of equipment, supplies of computers and their proper maintenance including other accessories. Most of the rural areas in Bangladesh do not have electricity and therefore one cannot even run a computer in the first place. On the other hand most of the cities of Bangladesh do not get electricity more than eight hours in a day due to lack of electric supply. The development of the ICT infrastructure in a country is dependent on the availability of a reliable electricity supply. Implementing ICT demands other resources, such as computers, printers, multimedia projectors, scanners, etc - which are not available in all the educational institutions. Besides, ICT requires up-to-date hardware and software. Using up-to-date hardware and software resources is a key feature in the diffusion of technology (Gulbahar 2007) but a rare experience in educational institutions. High-speed internet connection is another prerequisite for integrating ICT into the teaching-learning situation. But unfortunately internet access is very poor.

Insufficient Funds

Effective implementation of technology into education systems involves substantial funding, that is very hard to manage in developing countries like Bangladesh, where many people are living below the international poverty line. ICT-supported hardware, software, internet, audio visual aids, teaching aids and other accessories demand huge funds. Mumtaz (2000) stated that many scholars proposed that the lack of funds to obtain the necessary hardware and software is one of the reasons teachers do not use technology in their classes. Afshari, Bakar & Su-Luan et al. (2009) state that efficient and effective use of technology depends on the availability of hardware and software and the equity of access to resources by teachers, students an administrative staff. These costs are in most cases inflated and cannot be provided by most developing countries, including Bangladesh.

Vision and Plan

In developing countries, many stakeholders, educators, government, and business leaders consider that ICT investment enhances the instructional use of computers and improves teaching and learning. Even so, neither providing

computer tools in the classroom (Candiotti and Clark 1998) nor providing state-of-art technology by itself will make any desirable learning changes in education (Kent and McNergney 1999). This barrier mainly falls into two broad categories: (i) Government vision and plan and (ii) School Vision and plan.

Government vision and plan

The Government of Bangladesh has emphasized the implemention of ICT in education with "Vision 2021" - in order to improve the quality of the educational system and also to create an improved teaching and learning environment to empower and develop the proficiency of teachers and students in Bangladesh. Effective implementation of ICT in education is not merely a vision. Rather, it needs a proper plan, policies, execution and monitoring: which is really a major constraint for a country like Bangladesh.

School Vision and plan

Ertmer (1999) wrote, "A vision gives us a place to start, a goal to reach for, as well as a guidepost along the way" (p. 54). Many researchers have pointed out that a school's ICT vision is essential to effective ICT integration (Anderson & Dexter, 2000). In Bangladesh most of the educational institutions are far away from implementing ICT into teaching and learning situations. Also, there are few higher educational institutions in big cities that have ICT facilities but cannot integrate it effectively due to lack of a proper vision and plan. So ICT integration is clearly related to actions taken at the school level, such as the development of an ICT plan, ICT support, and ICT training (Tondeur, van Keer et al. 2008) which is absent at most of the educational institutions in Bangladesh.

Political Factors

Sharma (2003) states that the most notable of the barriers to the use of ICT in education in developing countries seems to be the political will of the people in the corridors of power. The allocation of sufficient funds for the educational sector and ICT does not seem to be very attractive to the leaders. It can be seen from the budgetary allocations in third world countries that greater allocations may be for the defense forces rather than education. If the political leaders favour the technology, it will bloom. Here the case of India and Bangladesh are worth citing. After the death of Mrs Indira Gandhi in 1984, Mr. Rajiv Gandhi became Prime Minister of India. Since he was very fond of computers and telecommunications (he himself had a Pilot's License), India witnessed a tremendous growth of computerization and tele-networking in his time. As a result, nowadays most of the schools (in the urban areas) have computers and are well connected to the Web. The new Government of Bangladesh came with

a slogan "Digital Bangladesh". The prime minister would like to build Bangladesh as a digitalized one in all sectors. Hence they are also trying to implement information technologies in education as well. Unfortunately if this political government will change after five years due to the democratic election then "Vision 2021" might be changed due to antagonistic attitudes among the political parties of Bangladesh.

Social and Cultural Factors

Half of the population of Bangladesh are women who are relatively deprived of access to the advantages of technology. Women are underepresented in almost every aspect of ICT implementation in Bangladesh. Sharma (2003) states that one of the most significant social factors influencing the use of ICT in Bangladesh, Malaysia and other developing countries is the low social status of women and hence providing education or the use of ICT to women is not considered important. Women are supposed to be primarily the caretakers of family and children. Men disproportionately occupy academic, management and technical roles, which by virtue of the nature of the work provide easier access to the internet and related technology. Even if women have the necessary hardware and software, they may find little time to use them due to being busy with domestic chores.

