THE INTERNATIONAL JOURNAL OF SCIENCE & TECHNOLEDGE

ICT Integration and Tutors' Obstacles: A Case of Atebubu College of Education, Ghana

Victor Dannyansah
Tutor, Mathematics Department, Atebubu College of Education, Ghana
Victor Kaing Anyanful
Tutor, Mathematics and ICT Department, Ola College of Education, Ghana
Benjamin Baiden
Tutor, Mathematics and ICT Department, St. Joseph's College of Education, Ghana

Abstract:
The aim of this study was to investigate the obstacles that impeded the progress of the tutors of Atebubu College of Education in their quest to integrate ICT into their teaching process. The study collected data from 38 tutors of Atebubu College of Education, Ghana. Questionnaire was given to the respondents to gather quantitative data from them. Descriptive statistics by way of frequency counts and percentages was used to analyse responses received from the participants. Results from the analysis of the data showed that 78.9 percent of the tutors had not received adequate professional development to enable them Integrate technology into their curriculum. Although 78.9 percent of the tutors believed that ICT increases the quality of education, they lacked the requisite skills or professional competence to integrate ICT into their subject areas. All 38 tutors (100 percent) stated that lack of Internet connection was an impediment to ICT integration. Tutors (68.4 percent) also indicated that insufficient number of computers hindered integration. It can be concluded from the findings of the study that due to the obstacles, tutors of Atebubu College of Education encountered, they could not effectively integrate ICT into their teaching process.

Keywords: ICT, integration, obstacles, tutors

1. Introduction

ICT into education is viewed as a potential technological tool that can revolutionize our outmoded educational system and better prepare our students for the information age, and/or accelerate national development efforts. In developing countries in particular, the above promise has brought about a lot of speculations about the necessity of educational reforms that will accommodate the new tools (Pelgrum, 2001). Governments in most developing countries have initiated national programs to introduce computers into education and in doing so they have added to their burden of debt (Benzie, 1995).

Over the years, Ghana has undertaken educational reforms aimed at raising the standard of education. The Junior High School (JHS) system was introduced to equip their graduates with technical and vocational skills while preparing students for the Senior High Schools. In view of the infrastructural challenges facing Ghana's educational system, ICT use, especially computers and Internet, was introduced to increase access and to improve the relevance of education. The educational reform was accompanied by educational program of direct class teaching through the television to thousands of homes in densely populated communities where fewer schools are available.

In many places, the computer technology has made it possible for teachers and students to interact through the Internet. ICTs are resources that can be used to support existing teaching and learning materials. Haddad and Drexler (2002) identified five levels of ICT use in education, which are Presentation, demonstration, drill and practice, interaction and collaboration. There are many Websites today where instructors and students can visit in order to obtain needed information and interact. This is used in most distance education programs. United Nations Institutions for Training and Research (UNITAR), for instance, uses the Internet as a medium to offer training programs to thousands of public sector workers around the world. Computers indeed have become motivating tools for teaching and learning in our schools.

Computers have been used to create electronic libraries and catalogues to enhance academic research work. According to Heeks (1999), "many libraries now provide online resources to facilitate learning and research electronically". Hakkarainen, Ilomaki, Lipponen, Muukkonen and Rahikainen (2000) reported that ICT is a transformative tool and its full integration into the school systems is necessary to prepare students for the information society they will inherit.

The Ministry of Education, Science and Sports in Ghana implemented education reforms in September 2007 with emphasis on ICT. Currently, ICT has been incorporated into the school curriculum, beginning with the pre-tertiary institutions. ICT is now a subject on the schools' timetable from primary to senior high school (Asamoah, 2008).

Teachers with pedagogical proficiency who are ready and willing to transmit knowledge and support students to construct knowledge will normally make a difference in any learning process. In this age of ICT and its integration in the educational system, the role of the teacher, just like in the traditional classrooms, should not be overlooked or underestimated. It worth noting that ICTs in themselves do not improve student's learning prospect, but educators who use ICTs thoughtfully do. It is the contextualized teaching and learning needs that drive the ICTs intervention, rather than the technology itself. If teachers possess little knowledge of ICT as is the case of most Ghanaian teachers then the integration of ICT into pedagogical practices is seriously Compromised (Boakye & Banini, 2008).