The Commonwealth of Learning, in association with the British Council and the Commonwealth Educational Media Center for Asia (CEMCA) at New Delhi organized a regional expert group meeting in November 1998. This meeting was attended by participants from Pakistan, Bangladesh, Malaysia, Sri Lanka and India and discussed the challenges and opportunities posed by ICT for women in distance education. In Bangladesh, the key barriers to the use of ICT were found to be language and insufficient education and skills that facilitate the effective use of ICT. In Bangladesh, Bangla is the main spoken language, whereas English is the dominant language over the computer (software), internet and ict supported tools. Mcdonald (2001) has suggested that the emergence of English as a dominant second language of science, technology, business and interactional relations, as well as education and training, would ensure the availability of globally useable knowledge products. This in turn will also offer more opportunities for a wide range of choices in educational and training courses. But currently language seems to be one of the major social barriers to the use of ICT in Bangladesh, where English is not so widely spoken (see Leu and Leu (1997), Turbill (2001), Wims and Lawler (2008) who found that lack of developmentally-appropriate software (DAS) is considered to be one of the difficulties faced by teachers and students). The reason behind that could be due to the scarcity of Bangla software, since most of the software programs are designed in English, which is the second language in the country.

Corruption

The situation in Bangladesh represents a distinct case where corruption has found a remarkably safe space in which to proliferate, despite the vigilance of control mechanisms. Corruption is so pervasive that it has evoked widespread condemnation, both inside and outside the country (Zafarullah & Siddique, 2001). Consequently, Bangladesh has been consistently ranked by Transparency International as one of the most venal among the researched countries (Bhuiyan 2011). As a result, corruption can be identified as one of the strong barriers to the implementation of ICT in education. The misuse of government funds which could have been used to develop other sectors like the integration of ICT in education is channeled in other directions i.e. few people benefit from those funds by pocketing all the money (Kessy et al, 2006). Mamun & Tapan (2009) state that the budget for the newer technology was misused and reduced due to corruption in the administration. Huge budgets are passed to buy modern teaching and learning materials for the improvement of the teaching and learning process, but in the end only minor improvements are found in the over all technical and vocational education sector.

Teachers' Attitudes and Beliefs about ICT

Teachers' attitudes have been found to be major predictors of the use of new technologies in instructional settings (Almusalam, 2001). Mumtaz (2000) states that teachers' beliefs about teaching and learning with ICT are central to integration. To be successful in computer use and integration, teachers need ''to engage in conceptual change regarding their beliefs about the nature of learning, the role of the student, and their role as teacher'' (Niederhauser et al. 1999, p. 157). Hence the successful use of ICT into classroom largely depends on teachers' attitudes and belief relating to these. In fact, it has been suggested that attitudes towards computers affect teachers' use of computers in the classroom and the likelihood of their benefiting from training (Kluever, et al, 1994). It is found that less technologically capable teachers who possess positive attitudes towards ICT, require less effort and encouragement to learn the skills necessary for the implementation of ICT in their design activities into the classroom. Therefore, teachers who have positive attitudes towards ICT itself will be positively disposed towards using it in the classroom (Moseley & Higgins, 1999). Moreover, Harrison and Rainer (1992) found that participants with negative computer attitudes were less skilled in computer use and were therefore less likely to accept and adapt to technology than those with positive attitudes. They concluded that changing individuals' negative attitudes is essential for increasing their computer skills. Therefore, if teachers want to successfully use technology in their classes, they need to possess positive attitudes to the use of technology. Such attitudes are developed when teachers

are sufficiently comfortable with technology and are knowledgeable about its use (Afshari et al, 2009).

Lack of Knowledge and Skill

According to Pelgrum (2001), the success of educational innovations depends largely on the skills and knowledge of teachers. Teachers' lack of knowledge and skills is one of the main hindrances to the use of ICT in education both for the developed and underdeveloped countries (Mamun, & Tapan, 2009; Pelgrum, 2001; Ihmeideh, 2009; Williams 1995). Integrating technology in the curriculum requires knowledge of the subject area, an understanding of how students learn and a level of technical expertise (Morgan 1996). Moreover, Berner (2003) found that the faculty's belief in their computer competence was the greatest predictor of their use of computers in the classroom. Therefore, lack of knowledge regarding the use of ICT and lack of skill on ICT tools and software have also limited the use of ICT tools in teaching learning situation in Bangladesh.

Lack of Time

Bangladesh, a developing country, has a shortage of teachers, and they are already burdened with heavy workload. Some of the institutions have already introduced two shifts, without increasing the number of teaches. So teachers' teaching load has been increased due to conducting classes in both the shifts. Moreover, most of the teachers are also responsible for administrative tasks. In these circumstances teachers don't have time to design, develop and incorporate technology into the teaching learning situation (Afshari et al, 2009; Beggs, 2000; Newhouse, 1999; Ihmeideh, 2009). These studies reported lack of time as one of the biggest constraints to the integration of ICT into the teaching-learning situation. Teachers need time to learn how to use the hardware and software, time to plan, and time to collaborate with other teachers. Teachers also need time to develop and incorporate technology into their curriculum. Some teachers are unable to make appropriate use of technology in their own classrooms, while others are unwilling to try because of anxiety, lack of interest, or lack of motivation (Duhaney 2001).

In addition to the factors mentioned above, there are other factors that directly and indirectly influence the effective implementation of ICT in education in Bangladesh. They are: poor administrative support (Keengwe et al. 2008); lack of appropriate staff training and quality training for teachers and school principles (Copley and Ziviani, 2004; Mamun, M. A. & Tapan, S.M., 2009; Afshari et al, 2009); lack of qualified ICT coordinators who will assist teachers to integrate ICT in classroom and lab and favorable school culture (Afshari et al, 2009; Lim, C. P., 2002; Tearle, P., 2003).

DISCUSSION AND RECOMMENDATIONS

This paper suggests that the effective implementation of ICT in education in Bangladesh is impeded by a number of constraining factors. The paper also suggests the following recommendations for improving on the current situation:

1. Effective implementation of ICT in education requires commitment from the government of Bangladesh, administrators, teachers, parents, students, and the community. That is, all the stakeholders and responsible authorities including teachers and other staff should be aware of the importance of technology in developing student's learning and should strive to overcome the barriers which prevent the use of technology in classroom settings, so that students can benefit effectively from this ICT. Afshari et al, (2009) states that it is crucial to involve those who have a stake in the outcomes, including teachers, parents, students, and the community, and allow them to assist in the creation of the vision by contributing their knowledge, skills, and positive attitude. Therefore, a clear vision of ICT integration in schools that is shared by all members of the school community promotes effective use of ICT in the classroom.

2. Lack of resources within educational institutions are another major hindrance to the implementation of ICT in a developing country like Bangladesh. Lack of computers (both hardware and software) and other ICT-supported tools in the classroom can seriously limit the use of it by a teacher. Limited resources results in lack of computer integration, which in turn results in lack of sufficient computer experience for both pupils and teachers (Rosen & Weil, 1995; Winnans & Brown, 1992; Dupagne & Krendl, 1992; Hadley & Sheingold, 1993). The stakeholders and school authorities need to be provided with adequate facilities and resources for effective implementation of ICT.

3. The Government of Bangladesh has already taken some necessary steps to increase the enrollment of girls at school. Hence, strategies and proper policies should be formulated for encouraging women and girls with respect to the adoption of ICT. Without proper empowering of women, it is not possible to implement ICT in education. Sharma (2003) states that the policy-makers must pay more attention to accommodate all sectors (and those excluded also like rural communities, women and disabled) while planning for adoption of ICT.

4. Local software companies should be encouraged to work together with teachers to produce Bangla software programs suitable for the teachers and students who don't know English. In this regards Mumtaz (2000) states that software designers and teachers should work together and observe critically how a range of teachers teach in the classroom and how appropriate forms of software supporting different skills and ways of teaching and learning can be better developed for teachers to use in subject teaching.

5. Moreover, effective implementation of ICT in educational institutions of Bangladesh largely depends on teachers and principals, who require in-depth professional development due to lack of knowledge and skills. Vigilant attention needs to be given to in-service teacher training for both teachers and principals and pre-service training for newly appointed teachers before joining the regular classes to acquaint them with the important role of technology in schools settings and to train them on how to prepare and use ICT competently. Afshari et al, (2009) states that professional development is necessary for teachers to enable them to effectively use technology to improve student learning. Staff development should be collaboratively created, based on faculty input and school needs. It must prepare teachers to use technology effectively in their teaching. But this training should not consist merely of short workshops or training, which is not enough to build proper knowledge and skills. In relation to this argument, Fullan (1992) suggested that training should not be one-shot workshops, but rather ongoing experiences so that learners/teachers can be kept up to date with ever-changing technologies. During their teacher training programs teachers need to be given opportunities to practice using technology more practically so that they can see ways in which technology can be used to augment their classroom activities (Rosenthal, 1999).

6. To implement computers in the classroom, teachers should feel confident and comfortable using computers, through the use of computers on a consistent basis for instructional activities. Teachers must understand the value of computing in education to be able to benefit their students and to support meaningful learning (Novak 1998). So changing teachers' negative attitudes is essential for increasing their computer skills. Therefore, if teachers want to successfully use technology in their classes, they need to possess a positive attitude to the use of technology. Such an attitude is developed when teachers are sufficiently comfortable with technology and are knowledgeable about its use (Harrison & Rainer, 1992; Afshari et al, (2009). In this connection, Mumtaz (2000) states that schools can go only so far to encourage ICT use; actual take-up depends largely on teachers' personal feelings, skills and attitudes. Even if teachers are provided with up-to-date technology and supportive networks, they may not be enthusiastic enough to use it in the classroom. Teachers need to be given the evidence that ICT can make their lessons more interesting, easier, more fun for them and their pupils, more enjoyable and more motivating. As ICT is a relatively new field in the Bangladesh education systems, more in-depth research should be conducted related to integration of ICT into classroom situations, to show that ICT can make their lessons more interesting, easier and efficient.

Acknowledgement

We would like to show my sincere gratitude to Professor Peter Goodyear, Co-director, and Dr. Lina Markauskaite, Senior Lecturer, CoCo Research Centre, Faculty of Education and Social Work, The University of Sydney for their encouragement, guidance and support.

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