The development of teachers' positive attitudes toward ICT is a key factor for enhancing computer integration and avoiding teachers' resistance to computer use (Watson, 1998). Teachers' attitudes toward computers have been found to bear a direct effect on their classroom use of computers. In fact, some researchers have concluded that teachers' attitudes toward technology may determine their implementation of any computer skills they acquire (Woodrow, 1992). Ultimately, as Pelgrum (2001) suggests, teachers are the most important agents of change on the educational work floor. Hence, any attempt to implement computers in education would need to address teachers' attitudes toward computers as a perquisite for its success.

2. Literature Review

With advent of the information age, ICT has a significant role of enhancing the quality of education. It has a critical role of serving education by way of helping teachers to do their professional job and helping students to learn. Teachers are expected to be ICT leaders, role models for appropriate use of emerging types of ICT and integrate a variety of ICT into the curriculum effectively (Ozogul, 2002). Unfortunately, teachers face some problems in integrating ICT into the teaching and learning process. Many countries are monitoring how ICT is being integrated into the curriculum in order to reveal these problems. Cagiltay, Cakiroglu, Cagiltay and Cakiroglu (2001) indicated that the teachers in Turkey classified some problems related to integration of computer into the curriculum. These problems are:

- Inadequate computers
- Lack of teacher education in computer literacy
- Inappropriate instructional programs
- Lack of teacher's knowledge about how to use computer in instruction
- Load of the curriculum

Many other studies have indicated that lack of access to resources, including home access, is another complex barrier that discourages teachers from integrating new technologies into education. Sicilia's study (2005) indicated that teachers complained about the difficulty they go through before having access to computers. The author gave reasons like "computers had to be booked in advance and the teachers would forget to do so or they could not book them for several periods in a row when they wanted to work on several projects with the students". Due to the fact that ICT resources were shared with other teachers, sometimes teachers would have no access them. According to Becta (2004), the inaccessibility of ICT resources is not always merely due to the non-availability of the hardware and software or other ICT materials within the school. It may be the result of one of a number of factors such as poor organisation of resources, poor quality hardware, inappropriate software or lack of personal access for teachers (Becta, 2004).

The barriers associated with the accessibility of new technologies for teachers are prevalent and differ from one country to another. Empirica's (2006) European study established that lack of access is the major barrier. Other barriers to using ICT in teaching were reported by teachers, for example, lack of computers and lack of adequate material. In a related study, Korte and Hüsing (2007) discovered that in European schools there were some infrastructure barriers such as broadband access. They concluded that one third of European schools still do not have broadband Internet access. Pelgrum (2001) looked at practitioners' views from 26 countries regarding the main obstacles to the implementation of ICT in schools. He established that four of the top ten barriers were related to the accessibility of ICT. These barriers were insufficient peripherals, insufficient number of computers, insufficient numbers of copies of software and insufficient simultaneous Internet access. Toprakci (2006) found that low numbers of computers, oldness or slowness of ICT systems and scarcity of educational software in the school were barriers to the successful implementation of ICT into science education in Turkish schools. Also, Al-Alwani (2005) found that having no access to the Internet during the school day and lack of hardware were obstructing technology integration in Saudi schools. Recent research on Syrian schools indicated that insufficient computer resources were one of the greatest impediments to technology integration in the classroom (Albirini, 2006).

Some other important factors have also been found to have significantly influencing ICT use in schools. Christensen (1997) compared students and teachers views toward computer-assisted class discussion and found that, while students were positive about the use of computers as an effective learning tool, teachers were uncomfortable using computers in class activities. One of the main reasons that teachers gave for their relative discomfort about the use of computers is their technical discomfort with using these tools. Most of them were unfamiliar with the functionality of the software they were using and about the optimal way to integrate it in class activities.

Research revealed that teachers often struggle with the integration of technology in the school curriculum on daily basis (Spiegel, 2001). Attesting to this fact, Bulkeley (1993) states that the problem is not getting computers and software, though; it is also about knowing how to use them. It is an undeniable fact that computer competence does not only include the knowledge of computers but also the skills and experience needed to put them into use. Earlier research suggests that the success of educational innovations depends largely on providing teachers with the competencies required to make them function (Pelgrum, 2001). In a multinational study that involved teachers from 26 countries, Pelgrum (2001) found

that teachers' lack of knowledge and skills was the second most inhibiting obstacle to the use of computers in schools. In their analysis of several major cross-cultural studies completed during the 1990s and related to information technology and education, Knezek and Christensen (2002) found that teachers' competence with computer technology is the principal determinant of effective classroom use by students. Isleem (2003) found that computers expertise was the strongest predictor of computer use by Ohioan technology education teachers.

Research has shown that computers are used less often in the classroom than in other organizations. In order for education innovations to succeed, systemic approaches and the collaboration of all stakeholders, including teachers, are required (Vrasidas & Glass, 2005). The concept of technology integration does not mean putting technological tools in the classroom where the emphasis is only on technology per se (Smaldino, Lowther, & Russell, 2008) and it is not only the use of technology to support traditional methods of teaching. It is rather the integration of technology where the traditional teacher-centered approach is replaced with a new approach where learners use the technology to learn with and through computers (Du Plessis & Webb, 2012). When it comes to the introduction of technology into the classroom, teachers are the most affected because there will be paradigm shift in teaching and learning. Their willingness to meet the new demands for implementing curriculum will determine the success of the process.

Researchers attributed teachers' negative attitudes towards computers to lack of knowledge, skill and/or experience of computers. Summers (1990) confirmed that a key reason for teachers' negative attitudes toward computers is their lack of knowledge and experience in using computers. Also, Al-Oteawi (2002) found that most teachers who showed negative or neutral attitudes toward the use of ICT in education lacked knowledge and skill about computers that would enable them to make "informed decision". He, therefore, suggested that teachers should have adequate training programs to develop their knowledge and skill. Mooij and Smeets (2001) indicated that teachers' lack of confidence in their ability to handle computers may hinder their willingness to introduce technology in their classrooms. They reported in their study that the main reason teachers give for not using ICT is that they are not familiar with ICT or they feel unsure about it.

On the other hand, computer competence does not always account for positive attitudes towards computers. Sometimes, teachers report positive attitudes toward computers but indicate that they lack the skills necessary for using them effectively in the classroom Na (1993). That is partly why some studies did not find any considerable relationship between teachers' attitude and competence (e.g., Hendricks, 1998). However, many studies indicate that teachers' attitudes towards ICT are directly related to their level of computer competence.

Yildirim (2000) pointed out that inadequate pre-service and in-service training is another obstacle for many teachers to integrate technology in their classroom teaching. There is a large amount research in the literature that supports the same point that teachers should be given effective, timely and continuous training to promote technology in their teaching (Wilson, Notar, & Yunker, 2003).

3. Methodology

The survey research design was employed for the study. One of the common methodologies used in ICT research is survey research. It is widely used as a method owing to the nature of the ICT field that involves multiple interests of public, infrastructure and technologies associated with it. Kerlinger (1973) defined survey research as a study on large and small populations by selecting samples chosen from the desired population and to discover relative incidence, distribution and interrelations. The ultimate goal of survey research is to learn about a large population by surveying a sample of the population; thus, we may also call it descriptive survey. In this method, a researcher poses a series of questions to the respondents, summarizes their responses in percentages, frequency distribution and some other statistical approaches. Survey research typically employs face-to-face interviews, telephone interviews or the common approach using questionnaires. Basically, information is obtained by asking respondents questions by using interviews or questionnaires.

The population consisted of 38 tutors of Atebubu College of Education. This number was made up 33 (86.8%) males and 5(13.2%) females. This number of tutors was used for the study because they constituted the academic teaching staff of the college. Questionnaire was given to the tutors to solicit data from them regarding the problems they faced in their quest to integrate ICT into the teaching and learning process.

The analysis of the data was done using SPSS (Statistical Package for the Social Sciences). Descriptive statistics was used by way of frequency counts and percentages to analyse responses received from the tutors. Descriptive survey was chosen because its advantage of producing good responses from a wide range of people. It also provides a meaningful picture of events and seeks to explain people's opinion and behaviour on the basis of data gathered at the time of data collection.

4. Presentation of Data and Analysis

Gender	Frequency (F)	Percentage (%)
Male	33	86.8
Female	5	13.2
Total	38	100

Table 1: Gender Distribution of Respondents
Source: Fieldwork Survey, 2018

Table 1 shows the gender distribution of the respondents. 33 (86.8%) of the tutors were males while the remaining 5(13.2%) were females.

Gender	Frequency (F)	Percentage (%)
Yes	2	5.3
No	30	78.9
Not too sure	6	15.8
Total	38	100

Table 2: Adequate Professional Development of Tutors on the Integration of
Technology into the Curriculum
Source: Fieldwork Survey, 2018

Tutors were asked as to whether or not they felt they had received adequate professional development on the Integration of technology into their curriculum. Their responses are shown in Table 2. 2 (5.3%) of the tutors responded in the affirmative and 30 (78.9%) responded in the negative. However, 6(15.8%) tutors indicated that they were too sure about that.

It is evident from the data that majority of the tutors felt they had not received adequate professional development on the Integration of technology into their curriculum. This means that most of the tutors did not have adequate professional competence to integrate ICT into the curriculum.

Item	Frequency (F)	Percentage (%)
Smart phones	34	89.5
Tablets	5	13.2
Laptop computers	15	39.5
Desktop computers	10	26.3

Table 3: Number of Tutors Who Possess and Use the ICT Tools Below:
Source: Fieldwork Survey, 2018

Table 3 shows data about the number of tutors who owned and used some ICT tools. It can be seen from the table that 34 (89.5%) tutors responded that they possessed and used smart phones and 5 (13.2%) indicated that they possessed and used tablets. 15 (39.5%) tutors said that they owned and used laptop computers, while 10 (26.3%) tutors answered that they possessed and used desktop computers.

Data from the table revealed that majority of the tutors used smart phones whiles a few used tablets, laptops and desktop computers.

Items	Cannot Use/None	Low	Moderate	High	
	Frequency/ Percentage	Frequency/ Percentage	Frequency/ Percentage	Frequency/ Percentage	Total (%)
a) Windows or other Operating systems	8(21.1)	20(52.6)	6(15.8)	4(10.5)	38(100)
b) File handling (Creating/opening files, etc.)	9(23.7)	21(55.3)	4(10.5)	4(10.5)	38(100)
c) Databases	35(92.1)	1(2.6)	-------	2(5.3)	38(100)
d) Spreadsheets	20(52.6)	10(26.3)	5(13.2)	3(7.9)	38(100)
e) Word Processing	4(10.5)	10(26.3)	18(47.4)	6(15.8)	38(100)
f) Presentation Software	17(44.7)	6(15.8)	10(26.3)	5(13.2)	38(100)
g) Web Search Engines (Google, etc.)	7(18.4)	11(28.9)	15(39.5)	5(13.2)	38(100)
h) Web Authoring tools	36(94.7)	-------	-------	2(5.3)	38(100)
i) Programming Languages (e.g. Java)	36(94.7)	-------	-------	2(5.3)	38(100)

Table 4: Tutors' Skill Level
Source: Fieldwork Survey, 2018
Note: Bold Values Represent the Largest Values in Each Category
The Percentage Responses are Stated Beside (I.E. at the Right Side) the Number of Respondents in Each Cell

Tutors were asked to indicate their skill level in dealing with Windows or other operating systems, file handling (Creating/opening files, etc.), Databases, Spreadsheets, Word Processing, Presentation software, Web Search Engines (Google, etc.), Web Authoring tools and programming languages. Their responses are shown in table 4. Majority of the tutors indicated that they had low level of skill in Windows or other operating systems (52.6%) and file handling (55.3%). On the other hand, most of the tutors reported that they did not have any skill at all in dealing with the following: Databases (92.1%), Spreadsheets (52.6%), Presentation software (44.7%), Web Authoring tools (94.7%) and programming languages (94.7%). Again, many tutors said they had moderate skill in Word processing (47.4%) and Web search engines (39.5%).

It can be concluded from the data that most tutors lacked the requisite skills in dealing with many ICT applications such as such as Databases, Spreadsheets, Presentation software, Web authoring tools and Programming languages.

Items	Not at All	Small Extent	Moderate Extent	Large Extent	
	Frequency/ Percentage	Frequency/ Percentage	Frequency/ Percentage	Frequency/ Percentage	Total (%)
The use of computers in education increases the success of students	-------	-------	18(47.4)	20(52.6)	38(100)
I would like to teach in a class where every student works with a computer	-------	-------	21(55.3)	17(44.7)	38(100)
The use of computers in education diminishes students' creativity	29(76.3)	6(15.8)	3(7.9)	-------	38(100)
Computers increase the quality of education	-------	-------	8(21.1)	30(78.9)	38(100)
Using computers in education leads students to laziness	20(52.6)	10(26.3)	8(21.1)	-------	38(100)
There should be a quick transition in utilizing computers in education	-------	9(23.7)	9(23.7)	20(52.6)	38(100)
The use of computers in education adds dynamism in education	-------	2(5.3)	6(15.8)	30(78.9)	38(100)
Using computers in the classroom makes teachers passive	26(68.4)	9(23.7)	3(7.9)	-------	38(100)

Table 5: Tutors' Perception about ICT Use in Teaching and Learning
Source: Fieldwork Survey, 2018
Note: Bold Values Represent the Largest Values In Each Category.
The Percentage Responses Are Stated Beside (I.E. At The Right Side) the Number of Respondents in Each Cell

Tutors were asked of their perception about the use of ICT in teaching and learning. Their responses are shown in Table 5. Majority of the tutors said they believed in the following to a large extent: the use of computers in education increases the success of students-52.6%, computers increase the quality of education-78.9%, there should be a quick transition in utilizing computers in education-52.6% and the use of computers in education adds dynamism in education-78.9%. On the other most tutors disagreed with the following statements: the use of computers in education diminishes students' creativity-76.3%, using computers in education leads students to laziness-52.6% and using computers in the classroom makes teachers passive-68.4%. 55.3% of the tutors also indicated that they would like to teach in a class where every student works with a computer.

It clears from the table that tutors had a positive perception about the use of ICT in teaching and learning. They believed that the use of computers in education adds dynamism, increases the success of students as well as the quality of education and there should be a quick transition in utilizing computers in education.

Items	Not At All	Small Extent	Moderate Extent	Large Extent	
	Frequency/ Percentage	Frequency/ Percentage	Frequency/ Percentage	Frequency/ Percentage	Total (%)
I don't know how to incorporate technology and still teach content standards	3(7.9)	3(7.9)	4(10.5)	28(73.7)	38(100)
I don't think I have enough time to prepare for using technology	5(13.2)	1(2.6)	4(10.5)	28(73.7)	38(100)
Internet connection not available in the school	-------	-------	-------	38(100)	38(100)
Insufficient number of computers in the ICT lab.	2(5.3)	3(7.9)	7(18.4)	26(68.4)	38(100)
Lack of professional development on how to integrate technology	2(5.3)	-------	-------	36(94.7)	38(100)

Table 6: The Extent to Which Tutors Believe the Following are OBSTACLES to Integrating Technology:
Source: Fieldwork Survey, 2018
Note: Bold Values Represent the Largest Values in Each Category
The Percentage Responses are Stated Beside (I.E. at the Right Side) the Number of Respondents in Each Cell

Table 6 shows tutors' responses when they were asked to indicate the extent to which they believed the listed items in the table were obstacles to integrating technology in their subject areas. Majority of the tutors responded as follows: I don't know how to incorporate technology and still teach content standards-73.7%, I don't think I have enough time to prepare for using technology-73.7%,Internet connection not available in the school-100%, insufficient number of computers in the ICT laboratory 68.4% and lack of professional development on how to integrate technology-94.7%.

Data from the table indicate that the obstacles faced by tutors in integrating technology in their subject areas to a large extent were lack of knowledge on how to incorporate technology and still teach content standards, inadequate time to use technology, lack of Internet connection, insufficient number of computers in the ICT lab and lack of professional development on how to integrate technology.

Items	Yes	No	
	Frequency/Percentage	Frequency/ Percentage	Total (%)
Basic use of the computer hardware and software	36(94.7)	2(5.3)	38(100)
File management	36(94.7)	2(5.3)	38(100)
Email	25(65.8)	13(34.2)	38(100)
Word Processing	30(78.9)	8(21.1)	38(100)
Spreadsheets	35(92.1)	3(7.9)	38(100)
Databases	36(94.7)	2(5.3)	38(100)
Presentation software	34(89.5)	4(10.5)	38(100)
Integrating ICTs into teaching and learning	38(100)	-------	38(100)
Using the Internet	33(86.8)	5(13.2)	38(100)
Using social media for teaching and learning	37(97.4)	1(2.6)	38(100)

Table 7: Areas Tutors Would Like/Need Training for Teaching and Professional Use
Source: Fieldwork Survey, 2018
Note: Bold Values Represent the Largest Values in Each Category
The Percentage Responses are Stated Beside (I.E. at the Right Side) the Number of Respondents in Each Cell

When asked about areas where tutors would like/need training for teaching and professional use, their responses indicated that majority of them would need training in basic use of computer hardware and software-94.7%, file

management-94.7%, email-65.8%, Word processing-78.9%, Spreadsheets-92.1%, Databases-94.7%, Presentation software-89.5%, integrating ICTs into teaching and learning-100%, using Internet-86.8% and using social media for teaching and learning-97.4%.

Results from table 7 show that majority of the tutors would like/need training inbasic ICT or computer applications such as File management, email, Word processing, Spreadsheets, Databases, Presentations, integrating ICTs into teaching and learning, using the Internet and using social media for teaching and learning.

5. Summary of Findings

Based on the analysis of the data gathered, the following major findings were gathered from the study:

- Majority of the tutors (78.9%) indicated that they had not received adequate professional development on the Integration of technology into their curriculum, which means that most of them did not have adequate professional competence to integrate ICT into the curriculum.
- Most of the tutors owned and used smart phones (89.5%), whiles a few used tablets (13.2%), laptop (39.5%) and desktop (26.3%) computers.
- A large number of the tutors lacked the requisite skills needed to deal with ICT applications such as Databases, Spreadsheets, Presentation software, Web authoring tools and Programming languages (92.1%, 52.6%, 44.7%, 94.7% and 94.7% respectively).
- Most of the tutors had a positive perception about the use of ICT in teaching and learning. They believed that the use of computers in education adds dynamism (78.9%), increases the success of students (52.6%) as well as the quality of education (78.9%) and they also indicated that there should be a quick transition in utilizing computers in education (52.6%).
- Many tutors indicated that the obstacles they faced in integrating technology into their subject areas were lack of knowledge on how to incorporate technology and still teach content standards (73.7%), inadequate time to use technology (73.7%), lack of Internet connection (100%), insufficient number of computers in the ICT lab (68.4%)and lack of professional development on how to integrate technology (94.7%).
- Majority of the tutors said they would need training in basic ICT or computer applications such asFile management, email, Word processing, Spreadsheets, Databases, Presentation software, integrating ICTs into teaching and learning, using the Internet and using social media for teaching and learning (94.7%, 65.8%, 78.9%, 92.1%, 94.7%, 89.5%, 100%, 86.8% and 97.4% respectively).

6. Conclusion

The integration of ICT in the Ghanaian education systems could be seen as a major step in promoting innovation. However, the educational system currently is bedeviled with myriad of problems. The findings of this study revealed a number of them. Even though tutors had a good perception about the use of ICT to improve teaching and learning, they lacked the requisite skills or professional competence to integrate ICT in their subject areas. Internet connection and other resources such as computers also contributed to ICT integration problems.

7. Recommendations

Based on the findings of the study, we made some recommendations as follows;

- All Colleges of Education Tutors in Ghana should be given adequate training in computer applications or programs in order to increase their competence levels.
- There should be an ICT integration policy framework for all Colleges of Education in Ghana. This will provide guidance as to how ICT is to be integrated into the curriculum.
- Internet connection should be provided for all Colleges of Education in the country to enable tutors and students access resources on the Internet.
- State-of-the-art ICT laboratories should be provided for all Colleges of Education in the country as this will enable tutors and students to have access to computers.

8. Limitation of the Study

All 38 respondents of this study were only tutors from Atebubu College of Education and their responses might not necessarily reflect the views of all tutors in other Colleges of Education across the country.

9. References

i. Vrasidas, C. & Glass, C V. (2005). (Eds.). Online professional development for teachers.
ii. Greenwich, CT: Information Age Publishing, Inc.
iii. Cagiltay, K., Cakiroglu, J., Cagiltay, N. & Cakiroglu, E. (2001). Teacher's Perspectives about the Use of Computer in Education. Hacettepe University Journal of Education. 21(1), 19-28.
iv. Sicilia, C. (2005). The Challenges and Benefits to Teachers' Practices in Constructivist
v. Learning Environments Supported by Technology. Unpublished master's thesis, McGill University, Montreal.
vi. British Educational Communications and Technology Agency (Becta) (2004). A review of the research literature on barriers to the uptake of ICT by teachers Retrieved, August 13, 2008, from http://www.becta.org.uk.
vii. Empirica (2006). Benchmarking access and use of ICT in European schools 2006: Final report from Head Teacher and Classroom Teacher Surveys in 27 European countries. Germany: European Commission.

viii. Korte, W. B., & Hüsing, T. (2007). Benchmarking access and use of ICT in European

ix. schools 2006: Results from Head Teacher and A Classroom Teacher Surveys in

x. 27 European countries. ELearning Papers, 2(1), 1-6.

xi. Pelgrum, W.J. (2001). Obstacles to the integration of ICT in education: Results from a

xii. Worldwide Educational Assessment. Computers & Education 37 (2001), 163-178.

xiii. Toprakci, E. (2006). Obstacles at integration of schools into information and communication technologies by taking into consideration the opinions of the teachers and principals of primary and secondary schools in Turkey. Journal of Instructional Science and Technology (e-JIST), 9(1), 1-16.

xiv. Toprakci, E. (2006). Obstacles at integration of schools into information and communication technologies by taking into consideration the opinions of the teachers and principals of primary and secondary schools in Turkey. Journal of Instructional Science and Technology (e-JIST), 9(1), 1-16.

xv. Al-Alwani, A. (2005). Barriers to Integrating Information Technology in Saudi Arabia Science Education. Doctoral dissertation, the University of Kansas, Kansas.

xvi. Ozogul, G. (2002). Educational organizations as learning organizations. Arizona Educational

xvii. Research Organization Annual Conference, Tempe, AZ.

xviii. Albirini, A. A. (2006). Teacher's attitudes toward information and communication technologies:

xix. The case of Syrian EFL teachers. Journal of Computers and Education, 47,373-398. doi: 10.1016/j.compedu.2004.10.013

xx. Pelgrum, W.J. (2001). Obstacles to the integration of ICT in education: Results from a

xxi. Worldwide Educational Assessment. Computers & Education 37 (2001), 163-178.

xxii. Haddad, W. D. & Drexler, A.D. (2002). The dynamics of technologies for education. In

xxiii. W. Haddad & Drexler, A. D. (Eds.) Technologies for education: Potentials, parameters, and prospects. Washington DC: Academy for Educational Development.

xxiv. Heeks, R. (1999). Information and communication technologies, poverty and development (Working Paper Series, Paper No. 5). Manchester, England: Institute for Development Policy and Management.

xxv. Hakkarainen, K., Ilomaki, L., Lipponen, L., Muukkonen, H., & Rahikainen, M. (2000).

xxvi. Students' skills and practices of using ICT: Results of a national assessment in Finland, Computers and Education, 34(2), 103-117.

xxvii. Asamoah, D. A. (2008). Learning through ICTs. Available at:

xxviii. http://www.digitallearning.in/ interview/ interview-details.asp?

xxix. Benzie, D. (1995). IFIP Working group 3.5: using computers to support young learners. In J. D.Tinsley, & T. J. van Weert (Eds.), World conference on computers in education VI: WCCE_ 95 liberating the learner (pp. 35–42). London: Chapman & Hall.

xxx. Boakye, K. B. & Banini, D.A. (2008). Teacher ICT readiness in Ghana. In K. Toure,

xxxi. Watson, D. M. (1998). Blame the techno centric artifact! What research tells us about problems inhibiting teacher use of IT. In G. Marshall, & M. Ruohonen (Eds.),

xxxii. Capacity Building for IT in Education in Developing Countries (185-192).

xxxiii. London: Chapman & Hall.

xxxiv. 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), 200-2.

xxxv. Pelgrum, W.J. (2001). Obstacles to the integration of ICT in education: Results from a

xxxvi. Worldwide Educational Assessment. Computers & Education 37 (2001), 163-178.

xxxvii. Al-Oteawi, S. M. (2002). The perceptions of Administrators and teachers in utilizing information technology in instruction, administrative work, technology planning and staff development in Saudi Arabia. (Doctoral dissertation, Ohio University,2002).

xxxviii. Bulkeley, W. (1993). Computers failing as teaching aids. In T. Cannings & L. Finkel(Eds.), The Technology Age Classroom (pp. 8-10). Wilsonville, Oregon: Franklin,

xxxix. Beedle & Associates, Inc.

xl. Christensen, R. (1997). Effect of technology integration education on the attitudes of teachers and their students.

xli. [URL], http://www.tcet.unt.edu/research/dissert/rhondac/index.htm.

xlii. Hendricks, S. (1998). The relationship between in-service teachers' beliefs about computers and their levels of computer use. (Doctoral Dissertation University of

xliii. Windsor (Canada), 1998). ProQuest Digital Dissertations (UMI No. AAT

xliv. MQ52570).

xlv. Honey, M., & Moeller, B. (1990). Teachers' beliefs and technology integration: different values, different understandings (Report No. 6). New York: Center for

xlvi. Technology in Education.

xlvii. Isleem, M. (2003). Relationships of selected factors and the level of computer use for instructional purposes by technology education teachers in Ohio public schools: a statewide survey. Doctoral dissertation, the Ohio State

xlviii. University.

xlix. Knezek, G. & Christensen, R. (2002). Impact of new information technologies on teachers and students. Education and Information Technologies 7(4), 369–376.

l. Mooij, T., & Smeets, E. (2001). Modeling and supporting ICT implementation in

li. Secondary Schools. Computers & Education, 36, 265–281.

lii. Na, S. I. (1993). Variables associated with attitudes of teachers toward computers in

liii. Korean vocational agriculture high schools. (Doctoral dissertation, The Ohio State

liv. University, 1993).

lv. Pelgrum, W.J. (2001). Obstacles to the integration of ICT in education: Results from a

lvi. Worldwide Educational Assessment. Computers & Education 37 (2001), 163-178.

lvii. Spiegel, A.J. (2001). The computer ate my grade book: understanding teachers' attitudes toward technology. Retrieved on 18 October, 2003 from:

lviii. http://www.iona.edu/cs/gradpapers/2001spiegelPap.pdf.

lix. Summers, M. (1990). New student teachers and computers: an investigation of experiences and feelings. Educational Review, 42(3), 261-271.

lx. Wilson, J.D., Notar, C.C., & Yunker, B. (2003). Elementary in-service teacher'suse of computers in elementary classroom.Journal of Instructional Psychology, 30(4), 256-263.

lxi. Yildirim, S. (2000). Effects of an educational computing course on pre-service and in service teachers: A discussion on attitudes and use. Journal of Research on Computing in Education 32(4), 479-495.

lxii. Smaldino, S. E., Lowther, D. L., & Russell, J. D. (2008). Instructional technology and media for learning (9th ed.). Columbus, OH: Pearson.

lxiii. Du Plessis, A., & Webb, P. (2012). Teachers' perceptions about their own and their schools' readiness for com-puter implementation: A South African case study. Turkish Online Journal of Educational Technology - TOJET,

lxiv. 11(3), 312–325.

lxv. Leedy, P.L. (1993), Practical research, planning and designing. 5th Edition, New York; Macmillan.

lxvi. Kerlinger, F.N. (1973). Foundations of Behavioural Research. New York: Holt, Reinehart and Winston.